Academic Program Description Form

University Name: Al-Nahrain University Faculty/Institute: College of Science Scientific Department: Department of Mathematics and Computer Applications Academic or Professional Program Name: Bachelors Final Certificate Name: Bachelors of Mathematics and Computer Applications Academic System: Semester Description Preparation Date: 2024 File Completion Date: 20/3/2024

Signature: Head of Department Name:

Head of Department Name: Assist.Prof.Dr. Fatimah Al-Taie Date: 20/3/2024

Signature: Scientific Associate Name: Assist.Prof. Dr. Manaf Adnan Saleh Date: 14/4/ 2024

The file is checked by: Dr. Oreobe Nodhun Harbi

Department of Quality Assurance and University Performance Director of the Quality Assurance and University Performance Department: Date: 14.4.2024

Signature:

Approval of the Dean

1. Program Vision

1. That the program be pioneering and distinguished at the Arab and international levels.

2. The program must be internationally recognized and accredited in providing high quality in the field of applied mathematics, statistics, and operations research.

2. **Program Mission**

The mission of the program is for the student to acquire basic knowledge and concepts in mathematical sciences and computer applications that will help him accomplish work that requires knowledge of mathematical relationships, as well as the use of applied mathematical methods and programs in solving some of the life problems facing society. In this way, the connection between applied academic sciences is also achieved in accordance with the needs of society. And development in Iraq through the realization that the specialty of mathematics and computer applications is of great importance in planning and decision–making through analyzing the data collected by the mathematician in all cases, for example, banking, insurance, the Ministry of Defense, transportation, medicine, and engineering, in a way that serves and leads to the development of the aforementioned fields.

3. Program Objectives

The main goal is to equip students with the basic concepts and titles for studying mathematics for the initial stages, as the program focuses on the following: A- Demonstrate an appropriate understanding of the basic set of mathematics and computer applications knowledge and the appropriate skill for processing of this knowledge, including its application in solving problems.

B– Apply basic mathematics concepts and computer applications through the use of analytical and computer methods tools, techniques, and judicious use of logical arguments.

C- Analyzing issues by formulating them mathematically.

D- Developing engineering modeling in system design and development, including the adoption of new technologies and adaptation to it.

E– Communicating the solution of applied mathematical and computational problems to a group of audiences in written and oral form.

F- Preparing graduates for jobs as professional mathematicians, especially in applied mathematics topics.

4. Program Accreditation

Does the program have program accreditation? And from which agency? –No

5. Other external influences

Is there a sponsor for the program?

-There isn't any.

6. Program Structure											
Program Structure	Number of Courses	Credit hours	Percentage	Reviews*							
Institution Requirements	12	17	11.80%								
College Requirements	5	15	10.42%								

Department Requirements	31	112	77.78%	
Summer Training				
Other				

* This can include notes whether the course is basic or optional.

7. Program	n Description					
Year/Level	Course Code	Course Code Course Name				
			theoretical	practical		
Stage One	MATH 141	Calculus I	4			
	MATH 142	Calculus II	4			
	MATH 112	Finite Mathematics	4			
	MATH 114	Mathematical Foundation I	4			
	MATH 115	Mathematical Foundation II	4			
	MATH 113	Analytic Geometry	4			
	UREQ 110	English Language	2			
	UREQ 151	Programming Fundamentals	2	3		
	UREQ 150	Introduction to Computer	2	3		
		Science				
Stage two	MATH 210	Advanced Calculus I	4			
	MATH 211	Advanced Calculus II	4			
	COMP 251	Programming I	2	3		
	COMP 253	Computer Graphics	2	3		
	MATH 212	Linear Algebra I	4			
	MATH 213	Linear Algebra II	4			
	MATH 214	Optimization I	2	3		
	MATH 243	Probability and Statistics	3			
	MATH 216	Solution of ODE	4			
	CHEM 271	General Chemistry	2			
	URIQ 201	Arabic Language I	2			
	URIQ 202	Arabic Language II	2			
Third Stage	MATH 316	Applied Mathematics	4			
	MATH 319	Optimization II	2			

	MATH 312	Abstract Algebra I	4	
		Abstract Algebra I	4	
	MATH 313	Abstract Algebra II	4	
	MATH 317	Fuzzy Set	3	
	MATH 314	Numerical Analysis I	2	3
	MATH 315	Numerical Analysis II	2	3
	MATH 310	Real Analysis I	4	
	MATH 311	Real Analysis II	4	
	UREQ 420	Human rights	1	
	MATH 318	Theory of ODE	4	
Stage Four	MATH 411	Complex Analysis I	4	
	MATH 412	Complex Analysis II	4	
	MATH 413	Mathematical Statistics I	4	
	MATH 414	Mathematical Statistics II	4	
	MATH 415	Topology I	4	
	MATH 416	Topology II	4	
	MATH 430	Topics in Pure Mathematics	4	
	MATH 410	PDE	4	

8. Expected learn	8. Expected learning outcomes of the program									
Knowledge										
Learning Outcomes 1	1- Creating a strong foundation for the student in the subject of									
	pure and applied mathematics.									
	2- Creating advanced thinking in understanding most mathematics									
	topics.									
	3- The student knows how to use computer programs to find									
	solutions to mathematical equations and enables him to read the									
	literature of the specialized scientific subject.									
	4- The student will acquire as much specialized terminology as									
	possible and be able to convert practical applications to									
	mathematical equations.									
Skills										
Learning Outcomes 2	1- Injecting a fair amount of specialized information, terminology,									
	and equations related to the scientific subject.									
	2- The student gains experience in using computer programs and									
	experience in solving many life problems.									

	3- Urging the student to build a self-study plan and teaching them
	how to progress towards achieving this plan through self-learning.
	4- To be guided by the department head and its council in this
	regard and to benefit from the experience of professors with long
	experience in the field of personal development.
Ethics	
Learning Outcomes 4	1- Increasing the student's cognitive and scientific awareness.
	2- Enabling the student to use mathematical concepts, both applied
	and pure.
	3- Understanding and solving life applications of various types.
	4- The student's knowledge of linking mathematical concepts to
	each other.

9. Teaching and Learning Strategies

The teaching and learning strategy is a set of tools and practices used by both the teacher and the student in order to comprehend the academic material or course in the best possible way.

This depends on two basic factors: good transmission by the teacher of the subject, which is supported by teaching strategies, and good reception by the student, which is supported by learning strategies.

Teaching strategies include a set of organized plans and methods followed by the subject teacher in order to guide students towards achieving learning goals, including cognitive goals for theoretical subjects, skill goals in proofs in a mathematical manner through sequential and ordered steps, and emotional and value goals through sensory perception of the theorems' statements and results and then their proofs and how to deal with it; that is done through specific teaching and learning methods in order for the student to acquire transferable general and qualifying skills, this is represented by:

1. Giving interactive lectures and display on screen.

- 2. Stimulating brain-storm thinking among students and use of electronic computers.
- 3. Support the work via blended learning.

10. Evaluation methods

- Daily participation.

2- Daily exams.

3- Monthly exam.

- 4- Reports.
- 5- Discussion sessions (seminars).
- 6- Graduation projects.
- 7- Homework.

11. Faculty											
Faculty Members											
Name & Academic	Specializatio	n	Special		Number of th	e teaching					
Position			Requirements	•	staff						
			(if applicable)								
	General	Special			Staff	Lecturer					
Professor Dr. Ali Hasan	Mathematics	Applied									
Fayadh		Mathematics /									
		Integral			v						
		transform									
Professor Dr. Osama	Mathematics	Numerical									
Hameed Mohammed		Analysis /									
		Approximation			v						
		Theory									
Associate Professor Dr.	Mathematics	Fuzzy set									
Fadhil Subhi Fadhil		Theory and			V						

		1	1		
		its			
		Applications			
	NA-41 C	Francis 1			
Associate Professor Dr.	Mathematics	Functional		\checkmark	
Ahlam Jameel Khaleel		Analysis			
Associate Professor Dr.	Mathematics	Functional		,	
Munaf Adnan Salih		Analysis		\checkmark	
		· · · · · · · · · · · · · · · · · · ·			
Associate Professor	Mechanical	Operations		\checkmark	
Saad Muhsin Salman	Engineering	Research		·	
Lecturer Dr. Ahmed	Mathematics	Numerical			
	Mainemalics			\checkmark	
Ayoob Yousif		Control			
Lecturer Dr. Amina	Mathematics	Functional		1	
Rasim Mohammed		Analysis		\checkmark	
Lecturer Dr. Akram	Mathematics	Applied		\checkmark	
Abbas Jasim		Mathematics		•	
Lecturer Dr. Zainab	Mathematics	Applied			
Riyadh Shakir	Mathematics	Mathematics		\checkmark	
Niyaun Shakii		Mainemalics			
Lecturer Dr. Ibtisam	Mathematics	Dynamical			
Kamil Hannan		Systems		v	
Lecturer Dr. Fatima	Mathematics	Control		\checkmark	
Sahib Kadhim		Systems			
Lecturer Dr. Omar	Mathematics	Applied			
Ismaeel Khaleel		Mathematics		\checkmark	
		maaromaaroo			
Lecturer Dr. Ayat Abdul-	Mathematics	Algebraic			
Aaly Niemah		statement		\checkmark	
		theory			
	Motherset	Complex			
Lecturer Dr. Iman Abdul-	Mathematics	Complex		\checkmark	
Wahab Husain		Analysis			
Lecturer Dr. Rana Majid	Arabic	Arabic			
Hameed	Language	Language		\checkmark	
		Grammer			

[1	1	1	1	
Lecturer Dr. Muna Salih	Mathematics	Stability of			
Abbas		Fuzzy		\checkmark	
		Differential			
		Equations			
Lecturer Raneen Zaid	Mathematics	Mathematical		✓	
Hamoud		Statistics		V	
Lecturer Dunya Muhyee	Mathematics	Semi-Analytic			
Haydar		Methods for			
		Solving		\checkmark	
		Differential			
		Equations			
Lecturer Wurood Riyadh	Mathematics	Numerical			
Abdul-Husain		Solutions of			
		Fractal partial		\checkmark	
		Differential			
		Equations			
Assistant Lecturer	Mathematics	Linear			
Yasemin Mueen		Programming		\checkmark	
Muhammed					
Assistant Lecturer	Computer	Computer		✓	
Muhammed Qasim Ali	Science	Graphics		•	
Assistant Lecturer	Mathematics	Numerical			
Haneen Abdul-Kareem		Solutions of			
Ameen		Partial		\checkmark	
		Differential			
		Equations			
Assistant lecturer	Mathematics	Mathematical			
Shayma Abdul-Sattar		Statistics		\checkmark	
Younis					
Assistant Lecturer Batool	Mathematics	Approximate			
Emkhailif Askar		Solutions of			
		Integro-		\checkmark	
		Differential			
		Equations			

Assistant Lecturer	Mathematics	Algebra			
Ruqayeh Saady Hashim	maaromaaroo	,		\checkmark	
Assistant Lecturer Abbas	Mathematics	Ordinary			
Ibrahim Khlayf		Differential		\checkmark	
		Equations			
Assistant lecturer Athraa	Mathematics	Numerical			
Abdul-Salam Jasim		Solutions of			
		Boundary		\checkmark	
		Value			
		Problems			
Assistant Lecturer Farah	Mathematics	Integro-			
Lateef Jewy		Differential		\checkmark	
		Equations			
Assistant Lecturer Nabaa	Mathematics	Bio-		1	
Hussain Fakhry		mathematics		v	
Assistant Lecturer Nibras	Mathematics	Algebra		√	
Yasir Khudhair				v	
Assistant Lecturer Mays	Mathematics	Algebra			
Majid Muhammed				\checkmark	
Assistant Lecturer	Mathematics	Mathematical			
Lamyaa Khalid Hussain		Statistics		v	
Assistant Lecturer Eman	Mathematics	Mathematical		√	
Khalid		Statistics		¥	

Professional Development

Mentoring new faculty members

1– Integrating new recruits into the educational process by assigning them to deliver lectures in the Mathematics Department and other departments, in addition to committees and administrative work.

2- Involving them in scientific activities (conferences, training courses, workshops, and seminars).

3- Creating joint research groups.

4– Educational, professional, and academic qualification for new faculty members, including informing them of the goals, learning outcomes, and plans drawn up to achieve them.

Professional development of faculty members

1- Continuous academic development for faculty members to keep pace with modern developments in the field of specialization.

2- Communication between faculty members, the supporting staff, and the supporting technical and administrative staff.

3- Communication between faculty members and students.

4– The existence of an integrated system for periodically evaluating faculty members and promoting them.

5- The stability of the teaching staff and the rate of continuity in their work.

6- Participation of faculty members and supporting staff in conferences, scientific activities, and community service.

7- The freedom and responsibility of faculty members in evaluating and developing the curriculum.

8– Provides the environment and time for faculty members and supporting staff for professional development and research activity.

12. Acceptance Criterion

Admission is through direct application to the Department of Mathematics and Computer Applications according to the student's Application Guide.

13. The most important sources of information about the program

-The Student's Handbook (Guide) to the central acceptance program issued by the Ministry of Higher Education and Scientific Research.

-The College of Science Handbook (Guide).

14.

Program Development Plan

- 1– Twinning between the department and the peer departments in the other Iraqi, regional and international Universities.
- 2- Achieving the connection between the academic and applied sciences according to the society needs and according to the development centers in Iraq.
- 3– Initiating new subdivisions of the department, namely: Statistics, operations Research, and Pure Mathematics.

			Pro	ogram	Skills	s Outl	ine									
				Required program Learning outcomes												
Year/Level	Course	Course Course Name Code	Basic	Knov	vledge			Skill	S			Ethics				
			or option al	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	
Stage One	MATH 141	Calculus I	Basic	X	Х			Х				Х	Х			
	MATH 142	Calculus II	Basic	X	Х			Х				Х	Х			
	MATH 112	Finite Mathematics	Basic	X	Х		Х	Х				Х	Х	Х	Х	
	MATH 114	Mathematical Foundation I	Basic	X	Х	X		Х				Х	X	X		
	MATH 115	Mathematical Foundation II	Basic	Х	Х	Х		Х				Х	X	Х		
	MATH 113	Analytic Geometry	Basic	X	Х			Х	Х	X						
	UREQ 110	English	Basic	X	Х			Х	Х	Х		Х	Х	Х		
	UREQ 151	Programming Fundamentals	Basic	X	Х			Х	X	Х		Х				

	UREQ 150	Introduction to computer	Basic	X	X	X		X	X	X		Х			
Stage two	MATH 210	Advanced Calculus I	Basic	X	X	X	X	X	X	X		Х	Х		
	MATH 211	Advanced Calculus II	Basic	X	Х	Х	Х	X	X	X		X	X		
	COMP 251	Programming I	Basic	X	Х			X	X			Х			
	COMP 253	Computer Graphics	Basic	Х	Х	Х	Х	X	Х	Х	Х	X	Х		
	MATH 212	Linear Algebra I	Basic	X	Х			X							
	MATH 216	Solutions of ODE	Basic	X	Х		Х	X				Х	Х	Х	Х
	MATH 213	Linear Algebra II	Basic	X	Х			X							
	MATH 214	Optimization I	Basic	X	Х	Х	X	X	X	X	Х	Х			
	MATH 243	Probability and Statistics	Basic	X	X	X	X	X	X						
	UREQ 201	Arabic Languages	Basic	Х	Х	X	Х	X	X						
	CHEM 271	General Chemistry	Basic	X	X			X				Х	Х	X	

Third Stage	MATH 316	Applied Mathematics	Basic	X	X	Х		Х						
	MATH 319	Optimization II	Basic	X	Х			X			Х	X		
	MATH 312	Abstract Algebra I	Basic	Х	X			X			Х	Х		
	MATH 313	Abstract Algebra II	Basic	Х	Х			X	X	Х	Х	Х	Х	
	MATH 317	Fuzzy Set	Basic	Х	Х			X	X		Х	X	Х	
	MATH 314	Numerical Analysis I	Basic	Х	Х	Х		X	Х		Х	Х		
	MATH 315	Numerical Analysis II	Basic	Х	Х	Х		Х	Х		Х	Х	Х	
	MATH 310	Real Analysis I	Basic	Х	Х	Х	Х	Х	Х		Х			
	MATH 311	Real Analysis II	Basic	Х	Х	Х		Х	Х					
	UREQ 420	Human rights	Basic	Х	Х		Х	Х			Х			
	MATH 318	Theory of ODE	Basic	Х	Х	Х		Х	X					
Stage Four	MATH 411	Complex Analysis I	Basic	Х	Х	X		X	X		Х	Х		
	MATH 412	Complex Analysis II	Basic	X	Х	X		X	X		X	X		

MATH 413	Mathematical Statistics I	Basic	X	X	X	X			X	X		
MATH 414	Mathematical Statistics II	Basic	X	X	X	X	X	X	X	X		
 MATH 415	Topology I	Basic	X	X		Х	X		Х	X		
MATH 416	Topology II	Basic	X	Х		Х			Х	X		
MATH 430	Topics in Pure Mathematics	Basic	X	X	X	Х	X		Х	X	X	
MATH 410	PDE	Basic	X	Х	Х	Х	Х		Х	Х	Х	

• Please tick the boxes corresponding to the individual program learning outcomes under evaluation.

Second Stage

1. Course Name	2:			
		Computer Graphics		
2. Course Code	:			
		COMP253		
3. Semester / Y	ear:			
		2 st semester/2 nd Year		
4. Description I	Preparation	Date:		
		23/3/2024		
5. Available Att	endance Form	ns:		
		Presences		
6. Number of Ci	redit Hours ('	Total) / Number of Units	(Total)	
7. 0	la la fue fe ale la	45 hours /3 units		
		name (mention all, if mo	ore than o	ne name)
		nmed Qasim Ali		
Email: mol	iammed.q.al	i@nahrainuniv.edu.iq		
8. Course Object	tives			
Course • Unde	erstand the con	cept of graphic and its import	tance and a	oplications.
Objectives • Lear	n about the gra	aphics environment in MATLA	B and how t	o use it.
• Usin	g MATLAB plot	tting functions to sketch geom	netric shape	s.
• Meth	ods of plotting	mathematical equations.		
Sket	ch the three-di	mensional curves, surfaces a	nd objects.	
9. Teaching and	Learning St	rategies		
Strategy	1. Lectures			
	2. Practicality			
	3. Exercises (1	nomework)		
10. Course Structure(theoretical)				
Week Hours	Required	Unit or subject name	Learning	Evaluation
Week Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method

3,4,5	5	Understanding the course	Plotting f argument	unctions and its optional is	Prace and	ctical	tical exams, homework attendance and		
6,7,8	3 (6 requirements	Plotting t	he mathematical equation	homework		participate during		
9,10, ²	11 (6	Creating	2D Geometric shapes			lect	ure	
121	15	3) (curves & surfaces) and nd Shapes					
10. Cour	se Struc	ture (Practical)							
Week	Hours	Required Learn	d Learn Unit or subject nar		9	Lea	rnin	Evaluation	
		Outcomes				me	thod	method	
1,2	4	Understanding the course	The (plot) command			Lecture Practic		Quizzes, midterm exams, homework	
3,4,5	6	requirements	Format Plotting Figure Commands			and		attendance and	
6,7,8	6		fplot, ezplot commands. Graphic Properties & Creating 2D sha		hapes	homework		participate during lecture	
9,10,11	6		Other 2D plotting Commands and fin Intersection & tangent points		nd				
1215	8		3D Plottir other obj	ng (sketch curves, surfaces ects)	s and				
Lab. Teach	ning stuff		بن معين/	م.م. رقية سعدي / م.م. يُاسم				م.م محمد قاسم علي/ م م.م. بتول امخيلف / م.	
11. Co	ourse Eva	aluation		p • • • •	<u> </u>		- 1		
	0		0	to the tasks assigne exams, reports etc		the st	uder	nt such as daily	
12. Le	arning a	nd Teaching Re	esource	s					
Required t	textbooks	(curricular books,	if any)						
Main refer	Main references (sources)			MATLAB: An Iı editi		duction Amos G			
Recomme	nded bo	ooks and refe	erences		Call	logo lib	rove		
(scientific	journals, r	eports)		College library					
B-Electror	nic referen	ces, Internet sites		MATLAB Documentation (mathworks.com)					

13	. (Course Name:				
			Programming I			
14	. (Course Code:				
	COMP251					
15	5. Semester / Year:					
	1 st semester/2 nd Year					
16	. I	Description Pr	eparation Date:			
			23/3/2024			
17.	.Availal	ole Attendance	Forms:			
			Presences			
18.	Numbe	r of Credit Ho	urs (Total) / Number of Units	(Total)		
			45 hours/ 3 units			
19	. (Course admin	istrator's name (mention all	, if more that	an one	
	name)					
	Name: Ass. Lect. Mohammed Qasim Ali					
	Email: mohammed.q.ali@nahrainuniv.edu.iq					
20	20. Course Objectives					
Course	Objectiv	es	 the student learns to wind mathematical problem or any other problem. The usage MATLAB function Solve calculus problems 	olems.		
21	. 7	Feaching and L	earning Strategies			
Strateg	У	1. Lecture 2. Practica 3. Exercise				
22. C	ourse S	Structure(theore	etical)			
Week	Hours	Required	Unit or subject name	Learning	Evaluation	
		Learning		method	method	
		Outcomes				
1,2	4		Flowcharts and Algorithms	Lectures,	Quizzes, midte	
3	2	Understanding	Programming Using Script Files	practical	exams,	
4	2	the	Input & Output Commands	and homework	homework, attendance	
5	2	course requirements	Relational And Logical Operators	nomework		
		requiremento		4	during lecture	
5 6 7,8	2 2 4	requirements	Conditional Statements Conditional Loops		and particip	

9,10	4			Functions Anonymous		
11	2		Functions			
11	_		Subfunctions			
12,13	4		Symbolic Mat	h Programming		
14,15	4		Calculus Prog	gramming		
10. C	ourse S	tructure(praction	cal)			
Week	Hours	Required	Unit or su	bject name	Learning	Evaluation
		Learning			method	method
		Outcomes				
1,2	4			and its properties disp" Statements		
3	2			statement and its properties		Quizzes, midterm
4	2		Relational Op ("and", "or" in MATLAB	erators and Logical . statements)		
5	2		{if - else	eif - else - end}		exams,
	2		and {switch} statements			homework,
6	2	Understanding the course	with {break}	{while loop} statements statement usage	Lectures, practical	attendance and participate
7,8	4	requirements		fined Functions and Functions in MATLAB	homework	
9,10	4		MATLAB Sub			
11	2			ariables and Expressions Id "syms" statements on Functions		during lecture
12,13	4			essions and Equations with		
14,15	4			ramming using d int} statements		
23.	Course	Evaluation				
Distrib	uting th	e score out of 10	0 according	to the tasks assigned	to the studen	t such as daily
prepar	ation, da	aily oral, monthl	y, or writter	n exams, reports etc	:	
24.	Learnir	ig and Teachir	ng Resourc	ces		
Require	ed textbo	oks (curricular bo	ooks, if any)			
Main re	eferences	s (sources)		MATLAB® An Introdu Am	uction with App os Gilat @ 2011	
Recom	mended	books and	references			
(scienti	fic journa	als, reports)		Co	ollege library	
Electro	nic Refei	ences, Websites	i	MATLAB Docu	mentation (ma	thworks.com)
•		,				

r:					
Description Preparation Date:					
Forms:					
rs (Total) / Number of Units (Total)					
strator's name (mention all, if more than one					
dulsattar r					
neem					
dy d					
a Mahrainuiv.edu.ig					
es					
 Study of non-linear programming systems and their solutions. 					
• Study classical optimization and solve systems us					
many methods.numerical optimization and its applications					
earning Strategies					
to provide the students with as much information					
r programming as possible by attending lectures to					
onnection between the students and the lecturer in					
as many real-life statistical applications as possible					
ab.					
some homework and some other additional					
o shared on Google Classroom.					

Week	Hours	Required Learning	Unit or subject	Learning	Evaluation			
		Outcomes	name	method	method			
2-1		4	Definition and classificatior linear programming					
6-3		8	Model building					
9-7		8	Graphical Solution					
11-10		10	Simplex Method					
13-12		14	Duality and Theorem					
15-14		16	Transportation and Assignm					
35.	Course I	Evaluation						
	m exam: 4 kam: 60 n							
36.	Learning	and Teaching Res	ources					
Require	d textboo	ks (curricular books, if	any) Optimization the	Optimization theory and applications by S.S. RAO				
Main re	ferences	(sources)	Operation resea	Operation research by HAMDY A. TAHA				
Recom	mended	books and refe	erences Any website rela	Any website related to our study				
(scienti	ic journals	s, reports…)						
E 1	nic Roforo	nces, Websites	Google.com					

طريقة التقييم	طريقة التعليم	اسم الوحدة / أو الموضوع	مخرجات التعلم المطلوبة	الساعات	الأسبوع
	بر مجة باستخدام الماتلاب	Definition and classification of nonlinear programming	حل مسائل الامثلية العامة	4	2-1
	برمجة باستخدام الماتلاب	Solution of single variable optimization	طرق حل المتغير واحد لدالة الهدف	8	6-3
	برمجة باستخدام الماتلاب	Multi variable optimization with no constraints	حلا مسائل الامثليه لمتعددة المتغير ات بر مجيا	8	9-7

بر مجة باستخدام الماتلاب	Multi variable optimization with constraints	امثلة اضافية لايجاد النقاط العظمى والصغرى	10	11-10
برمجة باستخدام الماتلاب	Solve numerical optimization by unrestricted search and exhaustive	حل الامثليه بالطريقه الحسابيه بالطريقه المحدده وطريقة اكسوستف برمجيا	14	13-12
برمجة باستخدام ا لماتلاب	Solve numerical optimization by dichotomous, Fibonacci and golden section	حل الامثليه بالطريقه ا لحسابيه بالطريقه دايك توموس وفيبنونشي و كولدن سكشن برمجيا	16	15-14

27	Course Name, Arabia Language						
37.	Course Name: Arabic Language						
38.	Course Code: URIQ 201						
39.	Semester / Year: 1 / 2						
40.	40. Description Preparation Date: 2024/2/20						
41.Avail	able Attendance Forms: Integrated Education						
42.Num	ber of Credit Hours (Total) / Number of Units (Total) : 15 hours/ 1						
43.	Course administrator's name (mention all, if more than one name)						
Nam	e: D. Rana Majed Hameed						
Emai	l: <u>Rana.Majid@nahrainuniv.edu.iq</u>						
44.	Course Objectives						
Course Objec							
	Keep the tongue from falling into the word's pronunciation error.						
	Developing the student's expressive abilities.						
	Teaching students to analyze the speech system.						
	Teach students to distinguish between the origins of the word or						
	increase and what it does in increasing meaning.						
	Teaching students on methods and rules of control and drafting of						
	vocabulary.						
	Enabling the student to use the language vocabulary in the proper location.						
	Provide training to strengthen the student's queen and develop his ability						
	in language practice and influential rhetoric while benefiting from						
	Experiences and trainings.						

4.5				
45.	Teaching and Learning Strategies			
Strategy	1. POWERPOINT DISPLAY			
	2. Writing Reports-			
	3. Quarterly Tests-			
	 Quality Foods Discussing and Solving Questions 			
	5. Homework			
	J. HUHEWUK			

46. Course Structure

Week	Hours		Required Learning Outcomes			Init or subject name		
First	1	linguistic improves sketch in able to	ent acquires c skills and the writing order to be write and eloquently.	Concept of language errors	Lecture, class discussion and training	Daily and quarterly examinations and examinations		
Second and Third	1	The stud linguistic improves sketch in able to	ent acquires c skills and the writing order to be write and eloquently.	Tie-in and Tip-Out Rules	Lecture, class discussion and training	Daily and quarterly examinations and examinations		
Fourth and Fifth	1	linguistic improves sketch in able to	ent acquires c skills and the writing order to be write and eloquently.	A thousand outstretched and cabin	Lecture, class discussion and training	Daily and quarterly examinations and examinations		
Sixth	1	linguistic improves sketch in able to	ent acquires c skills and the writing order to be write and eloquently.	Solar and lunar letters	Lecture, class discussion and training	Daily and quarterly examinations and examinations		
Seventh and Eighth	1	linguistic improves sketch in able to	ent acquires c skills and the writing order to be write and eloquently.	Aldad and Lightness	Lecture, class discussion and training	Daily and quarterly examinations and examinations		

Ninth and Tenth and Eleventh	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Writing whispering (connecting and cutting, intermediate whispering, extreme whispering)	Lecture, class discussion and training	Daily and examinati examinati	ons and
The Twelfth and Thirteenth	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Punctuation marks	Lecture, class discussion and training	Daily and quarterly examinations and examinations	
Fourteenth And Fifteen,	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Name, verb and differentiation	Lecture, class discussion and training	Daily and examinati examinati	ons and
1. Course EvaluationDaily preparation: (10) degreesDaily exams: (10) DegreeMonthly exam: (20) DegreeReports: (20) DegreeSeminar: (20) DegreeHomework: (20) Degree						
	-	ching Resources cular books, if any)	Expression, creation, written dictation/a. d Jabouri			
Main reference	es (sources))	Clarify the trajectory of the millennium of the son of Malik/Ibn Hisham. Qatar al-Nada and Bel al-Echo of Hisham's son. as adequate as Abbas Hassan, is a shrewd custom in the art of drainage, polite in drainage.			
Recommende	d books	and references				
(scientific journals, reports)						
Electronic Ref	erences, We	ebsites	https://maktabeti.com https://www.noor-book.com			

1. Course Name:							
Linear Alge	ebra I						
2. Course Code:							
MATH 212							
	3. Semester / Year:						
First/ Secon	ıd						
4. Desc	ription Preparation Date:						
23/3/2024							
5. Avai	able Attendance Forms:						
	nce of theories						
	ber of Credit Hours (Total) /	Number of Units (Total)					
60 ho	ours / 4 units						
7. Cour	se administrator's name (mention all, if more than one name)					
Nam	e: Dr.Zainab Riyadh Shakei	r					
	l: zaianb.riyadh22@nahra						
8. Cours	se Objectives						
Course Objec	tives	 Study of linear systems and their solutions. Study matrices and solve systems using matrices. Vectors and its applications Determinants and their applications 					
9. Teac	hing and Learning Strategie	s					
StrategyA- Cognitive goals.1. Enable students to obtain knowledge and understanding of the basic principles of I systems.2. Enable students to obtain knowledge and understanding of the laws and propert matrices.3. Enable students to gain knowledge and understanding of how laws are linked 4. Enable students to obtain knowledge of methods for deriving basic equations of I systems.5. Enable students to identify the most important applications of linear algebra su matrices and linear systems.6. The skills goals special to the course. 1. The student will be able to use matrices to solve linear systems.2. Using mathematical methods to understand the behavior of linear systems. 1. Giving theoretical lectures.							

2. Giving descriptive homework.
3. Direct questions to students to test their understanding of the topic.
4. Assigning students homework
Assessment methods
1. Monthly exams and daily quizzes.
2. Programmed mid-term exams.
3. Homework's.
4. Direct oral questions.
C. Affective and value goals
1. Enabling students to solve second and third order DEs.
2. Enabling students to solve problems related to the derivations of laws and their equations.
3. Enabling students to solve mathematical problems using the simplest means.
D. General and rehabilitative transferred skills(other skills relevant to employability personal development)
1. The ability to self-research to solve mathematical problems.
2. Recognize vector space and its benefits and use in mathematics.

10. Course Structure

Week	Hours	Required	Unit or subject name	Learning	Evaluation
		Learning		method	method
		Outcomes			
1	4		Linear Equations and Matrices		
2	4		Systems of Linear Equations		
3	4		Matrices		
4	4		Matrix Multiplication		
5	4		Algebraic Properties of Matrix Operations		
6	4		Special Types of matrices		
7	4		Solving Linear Systems		
8	4		Echelon Form of a Matrix		
9	4		Elementary Matrices; Finding A^(-1)		
10	4		Determinants		
11	4		Properties of Determinants		
12	4		Cofactor Expansion		
13	4		Inverse of a Matrix		

14	4		Other Application	s of Determinants			
15	4		Vector space and	its properties			
11 (Evaluation					
11. (Jourse	Evaluation					
	0		Ũ	o the tasks assigned to cams, reports etc	o the studer	nt such as daily	
			ing Resources				
Require	d textbool	ks (curricular	books, if any)	Introduction to Linear Bernard Kolman	Algebra and	Application by	
Main ref	erences	(sources)		Introduction to Linear Algebra by Franz hohn		Franz hohn	
Recomn	nended	books a	nd references	Any website that specializes in the study of linear			
(scientifi	(scientific journals, reports) algebra						
Electron	ic Refere	nces, Websit	es				

47.	Course Nam	e: Arabic Language					
48.	Course Code	e: URIQ 202					
49.	Semester / Year: 2/2						
50.	Description	Preparation Date: 2024/2/20					
51.Avail	able Attendan	ce Forms: Integrated Education					
52 Numl	per of Credit I	Hours (Total) / Number of Units (Total) : 15 hours/1					
J2.1\u1110							
53.		ninistrator's name (mention all, if more than one name)					
	e: D. Rana Ma I: Pana Majid	•					
Emai	I. <u>Nalid.Majiu</u>	<u>@nahrainuniv.edu.iq</u>					
54.	Course Obje	ctives					
Course Object	tives	Acquiring knowledge skills about linguistic concepts.					
		Keep the tongue from falling into the word's pronunciation error.					
		Developing the student's expressive abilities.					
		Teaching students to analyze the speech system.					
		Teach students to distinguish between the origins of the word or					
		increase and what it does in increasing meaning.					
		Teaching students on methods and rules of control and drafting of					
		vocabulary.					
		Enabling the student to use the language vocabulary in the proper location.					
		Provide training to strengthen the student's queen and develop his ability					
		in language practice and influential rhetoric while benefiting from					
		Experiences and trainings.					
55.	55. Teaching and Learning Strategies						

Strategy 1. POWERPOINT DISPLAY 2. Writing Reports- 3. Quarterly Tests- 4. Discussing and Solving Questions- 5. Homework						
56. Course						
Week	Hours	Required Learning	Unit or subject	Learning	Evaluation	
First	1	Outcomes The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	name Name, verb and differentiation	method Lecture, class discussion and training	method Daily and quarterly examinations and examinations	
Second	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Activation (effect with it, effect for the time being, effect with it)	Lecture, class discussion and training	Daily and quarterly examinations and examinations	
Third and Fourth	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Number	Lecture, class discussion and training	Daily and quarterly examinations and examinations	
Fifth and Sixth and Seventh	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Language Error Applications	Lecture, class discussion and training	Daily and quarterly examinations and examinations	
Eighth	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Meanings of prepositions	Lecture, class discussion and training	Daily and quarterly examinations and examinations	
Ninth	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and	One Thousand Difference Base	Lecture, class discussion and training	Daily and quarterly examinations and examinations	

		express it eloquently.				
Tenth	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Noon and Topical Base	Lecture, class discussion and training	Daily and a examinati examina	ons and
Eleventh The Twelfth	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Formal aspects of administrative discourse	Lecture, class discussion and training	Daily and o examinati examina	ons and
Thirteenth and Fourteenth and Fifteen,	1	The student acquires linguistic skills and improves the writing sketch in order to be able to write and express it eloquently.	Language of administrative discourse	Lecture, class discussion and training	Daily and a examinati examina	ons and
3. Cours	e Evaluati	ion				
Daily prepara Daily exams: Monthly exam Reports: (20) Seminar: (20) Homework: ((10) Degree n: (20) Deg Degree) Degree	e ree				
4. Learnin	g and Tea	ching Resources				
Required text	oooks (currid	cular books, if any)	Expression, creation, written drawing and written dictation/a. d. Abdulrahman Matlak al- Jabouri			
Main reference	es (sources)	Clarify the trajectory son of Malik/Ibn His Qatar al-Nada and B as adequate as Abba custom in the art of o	sham. el al-Echo of Hi s Hassan, is a sh	sham's son. rewd	
Recommende	d books	and references				
(scientific journals, reports)						
Electronic Ref	erences, W	ebsites	https://maktabeti.com https://www.noor-book.com			

1.0	N					
	1. Course Name:					
Linear Alge						
	2. Course Code:					
MATH 213						
	ester / Year:					
First/ Secon	ıd					
4. Desc	ription Preparation Date:					
23/3/2024						
5. Avai	lable Attendance Forms:					
Prese	ence of theories					
6. Num	ber of Credit Hours (Total) /	/ Number of Units (Total)				
60 ho	ours / 4 units					
	an administrator's name ((mantion all if more than one name)				
	e: Dr.Zainab Riyadh Shake	(mention all, if more than one name)				
	ll: zaianb.riyadh22@nahra					
Lilla	n. zalano.nyaunzz@nama	mumv.euu.iq				
8. Cours	se Objectives					
Course Objec	tives	1. Study of vector spaces and their solutions.				
		 Solving linear systems by RREF and GJRR methods. Inner product space and its applications. 				
		4. Gram Schmidt method and their applications.				
9. Teac	hing and Learning Strategie	S				
Strategy	A- Cognitive goals.					
	1. Enable students to obtain kno principles of linear systems.	wledge and understanding of the basic				
		wledge and understanding of the laws				
	and properties of matrices.					
	3. Enable students to gain knowledge and understanding of how laws					
are linked 4. Enable students to obtain knowledge of methods for deriving basic						
equations of linear systems.						
5. Enable students to identify the most important applications of						
 linear algebra such as matrices and linear systems. B. The skills goals special to the course. 1. The student will be able to use matrices to solve linear systems. 						
						2. Using mathematical methods
	Teaching and Learning Metho 1. Giving theoretical lectures.	ds				
	1. Giving medical lectures.					

	2. Giving descriptive homework.
	3. Direct questions to students to test their understanding of the topic.
	4. Assigning students homework.
	Assessment methods
	1. Monthly and daily exams.
	2. Programmed mid-term exams.
	3. Homeworks.
	4. direct oral questions.
	C. Affective and value goals
	1. Enabling students to solve problems related to matrices.
	2. Enabling students to solve problems related to the derivations of laws and
	their equations
	3. Enabling students to solve mathematical problems using the simplest means
	D. General and rehabilitative transferred skills(other skills relevant to
	employability and personal development)
	1. The ability to self-research to solve mathematical problems.
	2. Recognize vector space and its benefits and use in mathematics.
L	

10. Course Structure

Week	Hours	Required	Unit or subject name	Learning	Evaluation
		Learning		method	method
		Outcomes			
1	4		Real Vector Spaces		
2	4		Subspaces		
3	4		Span		
4	4		Linear Independence		
5	4		Basis and Dimension		
6	4		Homogeneous Systems		
7	4		Relationship between Nonhomogeneous Linear Systems and Homogeneous Systems		
8	4		Coordinates and Isomorphism's		
9	4		Isomorphism's		
10	4		Rank of a Matrix		
11	4		Inner Product Spaces		
12	4		Length and Direction in R^2 and R^3		
13	4		Gram-Schmidt Process		

			Linear Transforma	ations and Matrices				
14	4		Eigenvalues and Eigenvectors and Similarity					
15	4		Eigenvectors and Eigenvectors and Similarity					
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								
Require	d textboo	ks (curricular b	books, if any)	Introduction to Linear Algebra and Application by Bernard Kolman				
Main ref	erences	(sources)		Introduction to Linear Algebra by Franz hohn				
Recomn	nended	books and	d references	Any website that specializes in the study of linear				
(scientific journals, reports)								
Electron	ic Refere	nces, Website	S					

57. C	ourse Name:								
Solu	Solutions of ODE								
58. C	58. Course Code:								
MATH216									
59. Se	Semester / Year:								
	Second / Second								
60. D	escription Preparation Date:								
	2024								
61. A	61. Available Attendance Forms:								
Physical attendance									
62. N	Number of Credit Hours (Total) / Number of Units (Total)								
60 I	60 Hours/ 4 Units								
63. C	63. Course administrator's name (mention all, if more than one name)								
	Name: Dr. Fatimah Al-Taie								
Email: f	atimah	.altaie@nahrainu	univ.edu.iq						
64. C	ourse C	Dbjectives							
Course O	Course Objectives • Learning the basic concepts of mathematics,								
			application in reality, solution of ordinary						
	differential equations with first-, and higher-order and their applications. In addition, different								
classes of ODEs are considered.									
65. Teaching and Learning Strategies									
Strategy	The learning and teaching strategy is presented by:								
	Providing the students with a sufficient amount of mathematical terms and definitions								
	by attending lectures and presenting on the whiteboard to connect the students with								
	the lecturer to solve as many real-life applications as possible. The pdf lectures,								
	homework, quizzes, and exercises are shared on Google Classroom.								
66. Course Structure									
Week	Hours	Required	Unit or subject	Learning	Evaluation method				
		Learning	name	method					
		Outcomes							

1-2	8	Introducti	on to DE ³	Definition and classification of Differential Equations (DE's)	lectures	
3-6	16 1	First-order l	DE's	Methods for solving fi order ODE's	lectures	
7-9	12]	Higher Dl	E's	The general form of higher-order DE's	lectures	
10-11	8]	Homogen	eous DE'	Definition and method on solving homo. DE'	lectures	
12-13		Nonhomo DE's	geneous	Definition, properties, and methods of solvin non-homo. DE's	lectures	
14-15	8]	Laplace tr	ansform	Definition/properties of Laplace transform and then using Laplace transformation in solve DE's	lectures	
67. (Course Ev	aluation				
	Learning a d textbooks	; (currici I I	Earl D. R	ainville and Phillip		lementary Differential th Edition, New York,
Main references (sources) [1] an ed [2] Di			1] C. Her and Linea edition. Pe 2] Willia Differentia	r Algebra, ser. Pears earson Education, U am E. Boyce, and	on Internationa nited States of A Richard C. Dundary Value	America, 2010. DiPrima, Elementary Problems, John Wiley
	nended erences (sc , reports…)	books cientific		ons of ODE's		517 milenea. 2001
Electron Website			L- Google 2- https://v	.com www.khanacademy.	org/math/differ	ential-equations

69 .	Course Name:							
Advanced	Advanced calculus I							
70.	Course Code:							
MATH 21	MATH 210							
71.	Semester / Year:							
First sem	ester / the second stage							
72.	Description Preparation D	ate:						
2023								
73.	Available Attendance For	ms:						
74.	Number of Credit Hours (tal)	Total) / Number of Units						
· · · · ·	hours /4 Units							
75.	•	ame (mention all, if more than one						
nar	_	, , , , , , , , , , , , , , , , , , ,						
	ne: Dr. muna saleh ail: <u>muna.saleh@nahrainuni</u> Course Objectives	<u>v.edu.iq</u>						
Course Obje	ectives	 Introduce the basic cocepts 						
		advance calculus						
77.	Teaching and Learning Stra	tegies						
Strategy 1- Giving concepts in lectures 2- Various example 3- Daily and monthly exam								

Neek	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evalu ation methd
1	4		Sequences and Infinite Series	Theoretic lectures	
2	4		Type of series	Theoretic lectures	
4-3	8		Test for convergence of series	Theoretic lectures	
6-5	8		Power Series	Theoretic lectures	
8-7	8		Taylor's and Maclaurin series	Theoretic lectures	
9	4		Examples	Theoretic lectures	
10	4		Exam	Theoretic lectures	
11	4		Vector in Space.	Theoretic lectures	
12	4		(Dot) and cross products of tw vectors	Theoretic lectures	
13	4		Exam	Theoretic lectures	
14	4		Equation of lines,	Theoretic lectures	
15	4		Partial derivatives.	Theoretic lectures	

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

80. Learning and Teaching Resources

Required textbooks (curricular books, if an	Thomas' Calculus 14th Edition
Main references (sources)	University Calculus with Analytic Geometry, by J Morry
Recommended books and references (scientific journals, reports)	Calculus with application brief version
Electronic References, Websites	Google.com

81.	Course Name:					
Advanced	calculus II					
82.	Course Code:					
MATH 211						
83.	Semester / Year:					
second se	mester / the second stage					
84.	Description Preparation D	ate:				
2024						
85.	Available Attendance For	ms:				
86.	Number of Credit Hours (Total) / Number of Units				
(Tot	•					
60 hours/ 87		ame (mention all, if more than one				
nam						
	e: Dr. muna saleh					
Ema	il: <u>muna.saleh@nahrainuniv</u>	v.edu.iq				
88.	Course Objectives					
Course Objec	-	 Introduce the basic cocepts 				
		advance calculus				
89.	89. Teaching and Learning Strategies					
Strategy	4- Giving concepts in l	ectures				
	5- Various example					
	6- Daily and monthly e	exam				

90. Course Structure								
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evalu ation methd			
1	4		Introduction to Integratio	Theoretic lectures				
2	4		Double integrals over rectangle regions	Theoretic lectures				
4-3	8		Double integrals over nonrectangle regions	Theoretic lectures				
6-5	8		Area	Theoretic lectures				
8-7	8		Changing to polar coordinates	Theoretic lectures				
9	4		Triple integrals	Theoretic lectures				
10	4		Exam	Theoretic lectures				
11	4		Vector fields	Theoretic lectures				
12	4		Surface integrals	Theoretic lectures				
13	4		Exam	Theoretic lectures				
14	4		Line integrals	Theoretic lectures				
15	4		theorems	Theoretic lectures				

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

92. Learning and Teaching Resources					
Required textbooks (curricular books, if an	Thomas' Calculus 14th Edition				
Main references (sources)	University Calculus with Analytic Geometry, by J Morry				
Recommended books and references (scientific journals, reports)	Calculus with application brief version				
Electronic References, Websites	Google.com				

02						
93.	Course Name:					
	robability and Statistics					
94.	Course Code:					
MATH243						
95.	Semester / Year:					
First semes	ter/ Second year					
96.	Description Preparation Date:					
14/3/2024						
97.Avai	lable Attendance Forms:					
00 N	$1 \dots (C \dots 1' (U \dots (T \dots (1) / N \dots 1 \dots (U \dots (T \dots (1))$					
	ber of Credit Hours (Total) / Number of Units (Total)					
	ours/3 Units					
<u>99.</u>	Course administrator's name (mention all, if more than one name)					
_	e: Ranen Zaid Ahmood					
Ema	il: ranen.z.ahmood@nahrainuniv.edu.iq					
100.	Course Objectives					
Course Objec	 Enabling the students to understand the basics of Probability Providing the students with the maximum amount of statistical measure of data Understanding the basic concepts of the subject of Probability and statistics Providing the students with the sufficient amount of statistical measure of data and Probability 					
101.	Teaching and Learning Strategies					
Strategy	 Introductory written lectures and various activities and assignments which are given in the classroom. Answering the quick questions raised in the hall and the possibility of solving them by the student. Adopting the principle of preparing reports by students. 					

2-6 20 Statistical description data Tabular Representation Attendance interactive lectures Ask questions ar give assignments lectures 7-10 16 Statistical measure data Mean, median, mode, Variance interactive lectures Ask questions ar give assignments lectures 11-15 20 Probability Basic concepts theorems and Bays theorem Attendance interactive lectures Ask questions ar give assignments lectures 103. Course Evaluation Pre final exam 40% (written exams) Final exam 60% Attendance statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Main references (sources) • Introduction to statistics, by Ronald E. Walpole. • Introduction to statistics, by Ronald E. Walpole. Recommended books and references (scientific journals, reports) Introduction to the theory of statistic								
Week Hours Required Learning Outcomes Unit or subject name Learning method Evaluation method 1 4 Basic concepts Introduction to Statistic data Attendance interactive lectures Ask questions ar give assignments 2-6 20 Statistical description data Tabular Representation data Attendance interactive lectures Ask questions ar give assignments 7-10 16 Statistical measure data Mean, median, mode, Variance Attendance interactive lectures Ask questions ar give assignments 11-15 20 Probability Basic concepts theorems and Bays theorem Attendance interactive lectures Ask questions ar give assignments 103. Course Evaluation Pre final exam 40% (written exams) Final exam 60% Modern Mathematical Statistics with Applications, Jay L Devore, Kenneth N. Berk, Springer, 2012. Required textbooks (curricular books, if any) • Modern Mathematical Statistical with Applications, Dennis D. Wackerly, William Mendenhall Richard L. Scheaffer, Thomson Brooks, 20 Main references (sources) • Introduction to statistics, by Ronald E. Walpole. Introduction to statistics, by Ronald E. Walpole. Recommended books and references (scientific journals, reports) Introduction to the theory of statistic	102. Course Structure							
Outcomesnamemethodmethod14Basic conceptsIntroduction to StatisticAttendance interactive lecturesAsk questions ar give assignments2-620Statistical description dataTabular RepresentationAttendance interactive lecturesAsk questions ar give assignments7-1016Statistical measure dataMean, median, mode, VarianceAttendance interactive lecturesAsk questions ar give assignments11-1520ProbabilityBasic concepts theorems and Bays theoremAttendance interactive lecturesAsk questions ar give assignments103. Course EvaluationPre final exam 40% (written exams) Final exam 60%Modern Mathematical Statistics with Applications, Jay L Devore, Kenneth N. Berk, Springer, 2012.Modern Mathematical Statistics with Applications, Jay L Devore, Kenneth N. Berk, Springer, 2012.Main references (sources)Introduction to statistics, by Ronald E. Walpole. Introduction to statistics, by Ronald E. Walpole.Recommended books and references (scientific journals, reports)Introduction to the theory of statistic Alxander Mood and Franclin Garyb1								
2-6 20 Statistical description data Tabular Representation Attendance interactive lectures Ask questions an give assignments 7-10 16 Statistical measure data Mean, median, mode, Variance Attendance interactive lectures Ask questions an give assignments 11-15 20 Probability Basic concepts theorems and Bays theorem Attendance interactive lectures Ask questions an give assignments 103. Course Evaluation Pre final exam 40% (written exams) Final exam 60% Attendance interactive lectures Ask questions an give assignments 104. Learning and Teaching Resources Required textbooks (curricular books, if any) Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Mathematical Statistics, by Ronald E. Walpole. Main references (sources) Introduction to statistics, by Ronald E. Walpole. Statistics, by Ronald E. Walpole. Mathematical E. Walpole. 	Outcome	s	name	method	method			
adata interactive lectures give assignments lectures 7-10 16 Statistical measure data Mean, median, mode, Variance Attendance interactive lectures Ask questions ar give assignments 11-15 20 Probability Basic concepts theorems and Bays theorem Attendance interactive lectures Ask questions ar give assignments 103. Course Evaluation Pre final exam 40% (written exams) Final exam 60% Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Main references (sources) • Introduction to statistics, by Ronald E. Walpole. Introduction to statistics, by Ronald E. Walpole. Recommended books and references (scientific journals, reports) Introduction to the theory of statistic Alxander Mood and Franclin Garyb1	1 4 Basic con	acepts	Introduction to Statistic	interactive	Ask questions and give assignments			
10 data mode, Variance interactive lectures give assignments 11-15 20 Probability Basic concepts theorems and Bays theorem Attendance interactive lectures Ask questions are give assignments 103. Course Evaluation Pre final exam 40% (written exams) Final exam 60% Attendance Ask questions are give assignments 104. Learning and Teaching Resources Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Modern Mathematical Statistics with Applications, Dennis D. Wackerly, William Mendenhall I Richard L. Scheaffer, Thomson Brooks, 200 Main references (sources) Introduction to statistics, by Ronald E. Walpole. Recommended books and references (scientific journals, reports) Introduction to the theory of statistic Alxander Mood and Franclin Garyb1		l description	Tabular Representation	interactive	Ask questions and give assignments			
103 Loorents and Bays theorem interactive lectures give assignments 103. Course Evaluation Pre final exam 40% (written exams) Final exam 60% Interactive lectures give assignments 104. Learning and Teaching Resources Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Required textbooks (curricular books, if any) • Modern Mathematical Statistical with Applications, Dennis D. Wackerly, William Mendenhall J Richard L. Scheaffer, Thomson Brooks, 200 Main references (sources) • Introduction to statistics, by Ronald E. Walpole. Introduction to statistics, by Ronald E. Walpole. Recommended books and references (scientific journals, reports) Introduction to the theory of statistic Alxander Mood and Franclin Garyb1		measure		interactive	Ask questions and give assignments			
Pre final exam 40% (written exams) Final exam 60% 104. Learning and Teaching Resources Required textbooks (curricular books, if any) • Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. • Mathematical Statistical with Applications, Dennis D. Wackerly, William Mendenhall I Richard L. Scheaffer, Thomson Brooks, 200 Main references (sources) • Introduction to statistics, by Ronald E. Walpole. Introduction to statistics, by Ronald E. Walpole. Recommended books and references (scientific journals, reports) Introduction to the theory of statistical Alxander Mood and Franclin Garyb1	11-15 20 Probabilit	ty	theorems	interactive	Ask questions and give assignments			
Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. Mathematical Statistical with Applications, Dennis D. Wackerly, William Mendenhall I Richard L. Scheaffer, Thomson Brooks, 200 Main references (sources) Introduction to statistics, by Ronald E. Walpole. Introduction to statistics, by Ronald E. Walpole. Recommended books and references (scientific journals, reports) Introduction to the theory of statistic Alxander Mood and Franclin Garyb1	104. Learning and Tea	ching Reso	ources					
E. Walpole. Introduction to statistics, by Ronald E. Walpole. Recommended books and references (scientific journals, reports) Introduction to the theory of statistic Alxander Mood and Franclin Garyb1			any) • Modern Applicati Berk, Spi • Mathema Dennis D	ions, Jay L. Devo ringer, 2012. tical Statistical v . Wackerly, Wil	ore, Kenneth N. with Applications, lliam Mendenhall III			
(scientific journals, reports) Alxander Mood and Franclin Garyb1	Main references (sources)		E. Walp	ole. Introduct	ion to statistics,			
					•			
Electronic References, Websites	Υ.	/						

1. Cours	se Name: General Chemistr	V					
2. Cours	2. Course Code: CHEM 271						
3. Seme	ster / Year: 2023-2024						
4. Desci	ription Preparation Date: 21	/3/2024					
5 Augil	ahla Attandanga Formas Clas	a Attendence					
J. Avall	able Attendance Forms: Clas	s Attendance					
6. Numl	per of Credit Hours (Total) / N	Number of Units (Total) 30 hr/2 units					
		nention all, if more than one name)					
_	e: Assist. Prof. Dr. Atheel Ha						
Emai	l: atheel.alwash@nahrain.ui	niv.eau.iq					
8. Cours	se Objectives						
Course Object	lives	1. Develop and understand the uses of analytical chemistry.					
		2. Understanding the role of chemistry in					
		quantitative analysis3. The ability to understand the chemical					
		methods used					
	4. Understanding of occupational safety responsibilities that must be followed						
• 5. Understand some basics of organic							
		• 5. Understand some basics of organic					
		*					
9. Teacl	ning and Learning Strategies	• 5. Understand some basics of organic chemistry such as • Structure and properties					
9. Teacl Strategy	1 - Introduction to the ma	• 5. Understand some basics of organic chemistry such as • Structure and properties of alcohols, alkane alkanes 					
	1 - Introduction to the ma 2- Understanding the concentrat	• 5. Understand some basics of organic chemistry such as • Structure and properties of alcohols, alkane alkanes 					
	1 - Introduction to the ma	• 5. Understand some basics of organic chemistry such as • Structure and properties of alcohols, alkane alkanes 					

6- The basics of the gravimetric method7- Introduction to the basics of organic chemistry								
10. Course Structure								
Week	Hours	Required Learning	Unit or subject	Learning	Evaluation			
		Outcomes	name	method	method			
1	2	Introduce students to the basic concepts of pollution	Structure of atoms	White board to insure the student interaction	Oral and written exams			
2	2	Introduce students to the basic concepts of pollution	Molarity, Molality expression	White board to insure the student interaction	Oral and written exams			
3	2	Introduce students to the basic concepts of pollution	Normality expression	White board to insure the student interaction	Oral and written exams			
4	2	Introduce students to the basic concepts of pollution	Tutorial	White board to insure the student interaction	Oral and written exams			
5	2	Introduce students to the basic concepts of pollution	Acid and bases, pH	White board to insure the student interaction	Oral and written exams			
6	2	Introduce students to the basic concepts of pollution	Mid exam	White board to insure the student interaction	Oral and written exams			
7	2	Introduce students to the basic concepts of pollution	Titration	White board to insure the student interaction	Oral and written exams			
8	2	Introduce students to the basic concepts of pollution	Chemical equilibrium	White board to insure the student interaction	Oral and written exams			
9	2	Introduce students to the basic concepts of pollution	Factors effecting chemical equilibrium	White board to insure the student interaction	Oral and written exams			
10	2	Introduce students to the basic concepts of pollution	Tutorial	White board to insure the student interaction	Oral and written exams			
11	2	Introduce students to the basic concepts of pollution	Mid Exam	White board to insure the student interaction	Oral and written exams			
12	2	Introduce students to the basic concepts of pollution	Gravimetric method	White board to insure the student interaction	Oral and written exams			
13	2	Introduce students to the basic concepts of pollution	Gravimetric method	White board to insure the student interaction	Oral and written exams			

14	2	Introduce students to the basic concepts of pollution	Open discussion preparing for final test	White board to insure the student interaction	Oral and written exams				
11.Co	11.Course Evaluation								
daily p	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								
25 Sco	re for qui								
	eraction v or home	vithin the class works							
12	.Learnin	g and Teaching Re	sources						
Require	ed textbo	oks (curricular books		nalytical chemistry, R. Crouch, 8th ed., 2					
any)					. ,				
Main references (sources) Chemistry A First course, Jacqueline I. Kroschwitz, Second									
Recom	Recommended books and references Fundamentals of chemistry: Fourth Edition, Goldberg								
(scienti	fic journa	ls, reports)	0						
Electro	Electronic References, Websites Different sources from internet								

Third Stage

	1. Course Name:						
Optimizatio	Optimization II						
2. Cour	se Code:						
MATH 319							
3. Seme	ester / Year:						
First/ Third							
4. Desc	ription Preparation Date:						
23/3/2024							
	able Attendance Forms:						
6. Num	ber of Credit Hours (Total) / Nu	mber of Units (Total)					
	rs/ 4 Units						
7. Cour	se administrator's name (mei	ntion all, if more than one name)					
Nam	e: Associate Professor Saad Mo	ohsen					
Asst.	Lec. Abbas Ibraheem						
Asst.	Lec. Wurood Riyadh						
Asst.	Lec. Eman Khalid						
Emai	l: saad.mohsen@nahrainuiv.eo	du.iq					
8. Cours	se Objectives						
Course Objec	tives	Study of non-linear programming systems and					
		their solutions.					
		• Study classical optimization and solve systems us					
		many methods.					
9. Teac	hing and Learning Strategies	numerical optimization and its applications					
Strategy	The strategy is to provide the	e students with as much information					
2		as possible by attending lectures to					
		ween the students and the lecturer in					
		ife statistical applications as possible					
	-	ne statistical applications as possible					
	with practical lab.	work and some other additional					
		vork and some other additional					
1	exercises is also shared on Go	bogie classroom.					

Week	Hours	Required Learning	Unit o	or subject	Learning	Evaluation
		Outcomes	name		method	method
2-1		4		on and classificatior ar programming		
6-3		8	Solution optimiz	n of single vari		
9-7		8		ariable optimization		
11-10		10	Multi va constrai	ariable optimization v ints		
13-12		14	Solve numerical optimizatio unrestricted search exhaustive			
15-14		16		umerical optimization mous, Fibonacci		
11.	Course	Evaluation				
	m exam: 4 xam: 60 n					
12.	Learning	and Teaching Res	ources			
Require	ed textboo	ks (curricular books, if	any)	Optimization theory and applications by S.S. RAO		
Main re	ferences	(sources)		Operation research by HAMDY A. TAHA		
Recom	mended	books and refe	erences	Any website related to our study		
(scienti	fic journal	s, reports…)				
	nic Refere					

2. بنية المقرر

طريقة التقييم	طريقة التعليم	اسم الوحدة / أو الموضوع	مخرجات التعلم المطلوبة	الساعات	الأسبوع
	برمجة باستخدام الماتلاب	Graphical solution	الطريقة البيانية	4	2-1
	برمجة باستخدام الماتلاب	Simplex method	الطريقة المبسطة	8	6-3
	بر مجة باستخدام الماتلاب	Big M method	طريقة Big M	8	9-7

بر مجة باستخدام الماتلاب	Two phase method	طريقة ذات الطورين	10	11-10
برمجة باستخدام الماتلاب	Dual simplex method	طريقة الثنائية	14	13-12
برمجة باستخدام ا لماتلاب	Transportation method	طريقة النقل	16	15-14

13.	3. Course Name: Real Analysis I											
14.	Cour	se Code: MAT	°H 310									
15.	Seme	ester / Year: Fi	irst/ 2023	8-2024								
16.	Desc	ription Prepar	ration Dat	e: 15/10/2	023							
	•• • • •			• •								
17.Av	vailable A	Attendance Forr	ms: physic	al attendanc	e							
18.Nı	umber of	Credit Hours (7	Total) / Nu	mber of Un	its (Total): 60/4							
19.	Coui	rse administra	ator's nam	e (mention	all, if more that	an one name)						
		Aamena Rasim										
Er	nail: aam	ien.raimmohai	mmed@n	ahrainuniv.	edu.iq							
20.	Cour	se Obiectives										
_												
	Course Objectives- Understand the real number system. - Understand concepts of convergence and											
	-			- Understand	l concepts of conve	ergence and						
	-			- Understand divergence f		ergence and						
	-			- Understand divergence f Cauc - Understand	l concepts of conve or sequences, subs hy sequences. l metric spaces, co	ergence and equences and mplete metric						
21.	Теас	hing and Learn	ning Strate	- Understand divergence f Cauc - Understand spaces and c	l concepts of conve or sequences, subs hy sequences.	ergence and equences and mplete metric						
21. Strategy	Teac	hing and Learn Giving Lecture 		- Understand divergence f Cauc - Understand spaces and c gies	l concepts of conve or sequences, subs hy sequences. l metric spaces, co	ergence and equences and mplete metric ces.						
	Teac		ures support	- Understand divergence f Cauc - Understand spaces and c gies ed by exercise	l concepts of conve or sequences, subs hy sequences. l metric spaces, co ompact metric space	ergence and equences and mplete metric ces.						
	Teac	Giving Lecture	ures support	- Understand divergence f Cauc - Understand spaces and c gies ed by exercise	l concepts of conve or sequences, subs hy sequences. l metric spaces, co ompact metric space	ergence and equences and mplete metric ces.						
Strategy	Teac	Giving LectureDaily and WGiving home	ures support	- Understand divergence f Cauc - Understand spaces and c gies ed by exercise	l concepts of conve or sequences, subs hy sequences. l metric spaces, co ompact metric space	ergence and equences and mplete metric ces.						
Strategy		Giving LectureDaily and WGiving home	ures support	 Understand divergence for Cauce Understand spaces and construction gies ed by exercise sments. 	l concepts of conve or sequences, subs hy sequences. l metric spaces, co ompact metric space	ergence and equences and mplete metric ces.						
Strategy 22. Cou	rse Struc	 Giving Lectu Daily and W Giving home 	ures support eekly Asses ework	 Understand divergence for Cauce Understand spaces and construction gies ed by exercise sments. 	l concepts of conve or sequences, subs hy sequences. d metric spaces, co ompact metric spaces es and activities in t	ergence and equences and mplete metric ces. the classroom						

First	(3)+(1) Discussion	Well-ordered score sets	Real Numbers	Lectures	General discussion	questi
Second	(3)+(1)	Absolute value	Real Numbers	Lectures	assignments General	questi
Third	Discussion	Definition of	Sequences	Lectures	discussion assignments	
TIIIU	(3)+(1) Discussion	sequence			General discussion	questi
Fourth	(3)+(1) Discussion	convergent	Sequences	Lectures	assignments General	questi
-		divergent sequences	Sequences	Lectures	discussion assignments	
Fifth	(3)+(1) Discussion	Monotonic sequence	a		General	questi
Sixth	(3)+(1) Discussion	Subsequences	Sequences	Lectures	discussion assignments General discussion	questi
Seventh	(3)+(1) Discussion	Cauchy sequences	Sequences	Lectures	assignments General discussion	questi
Eighth	(3)+(1) Discussion	Definition of me	Metric Spaces	Lectures	assignments General	questi
Ninth	(3)+(1) Discussion	spaces with example Open and closed sets	Metric Spaces	Lectures	discussion assignments General	questi
Tenth	(3)+(1) Discussion		Metric Spaces	Lectures	discussion assignments	
	(3)+(1)	Limit points			General discussion	questi
Eleventh	Discussion	Convergent seque Cauchy sequences	Metric Spaces	Lectures	assignments	
Twelfth	(3)+(1) Discussion	Complete metric spa	Metric Spaces	Lectures	General discussion assignments	questi
Thirteenth	(3)+(1) Discussion	Contraction Mapping	Metric Spaces	Lectures	General discussion assignments	questi
Fourteenth	(3)+(1) Discussion		Metric Spaces	Lectures	General discussion	questi
Fifteenth	(3)+(1) discussion	Compact sets			assignments General discussion	questi
		Hiene-Borel Theorei	Metric Spaces	Lectures	assignments	

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

Homework 5%

Daily preparation 5% Monthly Assessments 30% Final Test 60%			
24. Learning and Teaching Resources	3		
Required textbooks (curricular books, if any)	Introduction to Mathematical Analysis, Adil Naoum, Baghdad University-Iraq.		
Main references (sources)	Introduction to Mathematica Analysis, William F. Tren USA 2015		
Recommended books and references (scientific journals, reports)	Principle of Mathematical Analysis, Wa Rudin, 2000		
Electronic References, Websites	https://www.britannica.com/science/analysis- mathematics		

25.	Cour	se Name: Real A	Analysis II					
26.	26. Course Code: MATH 311							
27.	Seme	ester / Year: Thi	ird/ 2023-2024					
28.	Desc	ription Prepara	tion Date: 15/10/2	023				
29.A	vailable A	ttendance Form	s: physical attendanc	e				
30.N	umber of	Credit Hours (To	otal) / Number of Un	its (Total): 60/4				
			,					
31.	Cour	<u>co administrat</u>	or's name (mention	all if more the				
-		Aamena Rasim			an one name)			
Eı	mail: aam	en.raimmoham	med@nahrainuniv.	.edu.iq				
	0							
32.		se Objectives	Ludoustou	d Continuity and la	ann tagt the			
Course Ol	bjectives			d Continuity and le functions in differ				
				d concepts of Riem d concepts of Diffe	ē			
33.	Teach	ning and Learnir						
Strategy		Giving Lecture	es supported by exercise	es and activities in t	the classroom			
		• Daily and Wee	ekly Assessments.					
		• Giving homew	vork					
34. Course Structure								
Week Hours Required Unit or subject Learning Evaluation								
WEEK								
Week		Learning	name	method	method			
Week		Learning Outcomes	name	method	method			
First	(3)+(1) Discussion	•	name Continuity	method Lectures	method General questi discussion			

Second	(3)+(1)	Continuity using	Continuity	Lectures	General	quest
	Discussion	open and			discussion	
		Closed sets			assignments	
Third	(3)+(1)	Continuity u	Continuity	Lectures		
	Discussion	sequences			General	ques
					discussion	
	(3)+(1)	Uniform Continuity	Continuity		assignments	
Fourth	Discussion	-		Lectures	General	quest
					discussion	-
			Sequence of Functions		assignments	
Fifth	(3)+(1)	Concept of	1	Lectures	8	
	Discussion	sequence		Lectures	General	ques
	Discussion	Functions			discussion	ques
		convergent		T		
C:	(2) + (1)		Service of Free stices	Lectures	assignments	
Sixth	(3)+(1)	Uniform convergent	Sequence of Functions		General	ques
	Discussion	-			discussion	
_					assignments	
Seventh	(3)+(1)	Definition of	Riemann Integrals	Lectures	General	ques
	Discussion	Riemann			discussion	
		Integrals			assignments	
Eighth	(3)+(1)	Examples of	Riemann Integrals	Lectures	General	ques
-	Discussion			Loctures	discussion	
		Riemann			assignments	
Ninth	(3)+(1)	NT 11 11 1		Lectures	General	ques
	Discussion	Negligible sets"	Riemann Integrals	Lectures	discussion	1
	2150005000				assignments	
Tenth	(3)+(1)			.	ussignments	
rentii	Discussion	continuous	Riemann Integrals	Lectures	General	anos
	Discussion	Functions and	Riemann megrais		discussion	ques
	(2) + (1)	integration				
	(3)+(1)		D:		assignments	
Eleventh	Discussion	The Integration as	Riemann Integrals	Lectures		
		continuous			General	ques
		Function			discussion	
Twelfth	(3)+(1)				assignments	
	Discussion	Differentiation conce		Lectures		
		Differentiation conce	Differentiation	Lectures	General	ques
Thirteenth	(3)+(1)	Definitions			discussion	-
	Discussion	Definitions	Differentiation	T	assignments	
		Examples		Lectures	General	ques
	(3)+(1)	- 1 - 1 - 1			discussion	Y ue5
Fourteenth	Discussion	Differentiation and	Differentiation		assignments	
. our teenth	2150051011	Integration	Differentiation	Lectures	General	auoa
	(3)+(1)					ques
Fifteenth	discussion	the Fundamental	Differentiation		discussion	
	uiscussion	Theorem in Calculus	Differentiation		assignments	
1 meenim		Theorem in Calculus				

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

Homework 5% Daily preparation 5% Monthly Assessments 30%

Final Test 60%						
36. Learning and Teaching Resources						
Required textbooks (curricular books, if any)	Introduction to Mathematical Analysis, Adil					
	Naoum, Baghdad University-Iraq.					
Main references (sources)	Introduction to Mathematica Analysis, William F. Tren					
	USA 2015					
Recommended books and references	Principle of Mathematical Analysis, Wa					
(scientific journals, reports)	Rudin, 2000					
Electronic References, Websites	https://www.britannica.com/science/analysis-					
,	mathematics					

1.	1. Course Name:						
	Theory of Ordinary Differential Equations						
2.	Cours	se Code		•			
			MATH	318			
3.	Seme	ster / Y	ear:				
			Second Semester	/ Third Class			
4.	Descr	ription I	Preparation Date:				
			1/3/20)24			
5.	Avail	able Att	endance Forms:				
6	Numb	er of Ci	redit Hours (Total) / Num	her of Units (T	otal).		
0	Tunn			urs/ 4Unit	0111).		
7.	Cours	e admin	istrator's name (mention a		n one name	e)	
	Name	e: Dr. Ah	med Ayyoub Yousif				
	Email	: <u>ahmed.</u>	ayyoub@nahrainuniv.edu.iq				
8.	Cours	e Objec	tives				
Course	Object	ives	• The course aims to g	live the basic exe	rcises and tl	neories of	
			first-order differential syster	ns and find the so	olution to the	em through	
			the basic solution matrix.				
			• After that, the course		-		
			and the solution behavior of	these systems w	ithout addre	essing their	
			solution				
			• At the end of the cou	-	-		
			was addressed through the	theory of parallel	behavior an	d the	
	- ·		theories of Lyabanov.				
		Ŭ	Learning Strategies				
Strategy	'	1- Dail					
			y Exams. Monthly Exam.				
			ne Works.				
10. Co	ourse	Structu	re				
Week	Hours	s Requi	ired Learning Outcomes	Unit or	Learning	Evaluation	
			-	subject name	method	method	

1 st & 2 nd	8	Linear systems		Give Lectures	Daily Exams and H.W.
3 rd & 4 th	8	Fundamental matrix soluti	on	Give Lectures	Daily Exams and H.W.
5 th & 6 th	8	Jordan canonical form		Give Lectures	Daily Exams and H.W.
7 th & 8 th	8	Phase plane		Give Lectures	Daily Exams and H.W.
9 th & 10 th	8	Existence and Uniquenes theorem	S	Give Lectures	Daily Exams and H.W.
11 th & 12 th	8	Periodic Systems		Give Lectures	Daily Exams and H.W.
13 th & 14 th	8	Stability theory		Give Lectures	Daily Exams and H.W.
15 th	4	Liapunov stability		Give Lectures	Daily Exams and H.W.
11.	Course	Evaluation			
12.	Learnin	g and Teaching Resources			
Require	ed textbo	oks (curricular books, if any)	The Qualitative Theo Equations. By Fred Brauer، John	-	ary Differential
Main re	ferences	(sources)			
	mended fic journa	books and references ls, reports)			
Electro	nic Refer	ences, Websites			

37. C	ourse Name:			
Abstract algebra I				
38. C	38. Course Code:			
MATH312				
39. Semester / Year:				
1^{st} semester /	2023-2024			
40. D	Description Preparation Date:			
2023				
41.Availab	le Attendance Forms:			
40 N 1				
	r of Credit Hours (Total) / Number of Units (Total)			
60 Hou	urs/4 units			
name) Name: I	Course administrator's name (mention all, if more than one Dr. Ayat Abdulaali Neamah ayatneamah@nahrainuniv.edu.iq			
44. C	Course Objectives			
 Course Objectives Introducing students to basic concepts and important theorems in basic algebra topics Equipping students with the basic concepts of the theory of groups. At the end of this semester , the student can Create complex examples in the topic of group theory Proof of new theories, preliminaries and results in the subject of the group 				
45. Teaching and Learning Strategies				
Strategy	StrategyThe main strategy that will be used in this module is to encourage the studen participation in the module activities. This strategy will be by giving the stud quizzes, assignments, projects and midterm exams throughout the semester			
46. Course S	tructure			

M (1) (1)		Required Learning	Unit or subject	Learning	Evaluation
Week	Hours	Outcomes	name	method	method
1	3	Binary operation- algebraic structure- semi group- monoid		Theoretical lectures	Weekly quizzes
2	3	Group and commutative group and some examples		Theoretical lectures	Weekly quizzes
3	3	Properties of groups and some Theorems		Theoretical lectures	Weekly quizzes
4	3	Left (right) cancellation law + some examples		Theoretical lectures	Weekly quizzes
5	3	Order of a group and order of an element		Theoretical lectures	Weekly quizzes
6	3	Some theorems and problems		Theoretical lectures	Weekly quizzes
7	3	Exam 1 + definition of complex + multiplication of two complexes +definition of subgroup		Theoretical lectures	Weekly quizzes
8	3	Two step test + one step testTheoretical+ some theorems and exampleslectures			Weekly quizzes
9	3	Definition of Coset +Some notes of cosets + Examples		Theoretical lectures	Weekly quizzes
10	3	Normalizer of an element +self conjugate element+center of groupTheoretical lectures			Weekly quizzes
11	3	Exam 2 + normal subgroup+ some results and examples		Theoretical lectures	Weekly quizzes
12	3	Some theorems of normal group + some problems		Theoretical lectures	Weekly quizzes
13	3	More theorems of Normal subgroup		Theoretical lectures	Weekly quizzes
14	3	σ		Weekly quizzes	
15	3	Review		Theoretical lectures	Weekly quizzes
47.	Course	Evaluation			
	0	e score out of 100 according to ily oral, monthly, or written e	0		it such as daily
48.	Learnin	g and Teaching Resources	3		

Required textbooks (curricular books, if any)	Introduction to Abstract Algebra
Main references (sources)	Rose, John S., A course on group theo Dover, Newyork 1994
Recommended books and references	
(scientific journals, reports)	
Electronic References, Websites	

49.	Course Name:			
Abstract alge	bra II			
50.	50. Course Code:			
MATH 313				
51.	Semester / Year:			
2 nd semester	/ 2023-2024			
52.	Description Preparation Date:			
2024				
53.Availa	ble Attendance Forms:			
	er of Credit Hours (Total) / Number of Units (Total)			
	ours/4 Units Course administrator's name (mention all, if more than one			
name)				
/	Dr. Ayat Abdulaali Neamah			
	ayatneamah@nahrainuniv.edu.iq			
56.	Course Objectives			
Course Objectiv				
	theorems in basic algebra topics			
	- Equipping students with the basic concepts of the theory			
	of groups.			
	- At the end of this semester, the student can			
	- Create complex examples in the topic of group theory.			
	- Proof of new theories, preliminaries and results in the			
	subject of the group			
57.	Teaching and Learning Strategies			
Strategy	The main strategy that will be used in this module is to encourage the students			
	participation in the module activities. This strategy will be by giving the stude quizzes, assignments, projects and midterm exams throughout the semester			
58. Course S				

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Homomorphism of groups isomorphism of group + Examples		Theoretical lectures	Weekly quizzes
2	3	Some theorems		Theoretical lectures	Weekly quizzes
3	3	Kernel and image of homomorphism+ example	es	Theoretical lectures	Weekly quizzes
4	3	Fundamental theorem of homomorphism of group	f	Theoretical lectures	Weekly quizzes
5	3	Automorphism + some theorems and problems		Theoretical lectures	Weekly quizzes
6	3	Permutation of groups + order of permutation+ sor examples		Theoretical lectures	Weekly quizzes
7	3	Exam + Cyclic permutation product of disjoint cycle		Theoretical lectures	Weekly quizzes
8	3	even permutation and od permutation		Theoretical lectures	Weekly quizzes
9	3	Important properties of ev and odd permutation	en	Theoretical lectures	Weekly quizzes
10	3	Definition of Alternating group+ Examples	y	Theoretical lectures	Weekly quizzes
11	3	Some Theorems		Theoretical lectures	Weekly quizzes
12	3	Cayley's theorem and its pro	oof	Theoretical lectures	Weekly quizzes
13	3	Cyclic group + Example	S	Theoretical lectures	Weekly quizzes
14	3	Some Theorems and problems		Theoretical lectures	Weekly quizzes
15	3	Review		Theoretical lectures	Weekly quizzes
Distributi preparati	on, daily	aluation ore out of 100 according to oral, monthly, or written ex and Teaching Resources	ams, reports et		t such as daily
		(curricular books, if any)		n to Abstract A	lgebra
Main references (sources)Rose, John S., A course on group theo Dover, Newyork 1994					

Recommended	books	and	references
(scientific journals	s, reports)	
Electronic Refere	ences, We	bsites	

1. Course Name: Applied Mathematics Applied Mathematics				
Applied Mathematics				
2. Course Code:				
MATH 316				
3. Semester / Year:				
First/ Third				
4. Description Preparation Date:				
23/3/2024				
5. Available Attendance Forms:				
Internal Mode of Attendance				
6. Number of Credit Hours (Total) / Number of Units (Total)				
60 hours/ 4 units				
7. Course administrator's name (mention all, if more than one na	ame)			
Name: Dr.Zainab Riyadh Shaker				
Email: zaianb.riyadh22@nahrainuniv.edu.iq				
8. Course Objectives				
Course Objectives 1. To introduce students to the new method Second and third Order Differential Found				
Second and third Order Differential Equation Power Series Method.	ions Using			
2. Study and solutions of Special unctions/				
3. Study and solution of Fourier series met	thod			
9. Teaching and Learning Strategies				
StrategyA- Cognitive goals.1. Students will enhance their logical thinking and problem structuring al further develop their understanding of the concept of proof. 2. Enable students to obtain knowledge and understanding of the bas				
applied mathematics.				
3. Empower students to obtain knowledge and understanding the power	r series metl			
and Fourier Series Analysis in applied mathematics.4. Enable students to gain knowledge and understanding of how laws are	linked.			
5. Support students to identify the most important applications in math				
solving some complicated equations with				
complex roots and how to make a mathematical analysis using Fourier series.				
B. The skills goals special to the course.				
1. The student will be able to use power series method to solve 2nd or even				
2. Studying and finding the analytical solutions for different special functi3. Fourier series will be discussed and studying intensively.	ons/equatio			
Teaching and Learning Methods				

10. Co	ourse	Structure			
			us type of differential equation using effi- se in mathematics.	cient methoc	ls and
		1. The ability to se	elf-research to solve applied mathematic		
			d rehabilitative transferred skills id personal development)	s(other ski	ills relevant
		Exams 85%			
		Homeworks and c Exams 85%	quizzes 15%		
		Assessment weigh Weighting:	nting used for 2-3 attempts.		
		Assessment meth	ods		
		Teaching and Le	arning Methods		
		-	ents to solve mathematical problems usin	ng the simple	est means.
		2. Enabling stude their equations.	ents to solve problems related to the der	ivations of la	ws and
		1. Enabling stude	ents to solve second and third order DI		
		4. Direct oral ques			
		 Programmed m Homework's. 	id-term exams.		
			and daily quizzes.		
		Assessment met	hods		
		4. Assigning stude 5. Solving problem	ents homework. n sheets and past examination papers.		
		-	s to students to test their understanding	of the topic.	
		2. Giving descript	ive homework.		

Week	Hours	Required	Unit or subject name	Learning	Evaluation
		Learning		method	method
		Outcomes			
1	4		Introduction to Linear Equations and Power Series. Studying the convergence of power		
2	4		series. Ordinary Points and Singular Points. Regular Singular Points, The Indicial Equation.		
3	4		Form and Validity of The Solution Near a Regular Singular Point. Indicial Equation with Difference of Roots NonIntegral.		
4	4				

5 4 Indicial Equation with Equal Roots. Non-homogenous case. 5 4 Indicial Equation with Difference of Roots a Positive Integer (Non Logarithmic Case), Solution of Large x 6 4 (Point at Infinity). Special Functions: The Gamma, Beta and Error Functions 7 4 Bessel's Functions: Essel's Equation, Repeated Relation, Integral Form for Bessel's Functions, Modified Bessel's 8 4 Cenerating Function for Legender Polynomials. Social Case, Social Case, C			Differentiation of a Product of Equation.
5 4 Non-homogenous case. 6 4 Indicial Equation with Difference of Roots a Positive Integer (Non Logarithmic Case, Logarithmic Case). Solution of Large x 7 4 Error Functions 8 4 Proteines Festel's Equation, Repeated Relation, Integral Form for Bessel's Functions: Bessel's Equation, Repeated Relation, Legender Polynomial. 9 4 Generating Function for Legender Polynomials, Orthogonality for Legender Polynomials, Associated Legender Equation 10 4 Hypergeometric Equation Confluent Hypergeometric Equation 11 4 Laguerre Polynomials Hermite Polynomials 12 4 Fourier Series: Orthogonality for Legender Polynomials Associated Legender Equation 13 4 Fourier Series: An Expansion Theorem, Examples of Fourier series: Even and odd Functions. 14 4 Fourier Sine Series, Fourier Cosine Series, Change of Interval, Complex Form of Fourier Series. Differentiation and Integral Transform. Fourier Stine & Cosine Transform. 15 4 Integral Transforms. Fourier Integrals. Fourier Transform. Fourier Sine & Cosine Transform. 11. Course Evaluation Integral Transforms. Fourier Integrals. Fourier Transform. Fourier Sine & Cosine Transform. 15 4 Integral Transforms. Fourier Integrals. Fourier Transform. <td< td=""><td></td><td></td><td></td></td<>			
6 4 Positive Integer (Non Logarithmic Case, Logarithmic Case, Logarithmic Case, Solution of Large x (Point at Infinity). 6 4 Quarithmic Case). Solution of Large x (Point at Infinity). 7 4 Error Functions: The Gamma, Beta and Error Functions: Bessel's Equation, Repeated Relation, Integral Form for Bessel's Functions: Legender Floptonnial. 9 4 Generating Function for Legender Polynomial. 9 4 Generating Function for Legender Polynomial. 10 4 Hypergeometric Equation. 11 4 Laguerre Polynomials. Hermite Polynomials 12 4 Fourier Series: Orthogonalily for Legender Polynomials 13 4 Fourier Series: Orthogonalily of a Set of Sine and Cosine. 14 4 Fourier Series: Fourier Cosine Series. Change of Hourier Series. Fourier Transform. Fourier Series. Fourier Transform. Complex Form of Fourier Series. Differentiation and Integration of Fourier Series. Fourier Transform. Fourier Series. Fourier Transform. 15 4 Integral Transforms. Fourier Sine & Cosine Transform. Fourier Transform. 16 4 Integral Transforms. Fourier Transform. Fourier Transform. 15 4 Integral Transforms. Fourier Sine & Cosine Transform. 16 11. Course Evaluation Integral Transforms. Fourie			
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15 4 Integral Transforms. Fourier Integrals. Fourier Transforms. Fourier Sine & Cosine Transform. Convolution Theory of Fourier Transform. 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 any)			
Integral Transforms. Fourier Integrals. Fourier Transforms. Fourier Sine & Cosine Transform. Convolution Theory of Fourier Transform. 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 any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint			I ransform.
Fourier Transforms. Fourier Sine & Cosine Transform. Convolution Theory of Fourier Transform. 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 any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint	15	4	Integral Transforms. Fourier Integrals.
Image: Transform. Transform. 11. Course Evaluation Image: Transform. 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 any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint			Fourier Transforms. Fourier Sine & Cosine
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 any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint			
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 any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint			Transform.
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 any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint			
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 any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint	11		
preparation, daily oral, monthly, or written exams, reports etc 12. Learning and Teaching Resources Required textbooks (curricular books, if any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint	11.	Course Ev	
12. Learning and Teaching Resources Required textbooks (curricular books, if any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint	Distrib	uting the sc	ore out of 100 according to the tasks assigned to the student such as daily
Required textbooks (curricular books, if any) Elementary Differential Equations, by E. D. Rainville and P. E. Bedeint	prepara	ation, daily	oral, monthly, or written exams, reports etc
Rainville and P. E. Bedeint	12.	Learning a	and Teaching Resources
Rainville and P. E. Bedeint	Require	d textbooks	
Fourier series and Boundary Value Problems		-	Rainville and P. E. Bedeint
			Fourier series and Boundary Value Problems

	(Brown and Churchill Series) 8th Edition.		
Main references (sources)	lementary Differential Equations, by E. D.		
	Rainville and P. E. Bedeint		
Recommended books and references (scientific journals, reports)	طرق في الرياضيات التطبيقية, تأليف د. باسل يعقوب Any website that specializes and reliable to study applied mathematics.		
	applied matternatics.		
Electronic References, Websites			

Course	Name:				
Fuzzy se	ets				
Course	Code:				
MATH 317					
Semest	Semester / Year:				
Second	2023-2024				
Descrip	otion Preparation Date:				
23/3/202	24				
	ole Attendance Forms:				
	nce lectures in the classroom				
Numbe	r of Credit Hours (total) / Number of Units (total)				
	rs / 4 units				
Course	administrator's name (mention all, if more than one name)				
Name: A	Asst. Prof. Dr. Fadhel Subhi Fadhel				
Email: <mark>f</mark>	adhel.subhi@nahrainuniv.edu.iq				
Course	Objectives				
arse Obje	• Studying fuzzy logic and in connection with classical				
	mathematical logic in set theory.				
	• Reviewing the basic algebraic and mathematical properties,				
	as well as, fundamental operations on fuzzy sets.				
	• Formulating some real-life problems using fuzzy logic and				
	indicating the appropriateness of fuzzy logic in these studies.				
	• Studying some mathematical topics using fuzzy logic, such				
	as evaluating fuzzy derivatives and integrals, solutions of				
	fuzzy differential equations, studying fuzzy real analysis				
	ng and Learning Strategies				
ategy	The teaching and learning strategy is considered a set of tools and				
	practices carried out by both the teacher and the student in order to				
	comprehend the academic material or course, which is the theory of				
	fuzzy sets, in the best possible way. This depends on two basic factors:				
	good transmission by the subject teacher, which is supported by				
	teaching strategies, and good reception by the student, which is				
	supported by learning strategies. Educational strategies include a set of				
	organized plans and methods followed by the subject teacher in order to guide students towards achieving learning goals, including the cognitive				
	goals of fuzzy logic, the skill goals in formulating life problems in a				
	mathematical manner by representing them with a mathematical model,				
	Fuzzy se Course MATH Semest Second Descrip 23/3/20/ Availab Attenda Numbe 60 hour Course Name: <i>A</i> Email: <u>f</u> Course arse Obje				

	я	nd the emotional an	d value goals thro	ugh the sensory	perception of the				
		and the emotional and value goals through the sensory perception of the nature of the problem and how to deal with it. With it, this is done							
		through specific teaching and learning methods in order for the student							
to acquire transferable general and qualifying skills.									
70. Course Structure									
	Vo. Course StructureWeekHoursRequiredUnit or subjectLearningEvaluation								
WEEK	nours	Learning	name	method	method				
		Outcomes	name	memou	inctitou				
1	4		Basic definitions and examples	Attendance	Ask questions				
		Studying fuzzy		interactive	and give				
		logic		lectures	assignments				
2	4	Study the basic		Attendance	Ask questions				
		algebraic	Basic algebraic	interactive	and give				
		operations with	operations	lectures	assignments				
		examples							
3	4	Generalization of	Expansion	Attendance	Ask questions				
		non-fuzzy concepts	principle and	interactive	and give				
		to fuzzy logic	level sets	lectures	assignments				
	4	Studying the	The membership	Attendance	Ask questions				
4		membership		interactive	and give				
		functions and how to find some of	functions	lectures	assignments				
		them analytically							
		Review some types		Attendance	Ask questions,				
	4	of fuzzy numbers		interactive	give assignments,				
5		and their	Fuzzy numbers	lectures	and make a 1st				
5		relationship to			attendance mid				
		fuzzy sets			exam				
6	4	Studying different	Fuzzy	Attendance	Ask questions				
		types of fuzzy	derivatives and	interactive	and give				
		functions	integrals	lectures	assignments				
7	4	Use the extension	Fuzzy	Attendance	Ask questions				
		principle to find	derivatives and	interactive	and give				
		fuzzy derivatives	integrals	lectures	assignments				
		and integrals							
	4	Introducing the	Fuzzy	Attendance	Ask questions				
8		fuzzifying function	derivatives and	interactive	and give				
		and find its	integrals	lectures	assignments				
9		derivatives	F	A 44 - x 1	A -1				
	4	Use of left-right	Fuzzy	Attendance	Ask questions				
		fuzzing functions to find derivatives	derivatives and	interactive	and give				
			integrals	lectures	assignments				
		and integrals							

	1		-		
10		Introducing fuzzy	Fuzzy	Attendance	Ask questions
	4	differential	differential	interactive	and give
		equations	equations	lectures	assignments
11		Solving fuzzy	Fuzzy	Attendance	Ask questions
	4	differential	differential	interactive	and give
		equations	equations	lectures	assignments
		analytically using			
		complex numbers			
12	4	Study the	Fuzzy	Attendance	Ask questions,
		numerical	differential	interactive	give assignments,
		solutions of fuzzy	equations	lectures	and make a 2nd
		differential			attence mid exam
		equations			
	4	Using the		Attendance	Ask questions
13		Hausdorff distance	Fuzzy real	interactive	and give
		function to define	analysis	lectures	assignments
		fuzzy metric space			
14	4	Give the basics	Fuzzy real	Attendance	Ask questions
		definitions of real	analysis	interactive	and give
		analysis in fuzzy		lectures	assignments
		metric space			
	4	Study compact sets	Fuzzy real	Attendance	Ask questions
15		and convergent	analysis	interactive	and give
		sequences in fuzzy		lectures	assignments
		metric space			
71. Co	ourse Eva	aluation			
Dis	stributing	the score out of 1	00 according	to the tasks assigned	ed to the student
	-		-	written exams, report	
		y written exams	,	· · · · · · · · · · · · · · · · · · ·	
		nd oral exams, hor	owork's and	class activities	
	•		iework s, and	class activities	
		final exam			
72. Le	arning a	nd Teaching Res	ources	I	
Requi	ired textb	ooks (curricular bo	1- Fuzzy Set Theory and Its		
			Applications, Third Edition, By:		
			HJ. Zimmermann, 1996.		
				2- Fuzzy Mathematical Techniques with Applications, By: Kandel	
			A., 1985.		
Main	reference	es (sources)	Fuzzy Set Theory, Foundations		
				and Applicatior	ns, by Klir G. J.
Reco	mmended	books and	1- Fuzzy sets and systems: theory		
		nals, reports)	and applications, by: D. J.		
(, reports)				Dubois and Prade.	
			Dubois and Prade.		

	 2- D. and M.Sc. Theses of Al- Nahrain university. 3- Journal of Fuzzy sets and Systems.
Electronic References, Websites	3-

73. Course N	ame				
Numerical Analysis I					
74. Course C	ode:				
MATH314					
75. Semester	r / Year				
First / 2023/2024					
76. Descripti	on Preparation Date				
1 ST September 2023					
77. Available Atten	dance Forms				
Full time attend	ance				
78.Number of Crea	lit Hours (Total) / Number of Units (Total)				
60/4					
	administrator's name (mention all, if more than				
one name)					
	name: Dr. Omar Al-Tameemi				
	nael@nahrainuniv.edu.iq				
	ant name: Ass. Lec. Abbas Ibrahim Khleaf				
Lab staff name					
1- Lec. Raneer					
2- Ass. Lec. Ha	nneen Abdulkareem				
3- Ass. Lec. Na	baa Husain				
4- Ass. Lec. Ba	tol Imkhelf				
80. Course C	bjectives				
Course Objectives	Derive appropriate numerical methods to solve				
	algebraic and transcendental equations.				
	• Develop appropriate numerical methods to				
	approximate a function.				
	• Derive appropriate numerical methods to evaluate a derivative at a value.				
	 Perform an error analysis for various numerical 				
	methods				
 Prove results for various numerical root finding methods. 					
	• Derive appropriate numerical methods to calculate a definite integral.				
	 Code various numerical methods in a modern computer language. 				
	computer language.				

81.	Теа	aching and Lea	rning Strategies			
Strategy Subject content will be presented in a combination of online materials and in the lectures. Lectures will take the form of an interactive session (3 hours per week) where the material is covered in depth.						
			ected to revise the		before each	
			2 hours per week) v of numerical metho		practical	
		Direct feedback will be provided during the computer labs. Further feedback on progress will be provided using the check-in Assignments which are spaced throughout the semester.				
		Students will be encouraged to develop code-sharing practices in the computer labs, and to tackle problems collaboratively, as well as being able to work on solving problems individually. A central aim of this is to prepare students for real-world coding environments, which consist of a mix of collaboration with intense periods of individual work.				
		Real world problems examples will enable the students to tackle an authentic and challenging problem in science or mathematics that can be approached using the methods given in this subject.				
82 Cours	eo Stri	Icture (Theory)				
	Hours	Cture (Theory) Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method	

1	3 hrs of lecture +1 hr tutorial	Preliminaries of Computing	Numerical Solution, type of errors; relative error, absolute error, percentage error, truncation error, round off error. Floating		
2	3 hrs of lecture +1 hr tutorial	Numerical	Bisection method, fixed- point iteration, Newton's method.	Lectures notes, In class presentations, Examples of Practical	Quizzes, Weekly homework, Team and homework problems, Open questions that have a definite answer,
3	3 hrs of lecture +1 hr tutorial	solution of Nonlinear Equations	Error analysis for Iterative Methods	Applications, Tutorial	(Oral questions)
4	3 hrs of lecture +1 hr tutorial		Computing roots of polynomials.		
5	3 hrs of lecture +1 hr tutorial	Interpolation and Polynomial Approximation	Lagrange Polynomial		
6	3 hrs of exam +1 hr tutorial		Midtern	n exam	
7	3 hrs of lecture +1 hr tutorial	Interpolation and	Divided Differences	Lectures notes, In class	Quizzes , Weekly homework, Team and homework
8	3 hrs of lecture +1 hr tutorial	Polynomial Approximation	Hermite Interpolation, Extrapolation Methods	presentations, Examples of Practical Applications, Tutorial	and nonework problems , Open questions that have a definite answer , (Oral questions)
9	3 hrs of	Numerical Differentiation	Forward, backward and]	

1	2 hours of Lab.	Preliminaries of Computing	Fundamentals of MATLAB Programming,	Lab Lectures, Practical	Exams , Weekly homework, Lab quizzes
Week	Hours	Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Course \$		Required			
	4hrs Structure	(l ab)	Revi	ew	
14	3 hrs of lecture +1 hr tutorial		Romberg integration		
13	3 hrs of lecture +1 hr tutorial	Numerical Integration	Quadrature Integration Methods, Including Gauss- Quadrature Methods, NewtonCots Open and Closed Methods	notes, In class presentations, Examples of Practical Applications, Tutorial	homework, Team and homework problems, Open questions that have a definite answer, (Oral questions)
12	3 hrs of lecture +1 hr tutorial		Trapezoidal Method, Simpson's Method	Lectures	Quizzes , Weekly
11	3 hrs of lecture +1 hr tutorial	Numerical Differentiation	Higher Order Derivatives.		
10	3 hrs of exam +1 hr tutorial		Midterm	n exam	<u> </u>
	lecture +1 hr tutorial		central difference approximation of the derivatives.		
	lecture		central		

			relative error, absolute error, percentage error, round off error. Floating	Applications, Tutorial	
2	2 hours of Lab.	Numerical solution of Nonlinear	Bisection method, fixed- point iteration, Newton's method.		
3	2 hours of Lab.	Equations	Error analysis for Iterative Methods		
4	2 hours of Lab.	Interpolation and Polynomial	Computing roots of polynomials.		
5	2 hours of Lab.	Approximation	Lagrange Polynomial		
6	2 hours of Lab.		Midtern	n exam	
7	2 hours of Lab.		Divided Differences		
8	2 hours of Lab.	Interpolation and Polynomial Approximation	Hermite Interpolation, Extrapolation Methods	Lab Lectures, Practical Applications,	Exams , Weekly homework, Lab
9	2 hours of Lab.	Numerical Differentiation	Forward, backward and central difference approximation of the derivatives.	Tutorial	quizzes
10	2 hours of Lab.		Midtern	n exam	
11	2 hours of Lab.	Numerical Differentiation	Higher Order Derivatives.	Lab Lectures, Practical	Exams , Weekly homework, Lab quizzes

12	2 hours of Lab.		Met Simp	zoidal hod, son's hod	Applications, Tutorial	
13	2 hours of Lab.	Numerical Integration	Integ Metl Inclu Gau Quad Metl Newto Oper	rature ration nods, uding uss- rature nods, on Cots on and Methods		
14	2 hours of Lab.			berg ration		
15	2hrs			Revi	ew	
83. Co	ourse Ev	aluation				
15% lab a Summativ	issessme ve assess	ment 60%: Theo	retical fi	nal exam		-
	84. Learning and Teaching Resource Required textbooks (curricular books, if any)			Burden, F	R. L., Faires, J. D., o umerical analysis.	
Main refer	eferences (sources)				nd R. Bulirsch, Intr 1 Analysis, Springe 20-4	
Recommended books and references (scientific journals, reports)			nonlinear	ley, Iterative metho equations, Society Mathematics		
Electronic	Reference	ces, Websites				

85. Co	urse Name
Numerical Ana	lysis II
86. Co	urse Code:
MATH315	
87. Sei	mester / Year
Second / 2023/2	2024
88. De	scription Preparation Date
1 ST Feb 2024	^
89.Available	e Attendance Forms
Full time	attendance
90.Number of	of Credit Hours (Total) / Number of Units (Total)
60/4	
	ourse administrator's name (mention all, if more than
one nam	
	eader name: Dr. Omar Al-Tameemi
	<u>mar.ismael@nahrainuniv.edu.iq</u>
	Assistant name: Ass. Lec. Abbas Ibrahim Khleaf
Lab staff	names: Dr. Ibtisam Kamil
	Raneen zaid
	.ec. Haneen Abdulkareem
8- Ass. I	lec. Nabaa Husain
9- Ass. I	ec. Batol Imkhelf
10- As	s. Lec Iman Khalid
11- As	s. Lec. Yasemen Moen
12- As	s. Lec. Farah Lateef
92. Co	urse Objectives
Course Objectives	Develop appropriate numerical methods to solve a
	differential equation.
	• Derive appropriate numerical methods to solve a linear system of equations.
	 Derive appropriate numerical methods to solve a
	system of nonlinear equations.
	• Perform an error analysis for various numerical
	methods

93. Teaching	and Learning Strategies
Strategy Subject Strategy Lecture Lecture week) Studer lecture Icomputing Studer Icomputing Direct feedba Assign Studer the computing Icomputing Studer Icomputing Icomputing Icomputing Icomputing	t content will be presented in a combination of online als and in the lectures. es will take the form of an interactive session (3 hours per where the material is covered in depth. Its are expected to revise the online material before each
94. Course Structure	(Theory)

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3 hrs of lecture +1 hr tutorial		Introduction to Numerical Solution of Ordinary Differential Equations		
2	3 hrs of lecture +1 hr tutorial		Finite Difference Method	Lectures	
3	3 hrs of lecture +1 hr tutorial	Introduction to Numerical Solution of Ordinary Differential Equations	Euler and Modified Euler Methods	notes, In class presentations, Examples of Practical Applications,	Quizzes , Weekly homework, Team and homework problems , Open questions that have a definite answer , (Oral questions)
4	3 hrs of lecture +1 hr tutorial	Equations	Explicit and Implicit Methods	Tutorial	
5	3 hrs of lecture +1 hr tutorial		Runge-Kutta Method, of 2 and 4 Orders		
6	3 hrs of exam +1 hr tutorial	Midterm exam			
7	3 hrs of lecture +1 hr tutorial	Direct Methods for Solving Linear Systems Iterative	Linear Systems of Equations, Pivoting Strategies	Lectures notes, In class presentations, Examples of	Quizzes, Weekly homework, Team and homework problems, Open questions that have a definite answer,
8	3 hrs of lecture	Techniques in Matrix Algebra	Linear Algebra and Matrix Inversion,	Practical Applications, Tutorial	(Oral questions)

	+1 hr		The		
	tutorial		Determinant of		
	tutoriai		a Matrix,		
			Matrix,		
			Factorization		
	3 hrs				
	of		Nama		
9	lecture		Norms of		
	+1 hr		Vectors and		
	tutorial		Matrices		
	3 hrs		•	•	
	of				
10	exam		Midterm	n exam	
	+1 hr				
	tutorial				
			Iterative		
	3 hrs		Techniques for		
	of		Solving Linear		
11	lecture	Direct Methods	Systems:		
	+1 hr	for Solving	Jacobi Iterative		
	tutorial	Linear Systems	Gauss-Seidel		
		Iterative	Iterative	Lectures	
	3 hrs	Techniques in		notes,	Quizzes, Weekly
	of	Matrix Âlgebra	Error Bounds	In class	homework, Team
12	lecture	-	and Iterative	presentations,	and homework
	+1 hr		Refinement	Examples of	problems, Open
	tutorial			Practical	questions that have
	3 hrs		Fixed Points for	Applications,	a definite answer, (Oral questions)
	of		Functions of	Tutorial	(Oral questions)
13	lecture	Numerical	Several		
	+1 hr	Solutions of	Variables		
	tutorial	Nonlinear	v arrables		
	3 hrs	Systems of			
	of	Equations	Newton's		
14	lecture	Lquations	Method		
	+1 hr		wiediou		
	tutorial				
15	4hrs		Revi	ew	
Course S	Structure	e (Lab)			
		Required		_	_
Week	Hours	Learning	Unit or	Learning	Evaluation
Week	nours	Learning	subject name	method	method
		Outcomes			
	2	Introduction to	Finite	Lab Lectures,	Evene W-11
					Exams, Weekly
1	2 bours	Numerical	Difference	Practical	
1	hours hours of Lab.	Numerical Solution of	Difference Method	Practical Applications,	homework, Lab quizzes

		Differential			
2	2 hours of Lab.	Equations	Euler and Modified Euler Methods		
3	2 hours of Lab.		Taylor Methods		
4	2 hours of Lab.		Explicit and Implicit Methods		
5	2 hours of Lab.		Runge-Kutta Method, of 2 and 4 Orders		
6	2 hours of Lab.	Midterm exam			
7	2 hours of Lab.	Direct Methods for Solving	Forward and Backward substitution	Lab Lectures, Practical	
8	2 hours of Lab.	Linear Systems Iterative Techniques in	Gauss Elimination	Applications, Tutorial	Exams , Weekly homework, Lab quizzes
9	2 hours of Lab.	Matrix Algebra	LU factorization		
10	2 hours of Lab.		Midtern	n exam	
11	2 hours of Lab.	Direct Methods for Solving Linear Systems	Jacobi Iterative Gauss–Seidel Iterative		
12	2 hours of Lab.	Iterative Techniques in Matrix Algebra	Error Bounds and Iterative Refinement	Lab Lectures, Practical	Exams , Weekly
13	2 hours of Lab.	Numerical Solutions of Nonlinear	Fixed Points for Functions of Several Variables	Applications, Tutorial	homework, Lab quizzes
14	2 hours of Lab.	Systems of Equations	Newton's Method		

15	2hrs	Review						
95. Co	95. Course Evaluation							
15% lab a	Formative assessment 40%: Theory (15% Midterm exams + 10% homework) + 15% lab assessment. Summative assessment 60%: Theoretical final exam 50% + Lab final exam 10%)							
96. Le	arning a	and Teaching Resource	es					
Required t	textbooks	(curricular books, if any)	Burden, R. L., Faires, J. D., & Burden, A. M. (2015). Numerical analysis. Cengage learning.					
Main refer	ences (se	ources)	J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, Springer-Verlag, ISBN 0- 387-90420-4					
Recomme (scientific		ooks and references reports)	C.T. Kelley, Iterative methods for linear and nonlinear equations, Society of Industrial and Applied Mathematics					
Electronic	Reference	ces, Websites						

1. Course	e Name: Human Rights And Democracy					
2. Course	e Code: UREQ 420					
3. Semes	3. Semester / Year: First/ 2023-2024					
4. Descri	ption Preparation Date: 6/12/2023					
5. Availa	ble Attendance Forms: In Presence					
6 Numbe	er of Credit Hours (Total) / Number of Units (Total)					
	urs /1 unit					
7. Cours	e administrator's name (mention all, if more than one name)					
	Ahmed Neama Jouda					
Email:	ahmedjuda68@gmail.com					
8. Coarse	e Objectives					
The air	m of human rights and democracy lectures is to simplify the					
	les of human right and to assure democracy disciplines applying by					
equally	and properly distribution among people in the society.					
	ng and Learning Strategies					
Strategy	This is done through a booklet that was prepared by me using external sources such as books, newspapers, and the information network, through in-person lectures, and supporting this with illustrative means in Word or PDF format. It is carried out through weekly lectures and through observations made by the teacher and measuring the extent of . students' knowledge					

10. C	0. Course Structure							
Week	Hours	Required Learning	Unit or subject	Learning	Evaluation			
		Outcomes	name	method	method			
1	One	The concept	Concepts about	Theoretical				
	Hour	of human rights	human rights and	lecture				
			fundamental					
2			freedoms					
2			Categories	Theoretical				
			and Features of	lecture				
3			Human Rights Characteristics	Theoretical				
3				lecture				
			and advantages of human rights	lecture				
			in Islam.					
4			The difference	Theoretical				
1			between human	lecture				
			rights and public	lootulo				
			freedoms.					
5			Freedom, its	Theoretical				
			concept and	lecture				
			types.					
6			Human rights	Theoretical				
			In ancient	lecture				
			civilizations					
			(Mesopotamia					
			civilization).					
7			Human	Theoretical				
			rights in ancient	lecture				
			civilizations					
			(Chinese,Hindu, Pharaonic					
			and Greek Egypt					
8			Human rights in	Theoretical				
			the heavenly	lecture				
			religions					
			(Christianity and					
			Islam).					

9				ıman rights in e Middle Ages.	Theoretical lecture	
10			Human rights in the modern era and the international organizations responsible for implementing them.		Theoretical lecture	
11		Written Exam				
12			der	e concept of nocracy and it's aracteristics .	Theoretical lecture	
13			-	pes democracy.	Theoretical lecture	
14				ctures	Theoretical	
				mocratic syster		
15				mocratic litical rights.	Theoretical lecture	
11.	Course Ev	valuation	[po	inical rights.	lecture	
	-	ore out of 100 according oral, monthly, or writter		_		such as daily
		and Teaching Resource		•		
Required textbooks (curricular books, if any)				 Universal De Rights (Draftin Universal Decl Rights). Human Righ 3.Human right Wahid). 	ng Committee aration of Hu ats (Thomas F	e of the iman Paine).
Main references (sources)			3. Human Rights in the Divine Religions (Abdul Razzaq Rahim Salal).			
Recommended books and references (scientific			Human rights in the Arab world			
journals	s, reports…)			(Hussein Jame	el)	
Electror	nic Referenc	ces, Websites				

Fourth Stage

13.	Course Name: Topics in Pure Mathematics				
14.	Course Code: MATH 430				
15.	Semester / Year: second/fourth				
16.	Description Preparation Date:2024/3/13				
17.Avai	lable Attendance Forms:				
18.Num	ber of Credit Hours (Total) / Nu	mber of Units (Total):60hours/4 Units			
	Course administrator's name e: Dr. Ahlam J. Khaleel il: ahlam.jamial@nahrainuniv.e	e (mention all, if more than one name) edu.iq			
20.	Course Objectives				
Course Objec	tives	1-Enable students to obtain knowledge and understanding some of the basic principles of Fields.2-Empowering and raising the students skills to obtain knowledge and understanding of the Algebra			
21.	Teaching and Learning Strateg	gies			
Strategy • Introductory written lectures and various activities and assignments which are given in the classroom. • Answering the quick questions raised in the hall and the possibility of solving them by the student. • Adopting the principle of preparing reports by students.					

22. Co	22. Course Structure								
Week	Hours	Required Learning	Unit or	Learning method	Evaluation				
		Outcomes	subject		method				
			name						
1	4	Definition of the Fields, some examples of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments				
2	4	Some Properties and Theorems of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments				
3	4	Some Properties and Theorems of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments				
4	4	Subfields and Prime Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments				
5	4	Maximal Ideals with Some Examples	Certain Special Ideals	Attendance interactive lectures	Ask questions, give assignments, and make a 1 st attence mid exam				
6	4	Some Properties of Maximal Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments				
7	4	Some Theorems of Maximal Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments				
8	4	Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments				
9	4	Some examples and Theorems of Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments				
10	4	Some Theorems of Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments				
11	4	The Radical of A ring, Semisimple Ring	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments				
12	4	Some Theorems of Radical	Certain Special Ideals	Attendance interact lectures	Ask questions, give assignments, and make a 2 nd attence mid exam				
13	4	Definition of Polynomial ring With some Examples	Polynomial Ring	Attendance interactive lectures	Ask questions and give assignments				

14		Some Theorems of	Polynomia	1 Attend	ance	Ask questions and	
14	4	Polynomial Ring	Ring	interac	tive lectures	give assignments	
15		Some Theorems of	Polynomia	1 Attend	ance	Ask questions and	
15	4	Polynomial Ring	Ring	interac	tive lectures	give assignments	
23. (Course I	Evaluation					
Distributing the score out of 100 according to the tasks assigned to the student such as depreparation, daily oral, monthly, or written exams, reports etc							
24. l	earning	and Teaching Reso	ources				
Require	d textboo	ks (curricular books, if a	any) A	A first Course in Abstract Algebra by J. B.			
		,	, Fra	Fraleigh			
Main ref	erences	(sources)	Int	Introduction to to Modern Abstract Algebra			
		· · · · ·	by	by Burton			
Recomn	Recommended books and references						
(scientific journals, reports)							
Electron	ic Refere	nces, Websites					

		Learning name method method					
Week		Required	Unit or subject	Learning	Evaluation		
34. Course Structure							
3			,				
Strategy		<u> </u>	, some activities in	n the class. Elec	ctronic reference		
33.	Teachin	g and Learning S					
		3-To study calcul and other concept	us of residues and its	applications the e	valuation of integi		
			ex power series, clas	-			
		with their derivati	ves, contour integrat	ion and transforma	tions.		
Course Obje	ectives	1-To study the tee	chniques of complex	variable and functi	ons together		
32.	Course	Objectives					
Ema	ail: iman a	. hussain@nahra	ununiv.edu.iq				
		an A. Hussain	· · · ·				
31.	Course	administrator's	name (mention a	all, if more thar	n one name)		
30.Nur	mber of Cre	edit Hours (Total)	/ Number of Unit	s (Total):60 hour	s/ 4Units		
29.AV	mable Alle	nuance rorms: A	nenuance				
20 1	vilable Atta	ndance Forms: A	ttendance				
28.	Descrip	tion Preparation	1 Date:2023-2024	t			
	_	_					
27.	Semeste	er / Year: First/2	2023-2024				
26.	Course	Code: MATH 411	L				
	Course	urse Name: Complex Analysis I					

1-3	12	Field of com numbers		Chapter 1	lectures		
4-8	20	Analytic Functions		Chapter 2	lectures		
9-11	12	Elementary Functions		Chapter 3	lectures		
12-1:	16	Elementary Mapping		Chapter 4	lectures		
35. Cou	rse Evalua	ation					
	<i>,</i>	out of 100 according monthly, or written	,		,	nt such as daily	
		Teaching Resource		3,100013			
Required tex	ktbooks (cur	ricular books, if any)		-	x variables and	applications	
					l v. Churchill x analysis Theo	dore	
Main referer	nces (source	es)			owitz, M. J., Fol		
)3). Complex va		
				introduction and			
				applications (2nd ed).			
				Cambridge University Press.			
				2. Brown, J. W., Churchill, R. V.			
				(2009). Complex Variables and			
				Applications. 8th Edition. New			
				York: McGraw-Hill Higher			
				Education.			
				3. Lundmark, H.			
				(2004). Visualizing complex			
				analytic functions using domain			
					<i>coloring.</i>		
					4. Needham, T. (1997). Visual Complex Analysis. Oxford		
					versity Press, Oz		
				Cill			

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

27	Course	James Complex Analyzia II					
37.	Course	Iame: Complex Analysis II					
38.	Course C	Course Code: MATH 412					
39.	Semeste	r / Year: First/2023-2024					
40.	Descript	ion Preparation Date:2023-2024					
41.Availa	able Atter	ndance Forms: Attendance					
42 Numb	er of Cred	dit Hours (Total) / Number of Units (Total)60 hours/4 Units					
+2.1\u1110		ant mours (Total) / Number of Omits (Total)00 nours/4 Omits					
43.	Course	administrator's name (mention all, if more than one name)					
Name	: Dr. Ima	n A. Hussain					
Email	: iman a.	hussain@nahrainuniv.edu.iq					
44.	Course C	Dbjectives					
Course Objecti	ves	1-To study integral together with various technique					
		with their derivatives, contour integration and transformations.					
		2–To study complex sequence and series and conformal mappings and Rimn					
		sphere.					
45.	Teaching	and Learning Strategies					
Strategy	Lect	ures, Homework, some activities in the class, Electronic reference					
46. Course	Structure						

Week	Hours	Required	Unit or subject	Learning	Evaluation		
		Learning	name	method	method		
		Outcomes					
1-3	12	Integral	Chapter 4	lectures			
4-8	20	Complex sequence	Chapter 5	lectures			
9-11	12	Conformal mapping	Chapter6	lectures			
12-1	16	Sphere surface	Chapter 7	lectures			
47. Cou	urse Evalu	ation					
	-	out of 100 accordin	-	-	nt such as daily		
		l, monthly, or writte		. etc			
	-	Teaching Resource		· 1 1 1	1		
Required te	xtbooks (cu	rricular books, if any)	•	ex variables and el v. Churchill	applications		
				ex analysis Theo	dore		
Main refere	nces (sourc	es)		lowitz, M. J., Fo			
	·)03). Complex va			
				roduction and	indores.		
			-		(b ,		
				plications (2nd e			
				Cambridge University Press.			
				6. Brown, J. W., Churchill, R. V.			
			(20	(2009). Complex Variables and			
			Ap	<i>plications.</i> 8th E	dition. New		
			Yo	rk: McGraw-Hil	l Higher		
			Ed	ucation.			
			7. Lu	ndmark, H.			
			(20	04). Visualizing	complex		
				alytic functions	•		
				oring.	0		
				edham, T. (1997) Visual		
				mplex Analysis.			
			Un	iversity Press, O	xiora.		

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

49.	Course Name:						
Mathe	matical Statistics I						
50.	Course Code:						
MATH	MATH413						
51.	Semester / Year:						
First/	Fourth						
52.	Description Preparation	ı Date:					
		2024/3/20					
53.Avai	lable Attendance Forms:						
Lectu							
) / Number of Units (Total)					
	urs/ 4 credits						
55. nam		name (mention all, if more than one					
	e: Dr. Akram Abbas Al-Sa	0					
Ema	il: akram.alsabbagh@nah	rainuniv.edu.iq					
56.	Course Objectives						
Course Objec	tives	Learning the basic concepts of mathematical					
		statistics					
		 the definition of random variables and 					
		statistical distributions					
	 introducing some of the most common 						
		statistical distributions with some properties					
		statistical distributions with some properties and applications					
57.	Teaching and Learning S	and applications					
	Teaching and Learning S	and applications					
57. Strategy		and applications Strategies					
	The strategy is to provi	and applications Strategies de the students with as much information					
	The strategy is to provi about mathematical sta	and applications Strategies					
	The strategy is to provi about mathematical sta maximize the connectio	and applications Strategies de the students with as much information tistics as possible by attending lectures to					
	The strategy is to provi about mathematical sta maximize the connectio order to solve as many n The lectures, some h	and applications Strategies de the students with as much information tistics as possible by attending lectures to on between the students and the lecturer in real-life statistical applications as possible. nomework and some other additional					
	The strategy is to provi about mathematical sta maximize the connectio order to solve as many r	and applications Strategies de the students with as much information tistics as possible by attending lectures to on between the students and the lecturer in real-life statistical applications as possible. nomework and some other additional					

58. Co	ourse St	ructure					
Week	Hours	Required Learning	Unit o	r subject		Learning	Evaluation
		Outcomes	name			method	method
1	4	Basic concepts	Intro Statis	duction tics	to	lectures	
2-8	28	Statistical distributions	Distri Rand Varia	-	of	lectures	
8-15	28	Common statistical distributions		Spe ematical butions	cial	lectures	
59. (Course I	Evaluation	•				
	n exam: 4 am: 60 n	ł0 marks narks					
60. l	earning	and Teaching Reso	ources				
Require	d textbool	ks (curricular books, if a	any)			uction to ics, Alixande	5
Main references (sources)				-M Applicati - Ap M	loder ons, J M oplica ender	n Mathematica ay L. Devore, K athematical tions, Dennis I	Il Statistics with Cenneth N. Berk, Springer, 2012. Statistics w D. Wackerly, Willi hard L. Scheaf
Recomn	nended	books and refe	rences	11	1011130	<u> </u>	0.
(scientifi	c journals	s, reports)					
Electron	ic Refere	nces, Websites					

<i>C</i> 1	2 N						
61.	Course Name:						
Mathe	ematical Statistics II						
62.	Course Code:						
MATH	MATH414						
63.	63. Semester / Year:						
Secon	nd/ Fourth						
64.	Description Preparation Date:						
65.Avai	lable Attendance Forms:						
Lectu	ures						
66.Num	ber of Credit Hours (Total) / Nur	ber of Units (Total)					
60 ho	ours/ 4 credits						
67.	Course administrator's name	(mention all, if more than one					
name	e)						
Nam	e: Dr. Akram Abbas Al-Sabbagh						
Emai	il: akram.alsabbagh@nahrainun	liv.edu.iq					
68.	Course Objectives						
Course Objec	•	Learning the basic concepts of multivariate					
		mathematical statistics					
	•	the definition of variable transformation and					
		Order Statistics					
	•	Statistical Estimations					
69.	Teaching and Learning Strategi	es					
Strategy							
	The strategy is to provide the	students with as much information					
		as possible by attending lectures to					
	maximize the connection between the students and the lecturer in						
	order to solve as many real-life statistical applications as possible.						
	-	ork and some other additional					
	exercises is also shared on Go						
L	1						

70. Co	ourse St	ructure				
Week	Hours	Required Learning	Unit c	r subject	Learning	Evaluation
		Outcomes	name		method	method
1-5	20	Multivariate	Mult	variate	lectures	
		statistics		ability		
				ibution		
6-9	16	Statistical	Func		lectures	
10.10	10	transformations		om Variable	1.	
10-12	12	Statistical	Samp	0	lectures	
		distribution for order statistics	Distr	ibution		
12-15	12	Parameter	Fetin	nation	lecture	
12-13	12	estimation	Louin	lation	lecture	
71. (Course I	Evaluation				
, 1, 1, 1		10 marks				
	am: 60 n					
72. L	_earning	and Teaching Reso	ources			
Require	d textboo	ks (curricular books, if a	any)		uction to t	-
					ics, Alixander	,
Main ref	erences	(sources)		-Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk,		
				Applications, J	•	Springer, 2012.
				- Ma	athematical	Statistics w
				A A		Wackerly, Willi
				•	ard L. Scheaf	
Recomn	nended	books and refe	rences		on Brooks, 2008).
			01003			
```		s, reports)				
Electron	ic Refere	nces, Websites				

73.	<b>Course</b> N	ame:
	Topology	Ι
74.	Course C	ode:
	MATH 41	.5
75.	Semester	
	First / 202	3-2024
76.	Descripti	on Preparation Date:
	23-3-2024	-
77.	Available	e Attendance Forms:
	Attendanc	e lectures in the classroom
<b>78</b> .	Number	of Credit Hours (Total) / Number of Units (Total)
	60 hours	
79.		dministrator's name (mention all, if more than one name)
	Name: As	st. Prof. Dr. Fadhel Subhi Fadhel
		lhel.subhi@nahrainuniv.edu.ig
80.	Course O	bjectives
Соі	arse Object	e
		undergraduate students and to prepare them for the post graduate
		studies.
		• To give clear statements of pertinent definitions, principles and
		theorems together with illustrative descriptive examples.
		• Improve student's thinking capacity to prove theoretical
		statements (theorems, propositions, remarks, etc.), which are
		given as a homework.
		• Studying the structures, components and properties of different
		questions, without smooth deformations, so that these properties
		remain similar under the formation processes related to the
		tearing process or leaving openings in the transition from one to
		the other and vice versa, as well.
		• Generalize all the concepts of real analysis topic.
		• To cover topics including the basic properties of topological, metric and norms spaces, the separation axioms, compactness,
		the product topology, and connectedness, as well as, state and
		prove theorems related to these concepts.
81.	Teaching	and Learning Strategies
	ategy	The teaching and learning strategy is considered a set of tools
001	~~oJ	and practices carried out by both the teacher and the student in

82. Co	urse St	order to comprehend the academic subject or course, namely topology, in the best possible way. This depends on two basic factors: good transmission by the subject teacher, which is supported by teaching strategies, and good reception by the student, which is supported by learning strategies. Teaching strategies include a set of organized plans and methods followed by the subject teacher in order to guide students towards achieving learning goals, including cognitive goals for theoretical subjects and skill goals for proving theorems in a mathematical manner through sequential and ordered steps, and emotional and value goals through sensory perception of the operative theorems and results and then their proofs. And how to deal with it. This is done through specific teaching and learning methods in order for the student to acquire general and qualifying skills that are transferable.				
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method	
1	4	Introducing topological spaces and its related definitions, as well as, basic definitions and elementary examples	Topological spaces	Attendance interactive lectures	Ask questions and give assignments	
2	4	Give well known examples definitions in topology (indiscrete, discrete, usual and cofinite topologies)	Examples of topological spaces	Attendance interactive lectures	Ask questions and give assignments	
3	4	Studying the derived sets and closure of a set	Topological spaces	Attendance interactive lectures	Ask questions and give assignments	
4	4	Studying the interior, exterior and the boundary points	Topological spaces	Attendance interactive lectures	Ask questions and give some homework's	
5	4	Basis and local bases	Topological spaces	Attendance interactive lectures	Ask questions and give assignments	

6	4	Introducing dense and nowhere dense spaces, separated sets	Topological spaces with special properties	Attendance interactive lectures	Ask questions and give assignments
7	4	Introducing connected, disconnected and separated sets	Topological spaces with special properties	Attendance interactive lectures	Ask questions and give assignments
8	4	Continuous, open and closed mappings	Mappings	Attendance interactive lectures	Ask questions and give assignments
9	4	More concepts related continuous, open and closed mappings	Mappings	Attendance interactive lectures	Ask questions, give assignments, and make a 1st attendance mid exam
10	4	Homeomorphisms	Mappings	Attendance interactive lectures	Ask questions and give assignments
11	4	Topological properties and hereditary	Mappings	Attendance interactive lectures	Ask questions and give assignments
12	4	Product Topological Spaces	Mappings	Attendance interactive lectures	Ask questions and give assignments
13	4	Definitions and examples of compact sets, as well as some theoretical results	Compactness	Attendance interactive lectures	Ask questions, give assignments, and make a 2nd attendance mid exam
14	4	Compact sets (further results)	Compactness	Attendance interactive lectures	Ask questions and give assignments
15	4	Stating and proving the intermediate value theorem	Intermediate value theorem	Attendance interactive lectures	Ask questions and give assignments

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.

30% monthly written exams

10% daily and oral exams, homework's, and class activities

60% written final exam

#### 84. Learning and Teaching Resources

Required textbooks (curricular books	1. Introduction to General Topology, by: K.
any)	Joshi
	2. Theory and problems of general topology,
	Seymour Lipchitz, Schuam's series,1965
Main references (sources)	1-Lecture Notes on Topology, by: John Rognes, 2018.
	2-General Topology, by: Tom Leinster, 2014
Recommended books and reference (scientific journals, reports)	1-Lecture Notes- General Topology, by: Ziad Khalil, 2022.
	General Topology, by: Jesper M. Møller.
Electronic References, Websites	1-lecturer <u>vv3JNSPKeEU</u>

85.	<b>Course</b> N	ame:			
	Topology II				
86.	Course Code:				
	MATH 41	.6			
87.	Semester	•			
		2023-2024			
88.		on Preparation Date:			
	23-3-2024				
89.		Attendance Forms:			
		e lectures in the classroom			
90.		of Credit Hours (Total) / Number of Units (Total)			
0.1	60 hours				
91.		dministrator's name (mention all, if more than one name)			
		st. Prof. Dr. Fadhel Subhi Fadhel			
00		lhel.subhi@nahrainuniv.edu.iq			
	Course O				
Cou	ırse Object	e			
		undergraduate students and to prepare them for the post graduate			
		studies.			
		• To give clear statements of pertinent definitions, principles and theorems together with illustrative descriptive examples.			
		• Improve student's thinking capacity to prove theoretical			
		statements (theorems, propositions, remarks, etc.), which are			
		given as a homework.			
		• Studying the structures, components and properties of different			
		questions, without smooth deformations, so that these properties			
		remain similar under the formation processes related to the			
		tearing process or leaving openings in the transition from one to			
		the other and vice versa, as well.			
		• Generalize all the concepts of real analysis topic.			
	• To cover topics including the basic properties of topological,				
		metric and norms spaces, the separation axioms, compactness,			
		the product topology, and connectedness, as well as, state and			
		prove theorems related to these concepts.			
93.		and Learning Strategies			
Stra	ategy	The teaching and learning strategy is considered a set of tools			
		and practices carried out by both the teacher and the student in			

order to comprehend the academic subject or course, namely topology, in the best possible way. This depends on two basic factors: good transmission by the subject teacher, which is supported by teaching strategies, and good reception by the student, which is supported by learning strategies. Teaching strategies include a set of organized plans and methods followed by the subject teacher in order to guide students towards achieving learning goals, including cognitive goals for theoretical subjects and skill goals for proving proofs in a mathematical manner through sequential and ordered steps, and emotional and value goals through sensory perception of the operative theorems and results and then their proofs. And how to deal with it. This is done through specific teaching and learning methods in order for the student to acquire general and qualifying skills that are transferable.

94. Co	ourse St	ructure			
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Homeomorphism and homeomorphic topological spaces	The relationship between homeomorphic functions and open, closed, and continuous functions	Attendance interactive lectures	Ask questions and give assignments
2	4	Homeomorphism and homeomorphic topological spaces	Homeomorphic spaces and topological properties	Attendance interactive lectures	Ask questions and give assignments
3	4	Compact topological spaces	Open cover, definition of compact set, and examples	Attendance interactive lectures	Ask questions and give assignments
4	4	Compact topological spaces	Theorems and basic properties of compact sets	Attendance interactive lectures	Ask questions and give some homework's
5	4	Hereditary properties	Definition of subspace, examples and theorems	Attendance interactive lectures	Ask questions and give assignments
6	4	Connectedness of topological spaces	Basic definitions and examples with some properties	Attendance interactive lectures	Ask questions and give assignments

7	4	Connectedness of topological spaces	Closed paths and path wise	Attendance interactive	Ask questions and give assignments
			connected paths	lectures	
8	4	Simply and locally connected	Definitions, examples and	Attendance interactive	Ask questions and give assignments
		topological spaces	theorems	lectures	Ask questions,
9	4	The relationship between topological and metric spaces	Theorems	Attendance interactive lectures	Ask questions, give assignments, and make a 1st attendance mid exam
10	4	Separation axioms	T0 and T1 Spaces and their basic theorems	Attendance interactive lectures	Ask questions and give assignments
11	4	Separation axioms	T2 space (Hausdorff space) and its relationship with T1 spaces (basic theorems)	Attendance interactive lectures	Ask questions and give assignments
12	4	Separation axioms	Regular spaces, T3 spaces, and its relationship with T2 spaces	Attendance interactive lectures	Ask questions and give assignments
13	4	Separation axioms	Normal spaces, T4 space and their relationship with T3 spaces	Attendance interactive lectures	Ask questions, give assignments, and make a 2nd attendance mid exam
14	4	Compactness and separation axioms	The relationship between compact spaces and the spaces of the separation axioms	Attendance interactive lectures	Ask questions and give assignments
15	4	Homeomorphism and homeomorphic topological spaces	The relationship between homeomorphic functions and open, closed, and continuous functions	Attendance interactive lectures	Ask questions and give assignments
95. Co	ourse Ev	aluation			
Di	stributin	g the score out of 10	0 according to the	e tasks assigned	to the student such
		ion, daily oral, mont	-	-	

30% monthly written exams 10% daily and oral exams, homework's, and class activities								
60% written final exam								
96. Learning and Teaching Resources								
Required textbooks (curricular books	3. Introduction to General Topology, by: K.							
any)	Joshi							
	4. Theory and problems of general topology,							
	Seymour Lipchitz, Schuam's series,1965							
Main references (sources)	3-Lecture Notes on Topology, by: John Rognes, 2018.							
	4-General Topology, by: Tom Leinster, 2014							
Recommended books and reference	2-Lecture Notes- General Topology, by: Ziad							
(scientific journals, reports)	Khalil, 2022.							
	General Topology, by: Jesper M. Møller.							
Electronic References, Websites	3-lecturer <u>vv3JNSPKeEU</u>							

13.		Course	Course Name:							
	Partial Differential Equations									
14.		Course Code:								
	MATH 410									
15.		Semester / Year:								
	First Semester / Fourth Class									
16.	16. Description Preparation Date:									
				1/10/	2023					
17.4	Availa	able Att	enda	nce Forms:						
10 1	NT1-	an af C		$\mathbf{U}_{\mathbf{r}} = \left( \mathbf{T}_{\mathbf{r}} + \mathbf{r} \right) / \mathbf{N}_{\mathbf{r}}$	al an af Unita (T	- 4 - 1).				
18.1	18.Number of Credit Hours (Total) / Number of Units (Total):									
19 (	60 Hours/ 3Unit 19.Course administrator's name (mention all, if more than one name)									
				d Ayyoub Yousif						
	_			ub@nahrainuniv.edu.iq						
20.		Course	e Obj	ectives						
Course	Objecti	ives	•	The student knows ho	w to solve a differe	ential equation	on of the first			
				and second order.						
			•	The student knows ho	w to make a systen	n of differen	tial equations			
				of the first order.						
			•	The student knows h	ow to use transfor	mations of i	integration in			
				place of partial differe	ntial equations.					
21.		Teachir	ng ai	nd Learning Strateg	ies					
Strategy		1- Dail								
		2- Dail								
				thly Exam.						
4- Home Works.										
22. Co	burse	Structu	re							
Week	Hours	Requi	ired L	_earning Outcomes	Unit or subject	Learning	Evaluation			
					name	method	method			
1 st & 2 nd	8		ons a	to partial differential and the separation of		Give Lectures	Daily Exams and H.W.			

3 rd & 4 th	8	Transforming nonhomogeneous B to homogeneous ones and solvin more complicated problems.		Give Lectures	Daily Exams and H.W.				
5 th & 6 th	8	Transforming hard equations in easier ones and solvin nonhomogeneous PDE usin eigenvector expansion method.	ng	Give Lectures	Daily Exams and H.W.				
$7^{ ext{th}}$ & $8^{ ext{th}}$	8	Integral transform (sine and cosin transform.	ne	Give Lectures	Daily Exams and H.W.				
9 th & 10 th	8	The Fourier series and transforr and its application to PDEs	ns	Give Lectures	Daily Exams and H.W.				
11 th & 12 th	8	The Laplace transform and application to PDEs	ts	Give Lectures	Daily Exams and H.W.				
13 th & 14 th	8	The one dimensional wave equation (hyperbolic equation)		Give Lectures	Daily Exams and H.W.				
15 th	4	The D'alembert solution of the war equation and the finite vibratin string (standing waves) and Ellipt type problems (the Laplacian)	ng	Give Lectures	Daily Exams and H.W.				
23.	23. Course Evaluation								
Monthly exams70%Daily preparation10%Daily exams10%Home works10%24. Learning and Teaching Resources									
Require	ed textbo	oks (curricular books, if any)	Partial differential equations for scientists a engineers By Stanley J. Farlow						
Main re	ferences	(sources)							
Recommended books and references (scientific journals, reports)									
Electronic References, Websites									