Ministry of Higher Education and Scientific Research Scientific Supervision and Scientific Evaluation Apparatus Directorate of Quality Assurance and Academic Accreditation Accreditation Department



Academic Program and Course Description Guide

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

<u>Course Description</u>: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

<u>Program Vision</u>: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

<u>Program Mission</u>: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

<u>Program Objectives:</u> They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

<u>Curriculum Structure</u>: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

<u>Teaching and learning strategies</u>: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra

Academic program description form

University name: University ofBaghdad..... College/Institute: College ofSciences..... Scientific Department: Department of Mathematics Name of the academic or professional program: Mathematics Department Academic Program..... Name of final degree: ... PhD in Mathematics.... Academic system: semester Description preparation date: 10/1/2023

Date of filling the file: 3/31/2024

the signature : Nor Name of scientific assistant: Name of department head:

the date :

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Name of department head: the date :

Check the file before **Division of Quality Assurance and University Performance** Name of the Director of the Quality Assurance and University Performance **Division:**

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the date the signature Istan

Authentication of the Dean

1 Program Vision

Raising the level of graduates of the Mathematics Department to contribute to the scientific and technical development of the country and to be among the ranks of distinguished and pioneering educational departments in academic achievement.

2. Program Mission

Enhancing the educational process in the Mathematics Department to reach the highest level of quality to graduate qualified students who are able to think logically and possess scientific research skills to meet the needs of the labor market.

3. Program Objectives

- Improving the quality of education to keep pace with the current technical development in international universities.
- Developing study plans at the bachelor's degree level to keep pace with scientific developments and the latest developments of the times.
- Qualifying cadres capable of dealing with advanced technologies and modern changes with all effectiveness and flexibility.
- Promoting scientific research in the field of mathematics, studying mathematical and statistical problems, and carrying out scientific research to find appropriate solutions to them, meeting the curricula needs of other departments in the college and universities.

4. Program accreditation

Does the program have program accreditation? From which side? nothing

5. Other external influences

nothing

6. Program structure												
comments *	percentage	Study unit	Number of	Program								
	20%	4	2	Enterprise requirements								
	nothing			College requirements								
	80%	24	10	Department requirements								
			both	summer training								
				Other								

7. Program desc	ription			
Credit hou	Irs	Name of the course or course	Course or course code	Year/level
practical	theoretical			
	3	Topics in dynamic systems	MAT6101	PhD/Applied Chorus 1
	3	Topics in fluid mechanics and thermal transport	MAT6102	
	2	Topics in mathematical statistics	MAT6103	
	2	Applied linear algebra	MAT6104	
	2	Numerical optimization and inverse problems	MAT6105	
		English	UOB6100	
	3	Topics in hysteresis equations	MAT6201	PhD/Applied Chorus 2
	3	Numerical analysis	MAT6202	
	2	Reliability	MAT6203	
	2	Control theory	MAT6204	
	2	Differential equations topics	MAT6205	
	2	Integral transformations and their applications	MAT6206	
	2	Scientific research method	UOB6200	
	3	Total functions	MAT6106	Ph.D./Pure Chorus 1
	3	Sizes 1	MAT6107	
	2	Topics in functional analysis 1	MAT6108	
	2	Algebraic topology	MAT6109	
	2	Classification theory 1	MAT6110	
	2	English	UOB6100	
	3	Homological algebra	MAT6207	Ph.D./Pure

			Course 2
3	Sizes 2	MAT6208	
 2	Topics in functional analysis 2	MAT6209	
 2	Different topology	MAT6210	
2	Classification theory 2	MAT6211	
2	Algebra is non-commutative	MAT6212	
2	Effects on Hardy spaces	MAT6213	
 2	Scientific research method	UOB6200	
3	Nodal analysis	MAT6111	Ph.D./General Chorus 1
3	Fluid mechanics	MAT6112	
2	Topics in statistics	MAT6113	
2	Functional analysis topics	MAT6114	
2	Topics in control theory, fractional differentiation and their applications	MAT6115	
2	Topics in algebraic topology	MAT6116	
2	The theory of univalent functions	MAT6117	
2	English	UOB6100	
3	Topics in dynamical systems	MAT6214	PhD/General Chorus 2
3	Reliability	MAT6215	
2	Integral transformations and their applications	MAT6216	
2	Heat and mass transfer	MAT6217	
 2	Topics in perturbation theory	MAT6218	
 2	Kama sizes	MAT5219	
2	Scientific research method	UOB6200	
 	5		

8. Expected learning outcomes of th	e programme
Knowledge	
.The skills and experiences that a student acquires while undergoing training or a study planYou certainly know that the skills added to the student are through the efforts of the teacher, who sets the goals for each lesson and uses methods to achieve these goals, thus honing the student's skill.	 A1- Developing his analytical capabilities to reach logical solutions to various problems A2- His ability to evaluate the academic program A3- Creating and organizing statistical tables A4- Identifying the basic characteristics of the nature of scientific material
Skills	
The student chooses activities and tasks according to his inclinations and preparations for Achieving these goals Active cooperation between the student and the faculty member within the framework of Subsequent to the intended outcomes Self- evaluation and developing performance first and foremost in light of the rules a specific clear	 B1 - The ability to listen effectively and contribute constructively to the discussion B2 - The ability to make decisions and bear responsibility B3 - The ability to self-discipline and the spirit of motivation B4- The ability to collect information from various sources
Value	
aLearning outcomes help to know what the student should learn and what he can do after completing the academic program he is enrolled in.	 Short exams and quizzes- Extracurricular activities Homework- Semester and final exams for theoretical and practical subjects Small projects within the lesson Interaction within the lecture Reports

9. Teaching and learning strategies

Explanation and clarification through lectures- How to display scientific materials using display devices: data shows, smart boards, and self-learning viaThe internetAnd mini projects withinLectures-Scientific visits.

10. Evaluation methods

-Short exams-Homework-Semester and final exams-Within the lesson-Interaction within the lecture-Reports

11. The teaching staff

Faculty	member	rs				
Preparing teaching st	the taff	Special requirements/skills (If any)	Specialization		Scientific rank	
lecturer	angel		private	general		
nothing	52		Inverse problems	mathematics	A.M.D. Muhammad Sabah Hussein	
			Pure/Algebra	mathematics	Mr. Dr. Abdul Rahman Hamid Majeed	
			Applied/Fluid Mechanics	mathematics	Mr. Dr. Ahmed Mouloud Abdel Hadi	
			Applied	mathematics	Mr. Dr. Raid Kamel Naji	
			mathematics	mathematics	Mr. Dr. Bahar Hamad Ahmed	
			Pure/Algebra	mathematics	Mr. Dr. Wasn Khaled Hassan	
			Pure/Algebra	mathematics	Mr. Dr. Sahira Mahmoud Yassin	
			Pure/Algebra	mathematics	Mr. Dr. Nihad Salem Al- Muzaffar	
			mathematics	mathematics	Mr. Dr. Buthaina Abdel Hassan Ahmed	
			Applied/dynamic systems	mathematics	Mr. Dr. Azhar Abbas Majeed	
			Algebra	mathematics	Mr. Dr. Alaa Abbas Aliwi	
			Nodal analysis	mathematics	Mr. Dr. Qasim Abdul Hamid Jassim	
			Pure/Dali analysis	mathematics	Mr. Dr. Iman Hassan Abboud	
			mathematics	mathematics	Mr. Dr. Zeina Zaki is	

				beautiful
		mathematics	mathematics	Mr. Dr. Hassan Fadel Reda
		Applied	mathematics	Mr. Dr. Sadiq Naji Nasser
			mathematics	A.M.D. Muhammad Ghazi inside
		Counting	mathematics	A.M.D. Tasneem Hassan Kazem
		Zarephath	mathematics	A.M.D. Afraa Radi Sadiq
		Nodal analysis	mathematics	A.M.D. Heba Fawzi Sabaa
		mathematics	mathematics	A.M.D. Iman Ali is torment
		mathematics	mathematics	A.M.D. Meeting Zaki Hammadi
		mathematics	mathematics	A.M.D. Hoda Abdel Sattar Abdel Aoun
		Applied	mathematics	A.M.D. Iraq Tariq Abbas
		Zarephath	mathematics	A.M.D. Ali Abed Obaid

Professional development

Orienting new faculty members

The new faculty member's familiarity with the university, its development vision, its plan towards internationalization, and its development programmes. AndHelping the new faculty member to adapt practically and psychologically and alleviating anxiety that could hinder his participation and integration into university work and activities.

Professional development for faculty members

Identifying the sources of knowledge and electronic information

available to the university faculty member and providing him with the

skills of searching the Internet and databases

12. Acceptance criterion

It is required for the student applying for admission to the master's program<mark>Must have a</mark> bachelor's degree or its equivalent from an accredited university

13. The most important sources of information about the program

Direct guidance through workshops in the Department of Quality Assurance and University Performance at the university and college, and the information available in the description form with its explanations attached by the university.-Websites of Iraqi and foreign universities -Workshops held by the Ministry of Higher Education in addition to the Ministry's standards.

14. Program development plan

Following up on scientific development through scientific research and contacting international, Arab and local universities with the corresponding specialization via the Internet

	مخطط مهارات البرنامج														
Outputs Learning required from the program															
القيم	المعرفة المهارات القيم											اساسىي أم اختياري	name The decision	CodeT he	the year / the level
C4	C3	C2	C1	B4	B3	B2	B 1	A4	A3	A2	A1			decisio n	
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Topics in dynamic systems	MAT6101	
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Topics in fluid mechanics and thermal transport	MAT6102	
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Topics in mathematical statistics	MAT6103	
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Applied linear algebra	MAT6104	
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Numerical optimization and inverse problems	MAT6105	
*	*	*	*	*	*	*	*	*	*	*	*	Basic	English	UOB6100	
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Topics in hysteresis equations	MAT6201	
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Numerical analysis	MAT6202	
													Rendomity	<u>MAT67</u> 03	

*	*	*	*	*	*	*	*	*	*	*	*	Basic	Control theory	MAT6204
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Differential equations topics	MAT6205
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Integral transformations and their applications	MAT6206
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Scientific research method	UOB6200
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Total functions	MAT6106
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Sizes 1	MAT6107
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Topics in functional analysis 1	MAT6108
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Algebraic topology	MAT6109
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Classification theory 1	MAT6110
*	*	*	*	*	*	*	*	*	*	*	*	Basic	English	UOB6100
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Homological algebra	MAT6207
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Sizes 2	MAT6208
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Topics in functional analysis 2	MAT6209
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Different topology	MAT6210
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Classification theory 2	MAT6211
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Algebra is non- commutative	MAT6212

*	*	*	*	*	*	*	*	*	*	*	*	my choice	Effects on Hardy spaces	MAT6213
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Scientific research method	UOB6200
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Nodal analysis	MAT6111
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Fluid mechanics	MAT6112
*	*	*	*	*	*	*	*	*	*	*	*		Topics in statistics	MAT6113
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Functional analysis topics	MAT6114
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Topics in control theory, fractional differentiation and their applications	MAT6115
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Topics in algebraic topology	MAT6116
*	*	*	*	*	*	*	*	*	*	*	*	my choice	The theory of univalent functions	MAT6117
*	*	*	*	*	*	*	*	*	*	*	*	my choice	English	UOB6100
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Topics in dynamical systems	MAT6214
*	*	*	*	*	*	*	*	*	*	*	*	Basic	Reliability	MAT6215
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Integral transformations and their applications	MAT6216
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Heat and mass transfer	MAT6217
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Topics in	MAT6218

													perturbation theory	
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Kama sizes	MAT5219
*	*	*	*	*	*	*	*	*	*	*	*	my choice	Scientific research method	UOB6200

• Please situation Signal in Squares the interview For outputs Learning Individuality from the program Submissive For evaluation

1. Course name

Theory of Univalent Functions (1)

2. Course code

MAT6117

3. Semester/year

Doctorate General / First Semester / 2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

kassim.jassim@sc.uobaghdad.edu.iqEmail:	Name: A.D. Qasim Abdul Hamid Jassim
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject

 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. The strategy	9. Teaching and learning strategies													
 How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 10. Course structure Evaluation method Teaching method Basic concepts Geometric function discussion theoretical Basic concepts Geometric function theoretical Basic concepts Geometric function discussion theoretical Basic concepts of univalent functions Elementary theory of univalent function. Cancer al questions and discussion theoretical Theories and applications of Area theoretical Applications of Area theoretical Theories and applications General theoretical discussion Cancer al questions and theoretical Theories and applications Cancer al questions and discussion Theories and applications Cancer al theoretical Theories and applications Cancer al questions and discussion Cancer al questions and discussion Theories and applications Cancer al questions and discussion Cancer al questions and dincorectical Cancer al questions and discussion<td colspan="12">Explanation and clarification through lectures.</td>	Explanation and clarification through lectures.													
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	General		Applications of	Starlike function	2									
questions and theoretical Starlike function twelveth	questions and	theoretical	Starlike function			twelveth								

discussion					
General questions and discussion	theoretical	Applications of Covex function	Covex function	2	Thirteenth
General questions and discussion	theoretical	Applications of Close-to-Convex Functions	Close-to-Convex Functions	2	fourteenth
General questions and discussion	theoretical	Applications of derivatives	Unitary Matrices	2	Fifteenth
11. Course eval	uation				
Monthly exam, o	quota and ques	st of 40 and final exam of 60			
12. Learning an	nd teaching re	sources			
Peter Lduren, U	nivalent functi	ons, New York, 1983	Required textbooks (methodology, if any)		
Univalent functions".			Main references (sources)		
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.		Recommended supporting books and references (scientific journals, reports)		and oorts)	
 Discreet websites. Virtual library. Library locations in some international universities 			Electronic references, we	ebsites	

1. Course name

Algebraic topology

2. Course code

MAT6116

3. Semester/year

General Doctorate/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

Nome A D. Sahina

sahira.yaseen@sc.uobaghdad.edu.iq Email: afraa.sadek@sc.uobaghdad.edu.iqEmail:	Mahmoud A.M.D. Afraa is satisfied
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to 	Objectives of the study subject

develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions.								
9. Teaching	9. Teaching and learning strategies							
• Explanati	Explanation and clarification through lectures.							
• How to di	splay scien	tific materials using dis	splay devices:					
data show	vs, smart bo	ards						
• Self-learn	ing through	homework and mini-p	orojects within	The stra	ategy			
lectures.	0 0	1	5					
Graduatic	on projectsA	AndaFor scientific visits	5.					
10. Course	structure							
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hour	s the week			
		Homotopic theory	Study of the					
General questions and	theoretical	r v	relationship	2	the first			
discussion	theoretical		between topologic	al	the mst			
General		Contractible space	equivalence Study of spaces the	at				
questions and	theoretical	contractible space	can be compresse	d 2	the			
discussion			into a point		second			
General		First homotopy group	Creation of the firs	st 2				
questions and	theoretical		homotopian grou	р	the third			
General		Van Kamper theorem	Applications of Va	n 2				
questions and	theoretical	I	Camper's theorem	n	the fourth			
discussion				<u> </u>				
General	theoretical	Simply connected	Give a description	of 2	Fifth			
discussion	lileoretical	space	spaces		FIIUI			
General		Quotient space	Give a geometric	2				
questions and	theoretical		description of		VI			
discussion			division spaces					
General questions and	theoretical	Free action	Study of the free	2	Seventh			
discussion	n agent Sevenu							
General		Topological group	al 2					
questions and	theoretical		groups		VIII			
discussion Nonifold Definition of 2								
exam	theoretical	Mailliolu	manifold	2	Ninth			
General		Read the group	Study of groups	2				
questions and	theoretical		from the beginnin	g	The tenth			
discussion			to end					

General		Smooth manifold	Study of the smooth	2	
questions and	theoretical		manifold		eleventh
discussion		2	<u> </u>	-	
General		Covering space	Study the concept of	2	
questions and	theoretical		cover		twelveth
discussion				2	
General	the energiant	HomotopyLifting	Definition of	2	Thirts and h
questions and	theoretical	property	nomotopic int		Thirteenth
Conorol		Eibration higher	A study of	2	
General questions and	theoretical	homotony group	fibrication in group	2	fourteenth
discussion	lileoretical	nomotopy group	arithmetic		Tourteentii
Monthly				2	Fifteenth
exam					Filteentii
11. Course	evaluatior	1			
Monthly exa	am, exams	, quest of 40 and final	of 60		
12. Learnin	g and tead	ching resources			
Algebrai	Algebraic topology, William Fulton, 2019			s (metho	odology,
Element	ary on alge	braic topology, James Munkres, 2015	Main references (so	ources)	
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.			Recommended supporting books and references (scientific journals, reports)		
• Discreet	websites.				
 Virtual library. Library locations in some international universities 			Electronic referenc	es, web	sites

1. Course name

Topics in Dali Analysis (1)

2. Course code

MAT6114

3. Semester/year

General Doctorate/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

	Name: A.D. Buthaina
	Abdel Hassan
buthaina.a@sc.uobaghdad.edu.iqEmail:	Mr. Dr. Iman Hassan Abboud
eiman.abood@sc.uobaghdad.edu.iqEmail:	

8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. 	Dbjectives of the tudy subject

4. Encouraging research programs and participating in scientific conferences and seminars.					
5. Preparing a stimulating environment for faculty members to					
develop their knowledge and educational and research skills-					
Building and developing partnerships with the governmental					
and private sectors and society with all its various institutions.					
9. Teaching and learning strategies					
• Explanation and clarification through lectures.					
• How to display scientific materials using display devices:					
data shows, smart boards	The strategy				
• Self-learning through homework and mini-projects within					
lectures.					
Graduation projectsAndaFor scientific visits.					

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Banach space in Topology	Concept and examples	2	the first
General questions and discussion	theoretical	Banach space	Def. and examples	2	the second
General questions and discussion	theoretical	Finite dimensional Banach space	Theorems and application	2	the third
General questions and discussion	theoretical	infinite dimensional banach space	Def. and theorems	2	the fourth
General questions and discussion	theoretical	Study the space $Lp(\Omega)$	Def. andremark	2	Fifth
General questions and discussion	theoretical	Linear operators, on a normalized space	Concept and examples	2	VI
General questions and discussion	theoretical	Dual space and Bidual space	Def. and remarks	2	Seventh
General questions and discussion	theoretical	Application Banach's theorem to linear equation	Def. and remarks	2	VIII
First semester exam	theoretical	Here Banach theorem with some application	Def. and properties	2	Ninth
General questions and	theoretical	Hilbertspaces	Def. and properties	2	The tenth

discussion						
General questions and discussion	theoretical	Orthonormal sets and Orthonormal basis (countable and uncountable)	Def. and properties		2	eleventh
General questions and discussion	theoretical	Linear operators, on a Banach space	Def. and pr	Def. and properties		twelveth
General questions and discussion	theoretical	adjoint operator	Def. and properties		2	Thirteenth
General questions and discussion	theoretical	Spectrum of Linear operators	Def. and properties		2	fourteenth
General questions and discussion	theoretical	Open mapping theorems	Concept and examples		2	Fifteenth
11. Course	evaluatior	1				
A monthly e	exam, a qu	est of 40, and a final e	exam of 60			
12. Learnin	g and tead	ching resources				
Linea	Linear functional analysis with by (Rymne)2016				Required textbooks (methodology, if any)	
Functional analysis by (Alexander cR Belton)2014				Main ref (sources	ferences	5
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.				Recomn supporti referenc journals	nended ng bool es (scie , reports	s and ntific s)
 Discreet websites. Virtual library. Library locations in some international universities. 				Electron websites	ic refer	ences,

1. Course name	
Nodal analysis	
2. Course code	
MAT6111	
3. Semester/year	
General Ph.D./first course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total))
3/45	
7. Name of the course administrator (if more than one na	ame is mentioned)
hiba.f@sc.uobaghdad.edu.iqEmail:	Name: A.M.D. Heba Fawzi Sabaa
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject

9.	9. Teaching and learning strategies						
•	Explanation and clarification through lectures.						
•	How to display scientific materials using display devices: data shows,						
	smart boards	The strategy					
•	Self-learning through homework and mini-projects within lectures.						
•	Graduation projectsAndaFor scientific visits.						

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Analysis function	Identify analytical functions	3	the first
General questions and discussion	theoretical	Elementary functions	Learn about basic functions	3	the second
General questions and discussion	theoretical	definite integral	Learn about integration	3	the third
General questions and discussion	theoretical	Cauchy integral	Cauchy integral	3	the fourth
General questions and discussion	theoretical	Cauchy- Goursat theorem	Cauchy's theorem courses	3	Fifth
General questions and discussion	theoretical	series	Sequences	3	VI
General questions and discussion	theoretical	Cauchy Residue theorem	Cauchy's residual theorem	3	Seventh
General questions and discussion	theoretical	Application of residues	Residue applications	3	VIII
First semester exam	theoretical	Invers Laplace transforms	Learn about inverse Laplace transforms	3	Ninth
General questions and discussion	theoretical	Mapping by elementary functions	Functions preserving angles	3	The tenth
General questions and discussion	theoretical	Rieman surfaces	Identify the types of transfers		eleventh
General questions and discussion	theoretical	Conform mapping	Preservative functions	3	twelveth
General	theoretical	Applications of	Applications of angle	3	Thirteenth

questions and		conformal mapping	preserving functions		
discussion					
General		The Schwarz-Chritofel	Schwarz-Christoffel		
questions and	theoretical	transformation	transform	3	fourteenth
discussion					
General		Integral formula of the	Learn the truth about		
questions and	theoretical	Poisson type	Poisson type integral	3	Fifteenth
discussion					

11. Course evaluation

12. Learning and teaching resources	
Complex variable and applications by James Ward Brown 2020	Required textbooks (methodology, if any)
Complex analysis by Alfors LV 2014 "Elementary on Complex analysis, James Brown, 2015"	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
 Discreet websites. Default libraryLibrary locations in some international universities. 	Electronic references, websites

modelCourse description

1. Course name
Fluid mechanics
2. Course code
MAT6112
3. Semester/year
General Ph.D./first course/2023-2024
4. The date this description was prepared
10/1/2023
5. Available attendance forms
My presence
6. Number of study hours (total) / number of units (total)

3/45

7. Name of the course administrator (if more than one name is mentioned)				
<u>ahmed.abdulhadi@sc.uobaghdad.edu.iq</u> Email: <u>liqaa.hummady@sc.uobaghdad.edu.iq</u> Email	Name: Prof. Ahmed Mawlood Name: A.M.D. Liqaa Zaki Hammadi			
8. Course objectives				
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject			
9. Teaching and learning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 	The strategy			

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Introduction	Concept and basic	3	the first
General questions and discussion	theoretical	Introduction	Concept and basic	3	the second
General questions and	theoretical	Types of fluid	Def. and theorems	3	the third

discussion					
General		Types of fluid flow	Concent and		
questions and	theoretical	Types of fluid flow	evamples	3	the fourth
discussion	incorctical		examples	5	the fourth
General		Acceleration	Def and theorems		
questions and	theoretical	Acceleration	Delland theorems	3	Fifth
discussion	incorctical			5	1 1101
General		Types of forces acting	Concent and basic		
questions and	theoretical	on fluid flow	concept and basic	3	VI
discussion	licoreticui	on nata now		5	· · ·
General		Types of forces acting	Def and remarks		
questions and	theoretical	on fluid flow	Den and remarks	3	Seventh
discussion	licoretical	on nata now		5	Bevenui
General		Continuity equation	Concent and		
questions and	theoretical	continuity equation	examples	3	VIII
discussion	incoretical		examples	5	V 111
		Motion equation (NS	Concent and basic		
First semester	the exetice 1		concept and basic	2	Nimth
exam	theoretical	equations		3	INIMU
~					
General		Application	Concept and		
questions and	theoretical		examples	3	The tenth
discussion					
General		Dimensional analysis	Def. and theorems		
questions and	theoretical			3	eleventh
discussion					
General		similarity	Concept and		
questions and	theoretical		examples	3	twelveth
discussion					
General		Heat equation	Def. and theorems		
questions and	theoretical			3	Thirteenth
discussion					
General		Boundary layer	Concept and		
questions and	theoretical		examples	3	fourteenth
discussion					
Exam					Fifteenth
11. Course	evaluatior	1			
A monthly exam, the pursuit of 40 and the final of 60					
12 Learning and teaching resources					
	g and ical			1 /	
F	luid mecha	nics, Frank M. White 2	2019 Required textbo	oks (met	hodology,

·	if any)
Fluid mechanics: Fundmentals and application	Main metamonage (agumage)
4th edition 2010	Main references (sources)
The most important books and special sources on the	Recommended supporting books
foundations of mathematics are in the central library, the	and references (scientific journals,
science library, and the department.	reports)

Discreet websites. • Virtual library.

modelCourse description

1. Course n	ame
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English

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2. Course code

UOB6100

3. Semester/year

General Ph.D./first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

ali.abd@sc.uobaghdad.edu.iqEmail:	Name: A.M.D. Ali Abed Obaid
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- 	Objectives of the study subject

Building and developing partnerships with the governmental and private sectors and society with all its various institutions.		
9.	Teaching and learning strategies	
•	Explanation and clarification through lectures.	
•	How to display scientific materials using display devices: data shows,	
	smart boards	The strategy
•	Self-learning through homework and mini-projects within lectures.	
•	Graduation projectsAndaFor scientific visits.	
10). Course structure	

Evaluation **Required** learning Teaching Name of the unit/topic hours the week method method outcomes International student Getting to know General students from questions and 2 the first theoretical different parts of the discussion world and talking to them Knowledge of the General Vocabulary the questions and development of 2 theoretical development second discussion speech vocabulary Where in the world General Identify a location in questions and theoretical the world 2 the third discussion General Newspaper articles Identify articles and questions and theoretical how to read 2 the fourth discussion magazines General Modern technology Learn about the questions and theoretical technology of his 2 Fifth discussion speech General Conferences and visits Identify the style of questions and theoretical writing in conferences 2 VI discussion Science and our world Science and our world General questions and theoretical 2 Seventh discussion General Writing trends Identify the questions and theoretical characteristics of 2 VIII discussion writing Reading air pollution Identify the First semester characteristics of theoretical 2 Ninth exam pollution using the reading method General Past and present Learn about the rules 2 questions and theoretical of the present and past The tenth discussion tense The world of IT General theoretical Identify the basic 2 eleventh

questions and			characteristics of the		
discussion			nature of scientific		
			material		
General		Inventions, discoveries	Identify the		
questions and	theoretical		characteristics of	2	twelveth
discussion			breakthroughs and	_	
~ 1			discoveries		
General		Processes	Identify the basic		
questions and	theoretical		processes of the	2	Thirteenth
discussion			nature of matter		
		International student,	Getting to know		
General		Travel and tourism	students from		
questions and	theoretical		different parts of the	2	fourteenth
discussion			world and talking to		
			them		
Exam					Fifteenth
11. Course evaluation					
Monthly exam and pursuit of 40 and final 60					
12. Learning and teaching resources					
New hand way:- Academic skills reading writing 2016 Required textbooks (methodology, if a			gy, if any)		
Academic skills reading writing 20142015" Main references (sources)					
The most impo	The most important books and special sources on the Recommended supporting books and				and
foundations of mathematics are in the central library, the science library, and the department.			references (scientific jo	urnals, re	eports)
Discreet websites.					
• Virtual library			Electronic references w	vebsites	
• vintual notary.				0001000	
	•				

1. Course name		
Topics in statistics		
2. Course code		
MAT6103		
3. Semester/year		
General Ph.D./first course/2023-2024		
4. The date this description was prepared		
10/1/2023		

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

tasnim.h@sc.uobaghdad.edu Email_ ali.abd@sc.uobaghdad.edu.iq Email					Name: A.M.D. Tasneem Hassan Kazem Name: A.M.D. Iraq Tariq Abbas			
8. Course objectives								
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 					Objectives of the study subject			
9. Teaching and learning strategies								
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 					The strategy			
10. Course structure								
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	5	hours	the week		
General questions and discussion	theoretical	Some techniques of finding point estimator of parameters	Def. ,remarks and examples	ł	2	the first		

General questions and discussion	theoretical	Fisher information and Gramer-Rao inequality	Concept and some remarks	2	the second	
General questions and discussion	theoretical	Baysian Estimation, prior and posterior distribution, loss function, Conjugate prior distributions, predictive distribution	Theorems and application	2	the third	
General questions and discussion	theoretical	Methods of Evaluating Goodness of estimators	Def. and theorems	2	the fourth	
General questions and discussion	theoretical	Unbiased estimator, relatively efficient estimator, sufficient estimator, consistent estimator	Def. andremark	2	Fifth	
General questions and discussion	theoretical	Some techniques for finding interval estimators of parameters	Concept and examples	2	VI	
General questions and discussion	theoretical	Test of statistical hypotheses	Def. and remarks	2	Seventh	
General questions and discussion	theoretical	Regression and correlation analysis	Def. and remarks	2	VIII	
First semester exam	theoretical	Analysis of variance	Def. and remarks	2	Ninth	
General questions and discussion	theoretical	One-way analysis of variance with equal sample sizes	Def. and properties	2	The tenth	
General questions and discussion	theoretical	One-way analysis of variance with unequal sample sizes	Def. and properties	2	eleventh	
General questions and discussion	theoretical	Pair wise comparison,Tests for the Homogeneity of variances	Def. and properties	2	twelveth	
General questions and discussion	theoretical	Goodness of fit Tests	Def. and properties	2	Thirteenth	
General questions and discussion	theoretical	The Chi-Square testsAndContingency tables	Concept and examples	2	fourteenth	
Exam					Fifteenth	
11. Course evaluation						

12. Learning and teaching resources						
1-hogg,RV,J,W. Mckean and AT Craig (2015):	Required textbooks (methodology, if any)					
Introduction to Mathematics Statistics, Sixth Pearson						
Education Inc.						
2- Larsen, R.J. and Marx, L. (2014): An Introduction to						
Mathematics Statistics and its Application. Fifth						
Edition, Prentice Hall.						
Degroot, M. H. (1986): problems and statistics, -1						
Second Edition, Addison, Wesley Pub.Co.						
Devore JL and Berk KN (2012): modern -2						
mathematics statistics with application.second	Main references (sources)					
Ed. Springer New York Dordrecht Heidelberg						
London.						
Mood,AM,raybill,FAbose.DC(1974): -3						
Introduction to the theory of statistics. Third						
Edition, McGraw.Hill						
The most important books and special sources on the	Recommended supporting books and					
foundations of mathematics are in the central library, the	references (scientific journals,					
science library, and the department.	reports)					
• Discreet websites.						
• Virtual library.	Electronic references, websites					

1. Course name

Topics in control theory, fractional differentiation and their applications

2. Course code

MAT6115
3. Semester/year General Ph.D./first course/2023-2024 4. The date this description was prepared 10/1/2023 5. Available attendance forms My presence 6. Number of study hours (total) / number of units (total) 2/307. Name of the course administrator (if more than one name is mentioned) Name: A.D. Sadiq sadiq.n@sc.uobaghdad.edu.iqEmail: Naji 8. Course objectives 1. Encouraging and developing scientific research in the field of mathematics in general. 2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the Objectives of the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and study subject teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems.

4. Encouraging research programs and participating in scientific conferences and seminars.
 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and private sectors and society with all its various institutions.
 9. Teaching and learning strategies

 Explanation and clarification through lectures.
 How to display scientific materials using display devices: data shows, smart boards
 Self-learning through homework and mini-projects within lectures.

• Graduation projectsAndaFor scientific visits.

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Basic concepts and definitions	Identify analytical functions	2	the first
General questions and discussion	theoretical	Attainable sets and controllability	Learn about basic functions	2	the second
General questions and discussion	theoretical	Formulation of simple control models:necessary conditions and sufficient conditions	Learn about integration	2	the third
General questions and discussion	theoretical	The Linear Time Optimal Problem	Cauchy integral	2	the fourth
General questions and discussion	theoretical	Optimal control problems - special forms	Cauchy's theorem courses	2	Fifth
General questions and discussion	theoretical	The Mayer, Lagrange and Bolza problems.	Sequences	2	VI
General questions and discussion	theoretical	Pontryagins Maximum principle: Continuous time	Cauchy's residual theorem	2	Seventh
General questions and discussion	theoretical	Optimality criteria and further properties of autonomous finite and infinite horizon problems	Residue applications	2	VIII
First semester exam	theoretical	Optimal control of several variables	Learn about inverse Laplace transforms	2	Ninth
General questions and discussion	theoretical	Fractional derivatives	Functions preserving angles	2	The tenth
General questions and discussion	theoretical	The popular definitions of fractional derivatives/integrals in fractional Calculus	Identify the types of transfers	2	eleventh
General questions and discussion	theoretical	Properties of fractional derivatives	Preservative functions	2	twelveth
General questions and discussion	theoretical	Fractional optimal control problems	Applications of angle preserving functions	2	Thirteenth
General questions and	theoretical	Discrete time optimal control	Schwarz-Christoffel transform	2	fourteenth

discussion		problemsAndControl			
		applied to biological			
		modelsand financing			
		model In both cases			
		continuous time and			
		discrete time			
Exam					Fifteenth
11. Course	evaluation	ı			
A monthly e	exam, the p	pursuit is from 40, and	the final exam is fr	om 60	
12. Learnin	g and tea	ching resources			
Leonid_TAsl	nchepkov,	Dmitriy_VDolgy,			
Taekyun_Kim			Required textbooks (methodology, if		
		Optimal control, 2021	any)		
Wilson A. Disconta damanial contants with an 1					
Wikan.A. Discrete dynamical systems with an -1					
introduction to discrete optimization problems.					
Grag Vnoula	. An introd	2013			
Greg Knowles	s All Illuou	nuction to applied -2			
Podlubny	[Erection	nol Differential 2	Main references (sources)		
Equations S	$\sum_{n=1}^{n} \operatorname{Diago} \Lambda$	nal Differential -3			
K S Miller &	B Poss An	Introduction to the A			
Fractional Cal	D. KUSS. ,All	actional Differential			
Faultions Ha	ulus allu 117 ordcover Wil	ev Blackwell 1003			
		cy-Diackwell, 1995.			
The most impo	rtant books a	nd special sources on the	Recommended suppor	rting boo	ks and
toundations of	mathematics	are in the central library,	references (scientific journals, reports		reports)
Discreat w	ary, and the o	lepartment.			
Discreet We			Electronic references	wahaitaa	,
• virtual libr	ary.		Electronic references,	websites	,
1			1		

1. Course name	
Topics in algebraic topology 1	
2. Course code	
MAT6116	
3. Semester/year	
General Ph.D./first course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total)	
2/30	
7. Name of the course administrator (if more than one nam	ne is mentioned)
sahira.yaseen@sc.uobaghdad.edu.iq afraa.sadek@sc.uobaghdad.edu.iq Email:	Name: A.D. Sahira Mahmoud Name: A.M.D. Afraa is satisfied
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the 	Objectives of the study subject

requirements of mathematical set teaching metho knowledge and 4. Encouraging conferences and 5. Preparing a set develop their knowledge Building and de private sectors	f work in the ciences throu ds and trainin skills to solv research pro d seminars. stimulating er nowledge and eveloping par and society v	private and public sectors i gh diversification in learnin ng students to apply the acc ve real-world problems. grams and participating in nvironment for faculty men d educational and research therships with the governn with all its various institutio	n ng and puired scientific nbers to skills- nental and ns.		
9. Teaching	and leari	ning strategies			
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 					egy
10. Course	structure				
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Homotopic theory	Study of the relationship between topological equivalence	2	the first
General questions and discussion	theoretical	Contractible space	Study of spaces that can be compressed into a point	2	the second
General questions and discussion	theoretical	First homotopy group	Creation of the first homotopian group	2	the third
General questions and discussion	theoretical	Van Kamper theorem	Applications of Van Camper's theorem	2	the fourth
General questions and discussion	theoretical	Simply connected space	Give a description of the connected spaces	2	Fifth
General questions and discussion	theoretical	Quotient space	Give a geometric description of division spaces	2	VI
General questions and discussionFree actionStudy of the free agent					Seventh
General questions and discussion	theoretical	Topological group	Study of topological groups	2	VIII
First semester	theoretical	Manifold	Definition of	2	Ninth

exam			manifold		
General questions and discussion	theoretical	Read the group	Study of groups from the beginning to end	2	The tenth
General questions and discussion	theoretical	Smooth manifold	Study of the smooth manifold	2	eleventh
General questions and discussion	theoretical	Covering space	Study the concept of cover	2	twelveth
General questions and discussion	theoretical	HomotopyLifting property	Definition of homotopic lift	2	Thirteenth
General questions and discussion	theoretical	Fibration, higher homotopy group	A study of fibrication in group arithmetic	2	fourteenth
Exam					Fifteenth

The monthly exam is 40, and the final exam is 60

12. Learning and teaching resources							
Algebraic topology, William Fulton, 2019	Required textbooks (methodology, if any)						
Elementary on algebraic topology, James Munkres, 2015	Main references (sources)						
The most important books and special sources on the	Recommended supporting books						
foundations of mathematics are in the central library, the	and references (scientific journals,						
science library, and the department.	reports)						
Discreet websites.Virtual library.	Electronic references, websites						

1. Course name
Reliability
2. Course code
MAT6215
3. Semester/year
General Ph.D./second course/2023-2024
4. The date this description was prepared

10/1/2023 5. Available attendance forms My presence 6. Number of study hours (total) / number of units (total) 2/307. Name of the course administrator (if more than one name is mentioned) Name: A.M.D. tasnim.h@sc.uobaghdad.edu.iqEmail: Tasneem Hassan Kazem 8. Course objectives 1. Encouraging and developing scientific research in the field of mathematics in general. 2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the Objectives of the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and study subject teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. 4. Encouraging research programs and participating in scientific conferences and seminars. 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 9. Teaching and learning strategies Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, The strategy smart boards Self-learning through homework and mini-projects within lectures. **10.** Course structure Evaluation Teaching **Required** learning Name of the unit/topic hours the week method outcomes method State Variable. A detailed study of General Time to Failure. the explanation with questions and theoretical 2 the first **Reliability Function** clarification of each discussion word

General questions and discussion	theoretical	Some Special -1 Discrete Distributions	A detailed study of the explanation with clarification of each word	2	the second
General questions and discussion	theoretical	Poisson Process	A detailed study of the explanation with clarification of each word	2	the third
General questions and discussion	theoretical	The Homogeneous Poisson Process	A detailed study of the explanation with clarification of each word	2	the fourth
General questions and discussion	theoretical	Some Special -2 Continuous Distributions	A detailed study of the explanation with clarification of each word	2	Fifth
General questions and discussion	theoretical	Stressor-Dependent Modeling	A detailed study of the explanation with clarification of each word	2	VI
General questions and discussion	theoretical	IFR and DFR distributions	A detailed study of the explanation with clarification of each word	2	Seventh
General questions and discussion	theoretical	Structure Functions	A detailed study of the explanation with clarification of each word	2	VIII
First semester exam	theoretical	Minimal Paths and Minimal Cut Sets	A detailed study of the explanation with clarification of each word	2	Ninth
General questions and discussion	theoretical	Bounds on the Reliability Function	A detailed study of the explanation with clarification of each word	2	The tenth
General questions and discussion	theoretical	Method of Inclusion Exclusion	A detailed study of the explanation with clarification of each word	2	eleventh
General questions and discussion	theoretical	Second Method for -3 Obtaining Bounds.	A detailed study of the explanation with clarification of each word	2	twelveth
General	theoretical	Maximum Likelihood	A detailed study of	2	Thirteenth

					1	
questions and		Estimation and	the explanation with			
discussion		Confidence Intervals for	clarification of each			
		Complete and Censored	word			
		Data				
General		Bayesian Reliability	A detailed study of	2		
Oelieral questions and	theoretical	Analysis and Credibility	the explanation with		fourtoonth	
questions and	theoretical	Intervals, Choice of	clarification of each		Tourteentin	
discussion		Prior Distribution	word			
Questions					Fifteenth	
11. Course	evaluatior	1				
Monthly exa	Monthly exam and pursuit of 40, 60 final exam					
12. Learnin	g and tea	ching resources				
			Required textbooks (mo	ethodolog	gy, if any)	
			Main references (source	es)		
The most impo	rtant books a	nd special sources on the	Decommon de desume ent		a and	
foundations of mathematics are in the central library,			Recommended support	$\lim_{n \to \infty} dook$	s and	
the science library, and the department.			references (scientific jo	urnais, re	eports)	
• Discreet we	ebsites.					
• Virtual library.			Electronic references, websites			
• • • • • • • • • • • • • • • • • • •			· · · · · · · · · · · · · · · · · ·			

1. Course name
Heat and mass transfer
2. Course code
MAT6217
3. Semester/year
General Ph.D./second course/2023-2024
4. The date this description was prepared
10/1/2023
5. Available attendance forms
My presence
6. Number of study hours (total) / number of units (total)

3/45

7. Name of the course administrator (if more than one na	me is mentioned)	
liqaa.hummady@sc.uobaghdad.edu.iqEmail:	Name: A.M.D. Meeting Zaki Hammadi	
8. Course objectives		
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject	
9. Teaching and learning strategies		
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 	The strategy	
10. Course structure		

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Introduction	Identify the basic characteristics of the nature of scientific material	3	the first
General questions and discussion	theoretical	Heat transfer methods	Identify the basic characteristics of the nature of scientific material	3	the second
General questions and discussion	theoretical	Heat transfer methods	Identify the basic characteristics of the nature of scientific	3	the third

			material	1	
		Energy equation in 1-	Identify the basic		
General		dim	characteristics of the		
questions and	theoretical	dilli	nature of scientific	3	the fourth
discussion			mature of scientific		
		English in 2			
General		Energy equation in 2-	Identify the basic		
questions and	theoretical	dim	characteristics of the	3	Fifth
discussion			nature of scientific		
			material		
General		Energy equation in 3-	Identify the basic		
questions and	theoretical	dim	characteristics of the	3	VI
discussion			nature of scientific	C C	
			material		
General		applications	Identify the basic		
questions and	theoretical		characteristics of the	3	Seventh
discussion	theoretical		nature of scientific	5	Seventii
uiscussion			material		
Cananal		applications	Identify the basic		
General			characteristics of the	2	1 /111
questions and	theoretical		nature of scientific	3	VIII
discussion			material		
		Energy equation in 1-	Identify the basic		
First semester		dim	characteristics of the		
exam	theoretical		nature of scientific	3	Ninth
			material		
~ .		Energy equation in 1-	Identify the basic		
General		dim	characteristics of the		
questions and	theoretical	C	nature of scientific	3	The tenth
discussion			material		
		Thermal boundary layer	Identify the basic		
General		Therman boundary rayer	characteristics of the		
questions and	theoretical		nature of scientific	3	eleventh
discussion			material		
		Thormal boundary layor	Identify the basic		
General		Thermal boundary layer	characteristics of the		
questions and	theoretical		nature of acientific	3	twelveth
discussion					
		The sum of the second sum from the second			
General		Thermal boundary layer	abore esteristics of the		
questions and	theoretical		characteristics of the	3	Thirteenth
discussion			nature of scientific		
		A 1' / 1 1	material	<u> </u>	
General		Application thermal	Identify the basic		
questions and	theoretical	boundary layer	characteristics of the	3	fourteenth
discussion			nature of scientific	-	
			material	<u> </u>	
Exam					Fifteenth
11. Course evaluation					

Daily and monthly exams, the final exam is 40 and the final is 60					
12. Learning and teaching resources					
Fundamentals of heat and mass transfer by Frank P. Incropera 2017	Required textbooks (methodology, if any)				
Heat and mass transfer: Fundamentals & Applications by Afshin Jahanshahi and Yungus A. Cengel 2015 Heat and mass transfer: Fundamentals & Applications-McGraw-Hill 2013	Main references (sources)				
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)				
Discreet websites.Virtual library.	Electronic references, websites				

1. Course nameTopics in dynamical systems2. Course codeMAT62143. Semester/yearGeneral Ph.D./second course/2023-20244. The date this description was prepared10/1/20235. Available attendance formsMy presence6. Number of study hours (total) / number of units (total)3/457. Name of the course administrator (if more than one name is mentioned)

raid.naji@sc.uobaghdad.edu.iqEmail:			Na Ka	me: A.D. mel Naji	Raed		
8. Course objectives							
8. Course objectives 1. Encouraging and developing scientific research in the field of mathematics in general. 2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Objectives of the study subject 4. Encouraging research programs and participating in scientific conferences and seminars. 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and private sectors and society with all its various institutions.							
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. 			The strategy				
• Graduation 10. Course	structure	aFor scientific visits.					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	5	hours	the week	
General questions and discussion	theoretical	Basic definitions	Identify the basic characteristics of the nature of scientific material		3	the first	
General questions and discussiontheoreticalExistence and uniquenessIdentify the basic characteristics of th nature of scientific material		he c	3	the second			
General questions and discussion	theoretical	Limit set	Identify the basic characteristics of th nature of scientific material	he c	3	the third	
General questions and discussion	theoretical	Stability theory	Identify the basic characteristics of the nature of scientifie	: he c	3	the fourth	

			mantania1			
			material			
General		Stability theory of	Identify the basic			
General	theoretical	linear system	characteristics of the	2	Eifth	
questions and	meoretical		nature of scientific	5	FIIUI	
discussion			material			
~ .		Stability theory of	Identify the basic			
General		nonlinear system	characteristics of the			
questions and	theoretical		nature of scientific	3	VI	
discussion			material			
		Lavnunov stability	Identify the basic			
General		Laypunov stability	characteristics of the			
questions and	theoretical		characteristics of the	3	Seventh	
discussion			nature of scientific			
			material			
General		Periodic dynamics	Identify the basic			
questions and	theoretical		characteristics of the	3	VIII	
discussion	incorcticui		nature of scientific	5	,	
discussion			material			
		Periodic dynamics	Identify the basic			
First semester	theoretical		characteristics of the	2	Ninth	
exam	theoretical		nature of scientific	3	INIIII	
			material			
~ .		Bifurcation theory	Identify the basic			
General			characteristics of the			
questions and	theoretical		nature of scientific	3	The tenth	
discussion			material			
		Bifurcation theory	Identify the basic			
General		Birdication theory	abarratoristics of the			
questions and	theoretical		characteristics of the	3	eleventh	
discussion			nature of scientific			
General		Bifurcation theory	Identify the basic			
questions and	theoretical		characteristics of the	3	twelveth	
discussion			nature of scientific	-		
			material			
General		Invariant folds	Identify the basic			
ounce and	theoretical		characteristics of the	2	Thirtoonth	
discussion	lieoretical		nature of scientific	5	Timteenui	
uiscussion			material			
		Invariant folds	Identify the basic			
General			characteristics of the	~		
questions and	theoretical		nature of scientific	3	fourteenth	
discussion			material			
Exam			muteriu	3	Fifteenth	
11. Course	11. Course evaluation					
Exam, coz, quest from 40, and final from 60						
12. Learnin	12. Learning and teaching resources					
Denny Guliclc, Encounters with chaos, Required textbooks (methodology, if any)						

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MCGrow Hill 2016	
Robert L. Devany, An introduction to chaotic dynamical system, second edition, Addison - wesely publishing company, Inc. 1989	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

1. Course name	
Topics in sizes	
2. Course code	
MAT6217	
3. Semester/year	
General Ph.D./second course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total)	
2/30	
7. Name of the course administrator (if more than one na	me is mentioned)
sahira.yaseen@sc.uobaghdad.edu.iqEmail:	Name: A.D. Sahira Mahmoud
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are 	Objectives of the study subject

compatible with meet the needs 3. Preparing an requirements of mathematical so teaching metho knowledge and 4. Encouraging conferences and 5. Preparing a so develop their kn Building and do private sectors						
9. Teaching	and leari	ning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 					e strateg	у
10. Course	structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes		hours	the week
General questions and discussion	theoretical	Definition and examples of modules, submodules.	Identify the basic characteristics of th nature of scientific material	le 2	2	the first
General questions and discussion	theoretical	Essential submodule	Identify the basic characteristics of th nature of scientific material	le c	2	the second
General questions and discussion	theoretical	A relative complement of submodules	Identify the basic characteristics of th nature of scientific material	le 2	2	the third
General questions and discussion	theoretical	Close submodules	Identify the basic characteristics of th nature of scientific material	le c	2	the fourth
General questions and discussion	theoretical	Simple modules	Identify the basic characteristics of th nature of scientific material	ie S	2	Fifth
General questions and discussion	theoretical	Semisimple modules The Socle of modules	Identify the basic characteristics of th nature of scientific	e c	2	VI

			material		
General questions and discussion	theoretical	Maximal submodules	Identify the basic characteristics of the nature of scientific material	2	Seventh
General questions and discussion	theoretical	Small submodules	Identify the basic characteristics of the nature of scientific material	2	VIII
First semester exam	theoretical	The Jacobson radical of modules	Identify the basic characteristics of the nature of scientific material	2	Ninth
General questions and discussion	theoretical	Singular and Nonsingular modules	Identify the basic characteristics of the nature of scientific material	2	The tenth
General questions and discussion	theoretical	Injective modules.	Identify the basic characteristics of the nature of scientific material	2	eleventh
General questions and discussion	theoretical	Divisible modules	Identify the basic characteristics of the nature of scientific material	2	twelveth
General questions and discussion	theoretical	Injective hulls of a module	Identify the basic characteristics of the nature of scientific material	2	Thirteenth
General questions and discussion	theoretical	Projective modules	Identify the basic characteristics of the nature of scientific material	2	fourteenth
Exam					Fifteenth

12. Learning and teaching resources					
	Required textbooks (methodology, if any)				
	Main references (sources)				
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)				
Discreet websites.Virtual library.	Electronic references, websites				

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1. Course name				
Integral transformations and their applications				
2. Course code				
MAT6216				
3. Semester/year				
General Ph.D./first course/2023-2024				
4. The date this description was prepared				
10/1/2023				
5. Available attendance forms				
My presence				
6. Number of study hours (total) / number of units (total)				
2/30				
7. Name of the course administrator (if more than one name is mentioned)				
azhar.majeed@sc.uobaghdad.edu.iqEmail:	Name: A.D. Azhar Abbas			
8. Course objectives				
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject			

9. Teaching and learning strategies					
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 					SY
10. Course	structure				
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Definition of infinite Fourier transform	Identify the basic characteristics of th nature of scientific material	e 2	the first
General questions and discussion	theoretical	sine and cosine transform, properties of Fourier transform,	Identify the basic characteristics of th nature of scientific material	e 2	the second
General questions and discussion	theoretical	Properties of Fourier cosine and sine transforms	Identify the basic characteristics of th nature of scientific material	e 2	the third
General questions and discussion	theoretical	inversion theorem (inverse of Fourier transform),	Identify the basic characteristics of th nature of scientific material	e 2	the fourth
General questions and discussion	theoretical	convolution theorem	Identify the basic characteristics of th nature of scientific material	e 2	Fifth
General questions and discussion	theoretical	general Perseval's relationship	Identify the basic characteristics of th nature of scientific material	e 2	VI
General questions and discussion	theoretical	Dirichlet's conditions for existence of Fourier transform	Identify the basic characteristics of th nature of scientific material	e 2	Seventh
General questions and discussion	theoretical	Fourier transform of derivatives	Identify the basic characteristics of th nature of scientific material	e 2	VIII
First semester exam	theoretical	Solving of differential equation, solution for boundary value problems	Identify the basic characteristics of th nature of scientific	e 2	Ninth

material

General questions and discussion	theoretical	Laplace transforms and their basic properties	Identify the basic characteristics of the nature of scientific material	2	The tenth
General questions and discussion	theoretical	existence for the Laplace transform	Identify the basic characteristics of the nature of scientific material	2	eleventh
General questions and discussion	theoretical	the Convolution theorem and properties of Convolution	Identify the basic characteristics of the nature of scientific material	2	twelveth
General questions and discussion	theoretical	the inverse of Laplace transforms and examples	Identify the basic characteristics of the nature of scientific material	2	Thirteenth
General questions and discussion	theoretical	Computation of the Laplace transform inverse by partial fraction method and by convolution theorem	Identify the basic characteristics of the nature of scientific material	2	fourteenth
Exam					Fifteenth

Daily and monthly exams, the end of the course exam is from 40, and the endof-course exam is from 60

12. Learning and teaching resources	
Lokenath Debnath and Dambaru Bhatta, "INTEGRAL TRANSFORMS AND THEIR APPLICATIONS, THIRD EDITION	Required textbooks (methodology, if any)
Lokenath Debnath and Dambaru Bhatta, "INTEGRAL TRANSFORMS AND THEIR APPLICATIONS, THIRD EDITION	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

1. Course name	
Kama sizes	
2. Course code	
MAT6219	
3. Semester/year	
General Ph.D./second course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total)	
2/30	
7. Name of the course administrator (if more than one nam	ne is mentioned)
nuhad.salim@sc.uobaghdad.edu.iqEmail:	Name: A.D. Nihad Salem
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. Teaching and learning strategies 	Objectives of the study subject

•	Explanation and clarification through lectures.				
•	How to display scientific materials using display devices: data shows,				
	smart boards	The strategy			
•	Self-learning through homework and mini-projects within lectures.				
•	Graduation projectsAndaFor scientific visits.				
10. Course structure					

Evaluation **Required** learning Teaching Name of the unit/topic the week hours method method outcomes General Gamma Rings, Concept and 2 the first questions and theoretical Gamma Ideals examples discussion General Gamma Modules Concept and some 2 the questions and theoretical remarks second discussion 2 General Gamma Submodules Definition and questions and theoretical the third remarks discussion 2 General fg Gamma Definition and questions and theoretical the fourth Submodules theories discussion 2 General Free Gamma Definition and questions and theoretical Fifth Modules mark discussion 2 General The residual Gamma Concept and VI questions and theoretical Ideals properties discussion General 2 Homomorphism Definition and questions and theoretical Seventh Gamma Modules remarks discussion 2 The endomorphism Definition and General questions and gamma ring of remarks VIII theoretical discussion Gamma Modules 2 The Gamma Theorems First semester theoretical Isomorphism in Ninth exam Modules 2 General Small and maximum Definition and questions and theoretical The tenth Gamma Submodules Theorems discussion 2 The Jacobson Definition and General Radical of Gamma questions and theoretical properties eleventh discussion Modules 2 General Pure Gamma Definition and questions and theoretical twelveth **Submodules** Theorems discussion

General questions and discussion	theoretical	Projective Gamma Modules	De	efinition and Theorems	2	Thirteenth
General questions and discussion	theoretical	Multiplication Gamma Modules	De	efinition and Theorems	2	fourteenth
Exam						Fifteenth
11. Course	evaluatior	1				
Daily and m	Daily and monthly exams, the pursuit of 40 and the final of 60					
12. Learning and teaching resources						
Gamma Modules (R. Ameri, R. Sadeghi) -1			Required textbooks (methodology, if any)			
On TheGamma-Ringsof Nobusawa -1 Rings and Categories of Modules (Frank W. Anderson Kent R. Fuller)			Main references	(sources)	
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.			Recommended s and references (s reports)	upportin scientific	g books journals,	
Discreet websites.Virtual library.			Electronic refere	ences, we	ebsites	

1. Course name

Scientific research method

2. Course code

UOB6200

3. Semester/year

General Ph.D./first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence	<u>,</u>					
6. Number	of study h	ours (total) / number	r of units (total))		
2/30						
7. Name of	the course	e administrator (if m	ore than one na	ame	e is mer	ntioned)
iraq.t@sc.uoba	ghdad.edu.iq	Email:		Na Tar	me: A.M. iq	.D. Iraq
8. Course o	bjectives					
 a. Course objectives 1. Encouraging and developing scientific research in the field of mathematics in general. 2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. 4. Encouraging research programs and participating in scientific conferences and seminars. 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and research skills- 						
9. Teaching and learning strategies						
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 						
10. Course structure						
Evaluation method	Teaching method	Name of the unit/topic	Required learnin outcomes	ıg	hours	the week
General questions and discussion	theoretical	Introduction to Research Methodology (RM) Research definition and origin	Definition and Theorems	d	2	the first
General questions and	theoretical	Basic Levels of Research	Definition and Theorems	d	2	the second

discussion

General		Steps for Writing	Definition and	2	
questions and	theoretical	Steps for writing		2	the third
discussion	uleoretical		Theorems		ule ulli u
General		Scientific Pesserch	Definition and	2	
General questions and	theoretical	Scientific Research	Definition and	2	the fourth
questions and	theoretical		Theorems		the fourth
Concerci		Main Dessenth Donts		2	
General	theoretical	Main Research Parts	Definition and	Z	E:64b
questions and	theoretical		Theorems		Filth
discussion					
		First Exam Short	Definition and	2	
General		research at the study	Theorems		
General questions and	theoretical	level Undergraduate			VI
questions and	uleoretical	(Bachelor).			V I
discussion					
		Advanced Research at	Definition and	2	
General		the Thesis Level (Mester	Theorems	_	
questions and	theoretical		Theorems		Seventh
discussion		Thesis).			
General		Advanced Research	Definition and	2	
questions and	theoretical	Level Doctoral thesis.	Theorems		VIII
discussion					
First semester		Original Research	Definition and	2	
exam	theoretical	C	Theorems		Ninth
Conorol		Patented	Definition and	2	
General	theoretical	Tatented.	Definition and	2	The tenth
questions and	theoretical		Theorems		The tenth
General		Review Article.	Definition and	2	1 .1
questions and	theoretical		Theorems		eleventh
discussion					
General		Steps for Writing A	Definition and	2	
questions and	theoretical	Scientific Research	Theorems		twelveth
discussion					
General		A Research Topic	Definition and	2	
questions and	theoretical		Theorems		Thirteenth
discussion					
General		The majority of research	Definition and	2	
questions and	theoretical	errors and literature	Theorems		fourteenth
discussion	uncoretical	review			Tourteentii
uiscussion					
Exam					Fifteenth
11. Course	11. Course evaluation				
Daily and m	onthly exa	ams, pursuit of 40 and	final of 60		
· -	-	-			

12. Learning and teaching resources

Research Methodology: Methods And Techniques (Multi Color Edition) Paperback – December 11, 2008	Required textbooks (methodology, if any)
Research Methodology Best Practices for Rigorous, Credible, and Impactful Research <u>Herman Aguinis</u> -The George Washington University	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

1. Course name				
Topics in functional analysis 1				
2. Course code				
MAT6106				
3. Semester/year				
PhD in pure mathematics/first course/2023-2024				
4. The date this description was prepared				
10/1/2023				
5. Available attendance forms				
My presence				
6. Number of study hours (total) / number of units (total)				
2/30				
7. Name of the course administrator (if more than one name is mentioned)				
buthaina.a@sc.uobaghdad.edu.iqEmail: eiman.abood@sc.uobaghdad.edu.iqEmail:	Name: A.D. Buthaina Abdel Hassan Name: Prof. Dr. Iman Hassan			

8. Course objectives							
 1. Encouraging and developing scientific research in the field of mathematics in general. 2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. 4. Encouraging research programs and participating in scientific conferences and seminars. 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 							
9. Teaching	9. Teaching and learning strategies						
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 			The strategy				
10. Course	structure						
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	5	hours	the week	
General questions and discussion	theoretical	Banach space in Topology	Concept and examples		2	the first	
General questions and discussion	theoretical	Banach space	Def. andexample	S	2	the second	
General questions and discussion	theoretical	Finite dimensional Banach space	Theorems and application		2	the third	
General questions and discussion	theoretical	infinite dimensional banach space	Def. and theorems		2	the fourth	
General questions and discussion	theoretical	Study the spaceLp($\overline{\Omega}$)	Def. andremarl	X	2	Fifth	
General	theoretical	Linear operators, on a	Concept and		2	VI	

questions and		normalized space	examples		
discussion					
General		Dual space and Bidual	Def. and remarks	2	
questions and	theoretical	space			Seventh
discussion					
General		Application Banach's	Def. and remarks	2	
questions and	theoretical	theorem to linear			VIII
discussion		equation	- 4 - 1		
First semester	theoretical	Here Banach theorem	Def. and	2	Ninth
exam	theoretical	with some application	properties		i vintii
General		Hilbertspaces	Def. and	2	
questions and	theoretical		properties		The tenth
discussion			FF		
General		Orthonormal sets and	Def. and	2	
questions and	theoretical	Orthonormal basis	properties		eleventh
discussion	licoreticui	(countable and			ere ventin
		uncountable)			
General		Linear operators, on a	Def. and	2	
questions and	theoretical	Banach space	properties		twelveth
discussion			• •		
General		adjoint operator	Def. and	2	
questions and	theoretical		properties		Thirteenth
discussion					
General		Spectrum of Linear	Concept and	2	
questions and	theoretical	operators	examples		fourteenth
discussion					
Exam					Fifteenth
11. Course evaluation					
N/ 11	1 1 11				

Monthly and daily exams, the pursuit of 40 and the final of 60

12. Learning and teaching resources

Linear functional analysis with by (Rymne)2016	Required textbooks (methodology, if any)
Functional analysis by (Alexander cR Belton)2014	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

1. Course name	
Total functions	
2. Course code	
MAT6111	
3. Semester/year	
PhD in pure mathematics/first course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total)	
3/45	
7. Name of the course administrator (if more than one nam	ne is mentioned)
abdulrahman.majeed@sc.uobaghdad.edu.iqEmail: hiba.f@sc.uobaghdad.edu.iqEmail:	Name: A. Dr Abdul Rahman Hamid Name: A.M.D. Heba Fawzi Sabaa
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Dividue and developing environment the sementation and the sementation of the sementation and the sementation of the se	Objectives of the study subject

private sectors	private sectors and society with all its various institutions.				
9. Teaching	9. Teaching and learning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 10. Course structure 					gy
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Complex Functions	Identify the basic characteristics of the nature of scientific material	3	the first
General questions and discussion	theoretical	Elementary Theory of Power Series	Identify the basic characteristics of the nature of scientific material	3	the second
General questions and discussion	theoretical	Analytic Functions as Mappings	Identify the basic characteristics of the nature of scientific material	3	the third
General questions and discussion	theoretical	Complex Integration	Identify the basic characteristics of the nature of scientific material	3	the fourth
General questions and discussion	theoretical	Conformal Mapping.	Identify the basic characteristics of the nature of scientific material	3	Fifth
General questions and discussion	theoretical	Part Two (Entire Functions)	Identify the basic characteristics of the nature of scientific material	3	VI
General questions and discussion	theoretical	Growth of entire functions	Identify the basic characteristics of the nature of scientific material	3	Seventh
General questions and discussion	theoretical	Main integral formulas for analytic functions in a disk	Identify the basic characteristics of the nature of scientific material	3	VIII
First semester exam	theoretical	Some applications of the Jensen formula	Identify the basic characteristics of the	3	Ninth

			nature of scientific		
			material		
Ganaral		Factorization of entire	Identify the basic		
General questions and	theoretical	functions of finite order	characteristics of the	2	The tenth
discussion	uleoretical		nature of scientific	5	The tenth
			material		
General		The connection between	Identify the basic		
Questions and	theoretical	the growth of entire	characteristics of the	2	alayanth
discussion	uleoretical	functions and the	nature of scientific	5	eleventii
uiscussion		distribution of zeros	material		
General		Subharmonic functions	Identify the basic		
questions and	theoretical		characteristics of the	3	twolvoth
discussion	uleoretical		nature of scientific	5	tweiveni
discussion			material		
General		Complex Functions	Identify the basic		
questions and	theoretical		characteristics of the	2	Thirtoonth
discussion	uleoretical		nature of scientific	5	1 mileenui
discussion			material		
General		Elementary Theory of	Identify the basic		
questions and	theoretical	Power Series, Analytic	characteristics of the	3	fourteenth
discussion	uncoretical	Functions as Mappings	nature of scientific	5	Tourteentin
41504551011			material		
					Fifteenth

Daily and monthly exam, pursuit of 40 and final exam of 60

12. Learning and teaching resources

Buterin, S.A., Freiling, G., Yurko, V.A.: Lectures on the Theory of Entire Functions, 2014.	Required textbooks (methodology, if any)
James Ward Brown, Ruel V. Churchill: Complex Variables and Applications, Eighth Edition, 2004	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

1. Course name
Sizes 1
2. Course code

MAT6107

3. Semester/year

PhD in pure mathematics/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

3/45

7. Name of the course administrator (if more than one name is mentioned)

nuhad.salim@sc.uobaghdad.edu.iqEmail:	Name: A.D. Nihad Salem
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject
9. Teaching and learning strategies	
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 	The strategy
10. Course structure	

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Essential submodels	Definition of essential partial sizes	3	the first
General questions and discussion	theoretical	Small submodels	Definition of small partial sizes	3	the second
General questions and discussion	theoretical	close module	Definition of closed partial sizes	3	the third
General questions and discussion	theoretical	injectective module	Study the internal sizes	3	the fourth
General questions and discussion	theoretical	Injection hull of module	Studying the concept and its relationship with substantive partial models	3	Fifth
General questions and discussion	theoretical	Hollow modules	Study of hollow sizes	3	VI
General questions and discussion	theoretical	lifting modules	Study of lifting sizes	3	Seventh
General questions and discussion	theoretical	Supplementedmodules	A study of sizes To complete it	3	VIII
First semester exam	theoretical	The socal of a module	Study the concept of Socle	3	Ninth
General questions and discussion	theoretical	The singular submodule	Study of abnormal partial sizes	3	The tenth
General questions and discussion	theoretical	Projective module	Definition of projective sizes	3	eleventh
General questions and discussion	theoretical	Projective cover of a module	Definition of cover unlessFall	3	twelveth
General questions and discussion	theoretical	Extending modules	Definition of expansion sizes	3	Thirteenth
General questions and discussion	theoretical	Theradical of a module	Definition of the root of the module	3	fourteenth
Exam					Fifteenth

Daily and monthly exams, pursuit from 40, final from 60

12. Learning and teaching resources

12. Dear ming and teaching resources		
Abstract algebra, WNCBrown published by DM Burton	Required textbooks (methodology, if	
2017	any)	
Modules and categories, springer-verlage, Berlin, New	Main references (courses)	
York, 2013	Wall Telefences (sources)	
The most important books and special sources on the foundations of mathematics are in the control library.	Recommended supporting books and	
the science library, and the department.	references (scientific journals, reports)	
• Discreet websites.		
• Virtual library.	Electronic references, websites	

1. Course name		
Classification theory 1		
2. Course code		
MAT6110		
3. Semester/year		
PhD in pure mathematics/first course/2023-2024		
4. The date this description was prepared		
10/1/2023		
5. Available attendance forms		
My presence		
6. Number of study hours (total) / number of units (total)		
2/30		
7. Name of the course administrator (if more than one na	me is mentioned)	
bahar.ahmed@sc.uobaghdad.edu.iqEmail:	Name: A.D. Bahar Hamad	
8. Course objectives		
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of 	Objectives of the study subject	

 mathematics, b compatible with meet the needs 3. Preparing an requirements of mathematical s teaching methon knowledge and 4. Encouraging conferences and 5. Preparing a s develop their k Building and de private sectors 9. Teaching	oth morpholo h international of the educat d qualifying a f work in the ciences throunds and training skills to solve research pro- d seminars. stimulating er nowledge and eveloping par- and society we and leartific:	bgical and applied, so that t al standards of academic qua- tion sector with highly qual specialist students to meet to private and public sectors in agh diversification in learning students to apply the accu- re real-world problems. grams and participating in invironment for faculty men- d educational and research thereships with the government with all its various institution hing strategies	hey are aality to ified cadres. the in ng and juired scientific hbers to skills- nental and ns.		
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 			evices: data shows, within lectures.	The strateg	gy
10. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Categories and Functions.	Identify the basic characteristics of th nature of scientific material	2 2	the first
General questions and discussion	theoretical	Natural transformation.	Identify the basic characteristics of th nature of scientific material	2 2	the second
General questions and discussion	theoretical	Monic, Epic and Zero.	Identify the basic characteristics of th nature of scientific material	2 2	the third
General questions and discussion	theoretical	Home-Sets. Duality.	Identify the basic characteristics of th nature of scientific material	e 2	the fourth
General questions and discussion	theoretical	Contravariance and Opposites.	Identify the basic characteristics of th nature of scientific material	2 2	Fifth
General questions and	theoretical	Product of categories	Identify the basic characteristics of th	e 2	VI

discussion			nature of scientific		
General questions and discussion	theoretical	The category of all categories	Identify the basic characteristics of the nature of scientific material	2	Seventh
General questions and discussion	theoretical	Universal Arrows	Identify the basic characteristics of the nature of scientific material	2	VIII
First semester exam	theoretical	The Yoneda	Identify the basic characteristics of the nature of scientific material	2	Ninth
General questions and discussion	theoretical	Coproduct and Colimits	Identify the basic characteristics of the nature of scientific material	2	The tenth
General questions and discussion	theoretical	Product and Limits	Identify the basic characteristics of the nature of scientific material	2	eleventh
General questions and discussion	theoretical	Adjunctions and examples of Adjoints.	Identify the basic characteristics of the nature of scientific material	2	twelveth
General questions and discussion	theoretical	Reflective Subcategories	Identify the basic characteristics of the nature of scientific material	2	Thirteenth
General questions and discussion	theoretical	Abelian Categories and Additive Categories	Identify the basic characteristics of the nature of scientific material	2	fourteenth
Exam					Fifteenth

Daily and monthly exams, the final exam is 40 and the final is 60

12. Learning and teaching resources				
Basic Category TheoryTom Leinster, 2014	Required textbooks (methodology, if any)			
An introduction to category theory, Jill Adamek, 1990	Main references (sources)			
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)			
Discreet websites.Virtual library.	Electronic references, websites			
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1. Course name	
Algebraic topology	
2. Course code	
MAT6109	
3. Semester/year	
PhD in pure mathematics/first course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total	l)
2/30	
7. Name of the course administrator (if more than one n	ame is mentioned)
sahira.yaseen@sc.uobaghdad.edu.iqEmail: afraa.sadek@sc.uobaghdad.edu.iqEmail:	Name: A.D. Sahira Mahmoud Name: A.M.D. Afraa Radi
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- 	Objectives of the study subject

Building and d private sectors	eveloping par and society v	rtnerships with the governn vith all its various institutio	nental and ns.		
9. Teaching and learning strategies					
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 					SY.
10. Course	structure				
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Topology, some connected concepts, compactetc.	Identify the basic characteristics of th nature of scientific material	2 2	the first
General questions and discussion	theoretical	Maps; continuous maps, smooth maps, quotient maps.	Identify the basic characteristics of th nature of scientific material	2 2	the second
General questions and discussion	theoretical	Diffeomorphism, locally homeomorphism and locally diffeomorphism	Identify the basic characteristics of th nature of scientific material	2 2	the third
General questions and discussion	theoretical	Chain rale, Jacobian and Liner maps	Identify the basic characteristics of th nature of scientific material	2 2	the fourth
General questions and discussion	theoretical	Diganarate and quadratic forms	Identify the basic characteristics of th nature of scientific material	2 2	Fifth
General questions and discussion	theoretical	Topolagical groups and free groups	Identify the basic characteristics of th nature of scientific material	2 2	VI
General questions and discussion	theoretical	View groups and groups	Identify the basic characteristics of th nature of scientific material	2 2	Seventh
General questions and discussion	theoretical	Tangent space in and action (free and fixed point free). R^2	Identify the basic characteristics of th nature of scientific material	2 2	VIII
First semester	theoretical	Smooth action and	Identify the basic	2	Ninth

			nature of scientific		
			material		
Cananal		Smooth maps on	Identify the basic	2	
General	theoretical	manifolds	characteristics of the		The tenth
questions and	theoretical		nature of scientific		The tenth
discussion			material		
Conoral		Inverse function	Identify the basic	2	
General	theoretical	theorem in manifolds	characteristics of the		alayanth
discussion	theoretical		nature of scientific		eleventii
uiscussion			material		
General		General preimage	Identify the basic	2	
General	theoretical	theorem and attaching	characteristics of the		twolvoth
discussion	theoretical	spaces	nature of scientific		tweiveni
			material		
General		General preimage	Identify the basic	2	
Oelieral questions and	theoretical	theorem and attaching	characteristics of the		Thirtoonth
diaguasion	theoretical	spaces	nature of scientific		Timteentii
			material		
General		General preimage	Identify the basic	2	
Questions and	theoretical	theorem and attaching	characteristics of the		fourtoonth
discussion	uleoretical	spaces	nature of scientific		Tourteentii
uiscussioli			material		
					Fifteenth

11. Course evaluation

Monthly and daily exam, quest from 40 and final from 60

12. Learning and teaching resources				
	Required textbooks (methodology, if any)			
	Main references (sources)			
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)			
Discreet websites.Virtual library.	Electronic references, websites			

1. Course name
English
2. Course code

3. Semester/year

PhD in pure mathematics/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

Email:

Name: A.M.D.

8. Course objectives				
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject			
9. Teaching and learning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 				
10. Course structure				

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	the first
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	the second
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	the third
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	the fourth
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	Fifth
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	VI
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	Seventh
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	VIII
First semester exam	theoretical		Identify the basic characteristics of the nature of scientific material	2	Ninth
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	The tenth
General questions and discussion	theoretical		Identify the basic characteristics of the nature of scientific material	2	eleventh
General questions and	theoretical		Identify the basic characteristics of the	2	twelveth

diamanian			notions of actorities		
discussion			nature of scientific		
			material		
General			Identify the basic		
questions and	theoretical		characteristics of the	2	Thirteenth
discussion			nature of scientific		
			material		
General			Identify the basic		
questions and	theoretical		characteristics of the	2	fourteenth
discussion	lineoretieur		nature of scientific	-	Tourteentii
albeabbion			material		
Exam					Fifteenth
11. Course	11. Course evaluation				
Monthly and	d daily exa	m, quest 40, final 6	50		
12. Learnin	g and tead	ching resources			
			Required textbooks (methodology, if any)		
М			Main references (sources)		
The most impo	rtant books a	nd special sources on		1 1	
the foundations of mathematics are in the central		Recommended supporting books and			
library, the science library, and the department.		references (scientific journ	als, repo	rts)	
 Discreet websites 					
Visteel library			Electronic references, websites		
• virtual fibra	ary.			51105	

1. Course nameHomological algebra2. Course codeMAT62073. Semester/yearPhD in pure mathematics/second course/2023-20244. The date this description was prepared10/1/20235. Available attendance forms

My presence 6. Number of study hours (total) / number of units (total) 3/457. Name of the course administrator (if more than one name is mentioned) Name: A.D. Alaa alaa.elewi@sc.uobaghdad.edu.iqEmail: Abbas 8. Course objectives 1. Encouraging and developing scientific research in the field of mathematics in general. 2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in Objectives of the mathematical sciences through diversification in learning and study subject teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. 4. Encouraging research programs and participating in scientific conferences and seminars. 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 9. Teaching and learning strategies Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, • smart boards The strategy • Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. **10.** Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Direct sum (product) of modules	Identify the basic characteristics of the nature of scientific material	3	the first
General questions and discussion	theoretical	Free (projective) modules	Identify the basic characteristics of the nature of scientific material	3	the second

General questions and discussion	theoretical	Tensor product	Identify the basic characteristics of the nature of scientific material	3	the third
General questions and discussion	theoretical	Chain Complex	Identify the basic characteristics of the nature of scientific material	3	the fourth
General questions and discussion	theoretical	Chain transformation	Identify the basic characteristics of the nature of scientific material	3	Fifth
General questions and discussion	theoretical	n-dimentional homology	Identify the basic characteristics of the nature of scientific material	3	VI
General questions and discussion	theoretical	Shan t exact sequence at chain complexes	Identify the basic characteristics of the nature of scientific material	3	Seventh
General questions and discussion	theoretical	Projective resolution	Identify the basic characteristics of the nature of scientific material	3	VIII
First semester exam	theoretical	Injective modules	Identify the basic characteristics of the nature of scientific material	3	Ninth
General questions and discussion	theoretical	Injective resolution	Identify the basic characteristics of the nature of scientific material	3	The tenth
General questions and discussion	theoretical	Reduced projective resolution	Identify the basic characteristics of the nature of scientific material	3	eleventh
General questions and discussion	theoretical	n-dimension at co homology	Identify the basic characteristics of the nature of scientific material	3	twelveth
General questions and discussion	theoretical	university theorem for homology	Identify the basic characteristics of the nature of scientific material	3	Thirteenth
General questions and discussion	theoretical	approximation at a lower sequence	Identify the basic characteristics of the nature of scientific material	3	fourteenth
Exam				3	Fifteenth

11. Course evaluation

Monthly and daily exams, the pursuit of 40 and the final of 60

12. Learning and teaching resources

0 0	
Topics in Ring Theory by IN HERSTEIV 2013	Required textbooks (methodology, if any)
Auto orphisms and derivations of associative ring by Kharcheuko VK 2014	Main references (sources)
The most important books and special sources on the	Recommended supporting books and
foundations of mathematics are in the central library, the	references (scientific journals,
science library, and the department.	reports)
Discreet websites.Virtual library.	Electronic references, websites

modelCourse description

1. Course name

Effects on Hardy spaces

2. Course code

MAT6213

3. Semester/year

PhD in pure mathematics/second course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

eiman.abood@sc.uobaghdad.edu.iqEmail:

Name: Prof. Dr. Eman Hassan

8. Course objectives

 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 					bjective udy sub	es of the oject
9. Teaching	g and learn	ning strategies		1		
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 			Th	e strateg	у	
10. Course structure						
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	5	hours	the week
General questions and discussion	theoretical	Analytic function theory.	Identify the basic characteristics of th nature of scientific material	ne c	2	the first
General questions and discussion	theoretical	Taylor theorem	Identify the basic characteristics of the nature of scientific material		2	the second
General questions and discussion	theoretical	The conformal automorphisms.	Identify the basic characteristics of the nature of scientific material		2	the third
General questions and discussion	theoretical	The angular derivative of a holomorphic self- maps	Identify the basic characteristics of th nature of scientific material	ne c	2	the fourth
General questions and discussion	theoretical	The fixed points and the Denjoy-Wolff point of a holomorphic self-	Identify the basic characteristics of th nature of scientific	ne c	2	Fifth

		maps.	material		
Comoral		Hardy spaces.	Identify the basic	2	
General	theoretical		characteristics of the		VI
discussion	lieoretical		nature of scientific		V I
uiscussion			material		
General		The definition of Hardy	Identify the basic	2	
questions and	theoretical	space	characteristics of the		Seventh
discussion	uncoretical		nature of scientific		Seventii
discussion			material		
General		The proof of the Hardy	Identify the basic	2	
questions and	theoretical	Space is a Hilbert space	characteristics of the		VIII
discussion	licoreticui		nature of scientific		V 111
albeabbioli			material		
		Study some of the	Identify the basic	2	
First semester	theoretical	Hardy space	characteristics of the		Ninth
exam	licoreticui		nature of scientific		1 (IIIui
			material		
General		The composition	Identify the basic	2	
questions and	theoretical	operator on Hardy	characteristics of the		The tenth
discussion	lineoretieur	spaces.	nature of scientific		
			material	_	
General		The definition of the	Identify the basic	2	
questions and	theoretical	composition operator on	characteristics of the		eleventh
discussion		Hardy space.	nature of scientific		
			material		
General		Study some elements of	Identify the basic	2	
questions and	theoretical	the properties of the	characteristics of the		twelveth
discussion		composition operator.	nature of scientific		
			Inaterial	2	
General		The adjoint of the	Identify the basic	2	
questions and	theoretical	composition operator.	characteristics of the		Thirteenth
discussion			mature of scientific		
		The normality and	Identify the basic	2	
General		compactness of the	characteristics of the	2	
questions and	theoretical	composition operator	nature of scientific		fourteenth
discussion	licoretical	The spectrum of the	material		Tourteentin
discussion		composition operator	material		
Exam		composition operator			Fifteenth
11. Course	evaluation	1			
Mand11	1 1.1				
Monthly and daily exams, the pursuit of 40 and the final of 60					
12. Learning and teaching resources					

An Introduction to Operators on the Hardy-Hilbert	
Space, Textbook, 2007, Rubén A. Martínez-	Required textbooks (methodology, if
Avendaño,Peter Rosenthal	any)

Hardy Operators, Function Spaces and Embeddings,2004, David E. Edmunds, •W. Desmond Evans	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

1. Course name

Algebra is non-commutative

2. Course code

MAT6212

3. Semester/year

PhD in pure mathematics/second course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

2/30					
7. Name of the course administrator (if more than one name is mentioned)					
abdulrahman.majeed@sc.uobaghdad.edu.iqEmail:	Name: Prof. Dr. Abdul Rahman Hamid				
8. Course objectives					
1. Encouraging and developing scientific research in the field of mathematics in general.2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in 					
9. Teaching and learning strategies					
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 10. Course structure 					
Evolution Teaching De	awined learning				

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Lie and Jordan Structures	Identify the basic characteristics of the nature of scientific material	2	the first
General questions and discussion	theoretical	Jordan Simplicity of R.	Identify the basic characteristics of the nature of scientific material	2	the second
General questions and discussion	theoretical	Lie Structure of R.	Identify the basic characteristics of the nature of scientific	2	the third

			material		
General		A result on rings with	Identify the basic	2	
questions and	theoretical	involution	characteristics of the		the fourth
discussion			nature of scientific		
			material		
General		The Lie Structures of	Identify the basic	2	
questions and	theoretical	RR][characteristics of the		Fifth
discussion	theoretical		nature of scientific		1 mui
			material		
General		Subrings fixed by auto	Identify the basic	2	
Outions and	theoretical	orphisms	characteristics of the		VI
questions and	lieoretical		nature of scientific		V I
discussion			material		
			Identify the basic	2	
General		Involutions of the	characteristics of the		G 1
questions and	theoretical	second kind	nature of scientific		Seventh
discussion			material		
		The Subring generated	Identify the basic	2	
General		by The skew elements	characteristics of the	2	
questions and	theoretical	by the skew clements	nature of scientific		VIII
discussion			material		
		A theorem of Deuter	Indentify the basic	2	
F '		A meorem of . Baxter	Identify the basic	2	
First semester	theoretical		characteristics of the		Ninth
exam			nature of scientific		
			material		
General		Jordan simplicity of the	Identify the basic	2	
questions and	theoretical	symmetric elements	characteristics of the		The tenth
discussion			nature of scientific		
			material		
General		Lie structure of K. the	Identify the basic	2	
questions and	theoretical	skew elements	characteristics of the		eleventh
discussion	incoretical		nature of scientific		cieventii
uiscussion			material		
Cananal		Lie structure ofK.K[]	Identify the basic	2	
General	41		characteristics of the		4777 0 177 0 410
questions and	theoretical		nature of scientific		tweiveni
discussion			material		
		JordanAuto orphisms	Identify the basic	2	
General		sumsonto prime rings	characteristics of the		
questions and	theoretical	r of the second se	nature of scientific		Thirteenth
discussion			material		
		n-Jordan mannings	Identify the basic	2	
General			characteristics of the	_	
questions and	theoretical		nature of scientific		fourteenth
discussion			material		
Fyam			muteriu	3	Fiftponth
Exam	_				Theenul
11. Course	11. Course evaluation				

Monthly and daily exams, the pursuit of 40 and the final of

12. Learning and teaching resources	
Topics in Ring Theory by IN HERSTEIV 2013	Required textbooks (methodology, if any)
Auto orphisms and derivations of associative ring by Kharcheuko VK 2014	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
• Discreet websites	Electronic references, websites

1. Course name	
Sizes 2	
2. Course code	
MAT6208	
3. Semester/year	
PhD in pure mathematics/second course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total)
3/45	
7. Name of the course administrator (if more than one n	ame is mentioned)
wasan.hasan@sc.uobaghdad.edu.iq Email:	Name: Prof. Dr. Wasan Khaled
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to 	Objectives of the study subject

 meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. 4. Encouraging research programs and participating in scientific conferences and seminars. 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 						
9. Teaching	g and leari	ning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 						
10. Course	structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learnin outcomes	ıg	hours	the week
General questions and discussion	theoretical	Maximal submodules and small submodules.	Concept and examples		3	the first
General questions and discussion	theoretical	The Jacobson radical of a module	Def. andexampl	les	3	the second
General questions and discussion	theoretical	Projective cover of a module	Theorems an application	d	3	the third
General questions and discussion	theoretical	Hollow modules.	Def. and theorems		3	the fourth
General questions and discussion	theoretical	The relationship between hollow modules and projective cover	Def. andremai	rk	3	Fifth
General questions and discussion	theoretical	Supplemented modules	Concept and examples		3	VI
General	theoretical	Supplemented modules	Def. and remar	·ks	3	Seventh

discussion					
General questions and discussion	theoretical	Weakly supplemented modules and amply supplemented	Def. and remarks	3	VIII
First semester exam	theoretical	coessential submodules	Def. and properties	3	Ninth
General questions and discussion	theoretical	coclosed submidules	Def. and properties	3	The tenth
General questions and discussion	theoretical	lifting modules	Def. and properties	3	eleventh
General questions and discussion	theoretical	Hollow lifting modules	Def. and properties	3	twelveth
General questions and discussion	theoretical	the relation ¥ on the set of submodules	Def. and properties	3	Thirteenth
General questions and discussion	theoretical	H-supplemented modules	Def. and properties	3	fourteenth
Exam				3	Fifteenth
11. Course	evaluatior	1			
Monthly and	d daily exa	ms, the pursuit of 40 a	and the final of 60		
12. Learnin	12. Learning and teaching resources				
.1.R. Wisbauer, Foundation of module and ring theory, Gordon and Breach, Philadelphia, (1991). 2.F. Kasch, Modules and Rings, Acad. Press, London, Required textbooks (methodology, if any)			gy, if any)		

.1.R. Wisbauer, Foundation of module and ring theory, Gordon and Breach, Philadelphia, (1991). 2.F. Kasch, Modules and Rings, Acad. Press, London, (1982). 3.J.clark, N.Vanaja, R.Wisbauer, lifting modules, 2006	Required textbooks (methodology, if any)
 1D. Keskin, On lifting modules, Comm. Algebra, 28(7)(2000), 3427-3440. 2-M. T. Kosan, and D. Keskin, H-supplemented duo modules, Journal of Algebra and its Applications, 6(6) (2007) 965-971 3 Yongduo Wang and Dejun Wu*, A generalization of supplemented modules, Hacettepe Journal of Mathematics and Statistics Volume 45 (1) (2016), 129 - 137 4-Nil Orhan, Derya Keskin Tütüncü and Rachid 	Main references (sources)

Tribak On hollow lifting modules, Taiwanese Journal of Mathematics <u>Vol. 11, No. 2 (June 2007)</u> , pp. 545-568	
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

1. Course name				
The theory of univalent functions				
2. Course code				
MAT6211				
3. Semester/year				
PhD in pure mathematics/second course/2023-2024				
4. The date this description was prepared				
10/1/2023				
5. Available attendance forms				
My presence				
6. Number of study hours (total) / number of units (total)				
2/30				
7. Name of the course administrator (if more than one name is mentioned)				
kassim.jassim@sc.uobaghdad.edu.iqEmail:	Name: A.D. Qasim Abdel Hamid			
8. Course objectives				
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in 	Objectives of the study subject			

mathematical sciences through diversification in learning and				
knowledge and skills to solve real-world problems.				
4. Encouraging research programs and participating in scientific				
conferences and seminars.				
5. Preparing a stimulating environment for faculty members to				
develop their knowledge and educational and research skills-				
Building and developing partnerships with the governmental and				
private sectors and society with all its various institutions.				
9. Teaching and learning strategies				
• Explanation and clarification through lectures.				
• How to display scientific materials using display devices: data shows,				
smart boards The strateg				
• Self-learning through homework and mini-projects within lectures.				
Graduation projectsAndaFor scientific visits.				

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Introduction to univalent functions	Definition and Basic Properties	2	the first
General questions and discussion	theoretical	Univalent Functions-the Elementary Theory, Definitions of Major Subclasses.	Definition and Basic Properties	2	the second
General questions and discussion	theoretical	Some important definitions, transformations and Fundamental lemmas	Definition and Basic Properties	2	the third
General questions and discussion	theoretical	Some Area theorems	Definition and Basic Properties	2	the fourth
General questions and discussion	theoretical	Elementary bounds for the coefficients	Definition and Basic Properties	2	Fifth
General questions and discussion	theoretical	Some theorems of power series	Definition and Basic Properties	2	VI
General questions and discussion	theoretical	Implications of the bounds on the second coefficients	Definition and Basic Properties	2	Seventh
General questions and discussion	theoretical	Functions with positive real part	Definition and Basic Properties	2	VIII

First semester	theoretical	Convex and starlike functions	Definition and Basic Properties	2	Ninth
General		Starlike and Convex	Definition and Basic	2	
questions and	theoretical	Functions of Order α	Properties		The tenth
discussion					
General		Strongly Starlike and	Definition and Basic	2	
questions and	theoretical	Convex Functions	Properties		eleventh
discussion					
General		Typical Real functions	Definition and Basic	2	. 1 .1
questions and	theoretical	and related topics	Properties		twelveth
General		Definitions Growth and	Definition and Pasia	2	
questions and	theoretical	Distortion Theorems	Properties	2	Thirteenth
discussion	incoretical	Distortion meorems	ropentes		Threenth
General		Bazilevič Functions:	Definition and Basic	2	
questions and	theoretical	Definition and Basic	Properties		fourteenth
discussion		Properties	Ĩ		
Exam				Fifteenth	
11. Course evaluation					
Monthly and daily exams, the pursuit of 40 and the final of 60					
12. Learning and teaching resources					
Univalent	Functions (G	rundlehren der mathematic	s		
	Wissens	chaften 259) 1983rd Edition	n Required textbooks (methodo	ology, if
	by <u>PL Duren</u> (Author) any)				
Univalent Fu	Univelant Functiona, A Drimon (De Courter Studies				
Onivalent Fu	in Mathematics 69) 1st Edition Main references (sources)				
by <u>Derek K.</u>	by <u>Derek K. Thomas</u> (Author), <u>Nikola Tuneski</u> (Author)				
The most important books and special sources on the			Recommended suppo	orting bo	oks and
foundations of mathematics are in the central library,		references (scientific	journals	,	
the science libr	ary, and the c	lepartment.	reports)		
• Discreet we	ebsites.				
• Virtual libra	ary.		Electronic references, websites		

1. Course name
Scientific research method
2. Course code

UOB6200

3. Semester/year

PhD in pure mathematics/second course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

iraq.t@sc.uobaghdad.edu.iqEmail:	Name: A.M.D. Iraq Tariq
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject
9. Teaching and learning strategies	
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 	The strategy
10. Course structure	

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Type of writing	Scientific Articles Research papers		the first
General questions and discussion	theoretical	Proposals	purpose ofProposalscomponents ofProposals	2	the second
General questions and discussion	theoretical	Titles	Point to check in your own writing	2	the third
General questions and discussion	theoretical	Planning your writing	Putting your ideas in order	2	the fourth
General questions and discussion	theoretical	Paragraph writing	Placing the main idea in the paragraph	2	Fifth
General questions and discussion	theoretical	Abstract and introduction	Problems, Literature review and Referring	2	VI
General questions and discussion	theoretical	Problem statement purpose	Main objective of paper	2	Seventh
General questions and discussion	theoretical	Writing the main body	Use of illustrations General information	2	VIII
First semester exam	theoretical	Results	Summarizing what was done	2	Ninth
General questions and discussion	theoretical	Discussion	Did the research support the hypothesis	2	The tenth
General questions and discussion	theoretical	Tables and Graphs	Describing graphsDescribingTables	2	eleventh
General questions and	theoretical	Referencing	Types of references2style sheetstv		twelveth

discussion						
General questions and	theoretical	Format of reference	Re and	Ref. to book, article and unpublished work		Thirteenth
discussion						
questions and discussion	theoretical	Useful phrases	P	Phrases that used in research paper		fourteenth
Exam						Fifteenth
11. Course	e evaluatio	on				
Monthly an	nd daily ex	ams, the pursuit o	of 40 a	and the final of 60		
12. Learni	12. Learning and teaching resources					
Z. subodova, writing in English apractical handbook for scientific technical writers, Technical University Bron, 2003				gy, if any)		
Z. subodo handboo A. wallwork, and grammar T.panstor Guidelines fo research (Is	ova, writing in ok for scientif Fechnical Un English for re springer .No h, Aconcise g language tea or writing uni ssam Fadel A	n English apractical fic technical writers, iversity Bron, 2003. esearch: usage style ewyork .Headelborg Dordrecht London. rammar for English achers, Ireland 2003 versity theses and scie l-Jumaili - Zahra Mah Al-Khafaji)	-1 -2 -3 entific moud 2009	Main references (source	es)	
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.			n the rary,	Recommended support references (scientific jo	ing book urnals, re	s and eports)
Discreet websites.Virtual library.			Electronic references, v	vebsites		

1. Course name
Numerical optimization and inverse problems
2. Course code
MAT6105

3.	Semester/year	
•••	Dennesser, year	

PhD in Applied Mathematics/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

<u>mmmsh@sc.uobaghdad.edu.iq</u>Email:

Name: Am..Dr. Mohamed Sabah

8. Course objectives				
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject			
9. Teaching and learning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 	The strategy			
10. Course structure				

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Introduction to inverse problems	Def. ,remarks and examples	2	the first
General questions and discussion	theoretical	Preliminaries and examples	Concept and some remarks	2	the second
General questions and discussion	theoretical	Models in different problems	Theorems and application	2	the third
General questions and discussion	theoretical	Identification of the Time-dependent conductivity	Def. and theorems	2	the fourth
General questions and discussion	theoretical	Method of solution satisfactory function and Ritz-Galerkin Method	Def. andremark	2	Fifth
General questions and discussion	theoretical	Tikhonov's regularization method	Concept and examples	2	VI
General questions and discussion	theoretical	Identification of the Time-dependent conductivity of an Inhomogeneous Diffusive Material	Def. and remarks	2	Seventh
General questions and discussion	theoretical	Finding the time- dependent diffusion coefficient from an integral observation	Def. and remarks	2	VIII
First semester exam	theoretical	Exam	Def. and remarks	2	Ninth
General questions and discussion	theoretical	Determination of Time- dependent thermal conductivity and a free boundary	Def. and properties	2	The tenth
General questions and discussion	theoretical	Backward heat conduction problem	Def. and properties	2	eleventh
General questions and discussion	theoretical	Inverse heat conduction problem	Def. and properties	2	twelveth
General questions and	theoretical	Inverse source	Def. and properties	2	Thirteenth

discussion		problems			
General questions and discussion	theoretical	Inverse coefficient problems	Concept and examples	2	fourteenth
Exam					Fifteenth
11. Course	evaluatior	ı			
Monthly and	d daily exa	ms, the pursuit of 40	and the final of 60		
12. Learnin	g and tead	ching resources			
Petrov, Yu.P. and Sizikov, V.S. (2005) Well-posed, Ill-posed and Intermediate Problems, VSP, The Netherlands. Required textbooks (methodology, if any					gy, if any)
 Engl, H. W. and Kaltenbacher, B. (2000) Inverse Problems, Regularization Theory and Applications: an Introduction, Conference in Strobl, Austria, June 2000. Denisov, AM (1999) Elements of the Theory of Inverse Problems, VSP, Utrecht, The Netherlands. Beck, J.V., Blackwell, B. and St. Clair Jr., R. (1985) Inverse Heat Conduction: Ill-Posed Problems, Wiley, New York. 					
1.Alifanov, O. M., Artyukhin, E. A. and Rumyantsev, S. V. (1995). Extreme Methods for Solving Ill-posed Problems with Applications to Inverse Heat Transfer Problems, Begell House, New York. 2.Engl, H.W., Hanke, M. and Neubauer, A. (1996) Regularization of Inverse Problems , Kluwer Academic, Dordrecht.			Recommended supporting books and references (scientific journals, reports)		s and eports)
Discreet weVirtual libr	ebsites. ary.		Electronic references, w	ebsites	

1. Course name Topics in mathematical statistics 2. Course code

MAT6103

3. Semester/year

PhD in Applied Mathematics/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

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tasnim.h@sc.uobaghdad.edu.iqEmail: _ iraq.t@sc.uobaghdad.edu.iqEmail:_	Name: A.M.D. Tasneem Hassan Name: A.M.D. Iraq Tariq
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject
9. Teaching and learning strategies	
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 	The strategy

10. Course structure						
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week	
General questions and discussion	theoretical		Def. and properties	2	the first	
General questions and discussion	theoretical		Def. and properties	2	the second	
General questions and discussion	theoretical		Def. and properties	2	the third	
General questions and discussion	theoretical		Def. and properties	2	the fourth	
General questions and discussion	theoretical		Def. and properties	2	Fifth	
General questions and discussion	theoretical		Def. and properties	2	VI	
General questions and discussion	theoretical		Def. and properties	2	Seventh	
General questions and discussion	theoretical		Def. and properties	2	VIII	
First semester exam	theoretical		Def. and properties	2	Ninth	
General questions and discussion	theoretical		Def. and properties	2	The tenth	
General questions and discussion	theoretical		Def. and properties	2	eleventh	
General questions and discussion	theoretical		Def. and properties	2	twelveth	
General questions and discussion	theoretical		Def. and properties	2	Thirteenth	
General questions and discussion	theoretical		Def. and properties	2	fourteenth	
Exam					Fifteenth	
11. Course evaluation						

12. Learning and teaching resources				
	Required textbooks (methodology, if any)			
	Main references (sources)			
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)			
Discreet websites.Virtual library.	Electronic references, websites			

The most important books and special sources on the Recommended supporting books				
foundations of mathematics are in the central library, the	and references (scientific journals,			
science library, and the department.	reports)			
• Discreet websites.				
• Virtual library.	Electronic references, websites			

1. Course name

Topics in dynamical systems

2. Course code

MAT6101

3. Semester/year

PhD in Applied Mathematics/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

3/45

7. Name of the course administrator (if more than one name is mentioned)

azhar.majeed@sc.uobaghdad.edu.iqEmail:

Name: Prof. Azhar Abbas

8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject
9. Teaching and learning strategies	

•	Explanation and clarification through lectures.	
•	How to display scientific materials using display devices: data shows,	
	smart boards	The strategy
•	Self-learning through homework and mini-projects within lectures.	
•	Graduation projectsAndaFor scientific visits.	
10		

10.	Course	structure
	000-280	

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Basic definitions	Identify the basic characteristics of the nature of scientific material	3	the first
General questions and discussion	theoretical	Existence and uniqueness	Identify the basic characteristics of the nature of scientific material	3	the second
General questions and discussion	theoretical	Limit set	Identify the basic characteristics of the nature of scientific material	3	the third
General questions and discussion	theoretical	Stability theory	Identify the basic characteristics of the nature of scientific material	3	the fourth
General questions and discussion	theoretical	Stability theory of linear system	Identify the basic characteristics of the nature of scientific material	3	Fifth
General questions and discussion	theoretical	Stability theory of nonlinear system	Identify the basic characteristics of the nature of scientific material	3	VI
General questions and discussion	theoretical	Laypunov stability	Identify the basic characteristics of the nature of scientific material	3	Seventh
General questions and discussion	theoretical	Periodic dynamics	Identify the basic characteristics of the nature of scientific material	3	VIII
First semester exam	theoretical	Periodic dynamics	Identify the basic characteristics of the nature of scientific material	3	Ninth
General questions and	theoretical	Bifurcation theory	Identify the basic characteristics of the	3	The tenth

discussion			nature of scientific material		
General questions and discussion	theoretical	Bifurcation theory	Identify the basic characteristics of the nature of scientific material	3	eleventh
General questions and discussion	theoretical	Bifurcation theory	Identify the basic characteristics of the nature of scientific material	3	twelveth
General questions and discussion	theoretical	Invariant folds	Identify the basic characteristics of the nature of scientific material	3	Thirteenth
General questions and discussion	theoretical	Invariant folds	Identify the basic characteristics of the nature of scientific material	3	fourteenth
Exam					Fifteenth
11. Course eva	luation				
Daily and mont	thly exam, qu	lest from 40 and final from	60		
12. Learning a	and teaching	resources			
Denny Gulicle, Encounters with chaos, MCGrow Hill 2016			Required textbooks (methodology, if any)		
Robert L. Devany, An introduction to chaotic dynamical system, second edition, Addison - wesely publishing company, Inc. 1989			Main references (sources)		
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.			Recommended supporting books and references (scientific journals, reports)		
 Discreet websites. Virtual library. 			Electronic references, websites		

1. Course name
Applied linear algebra
2. Course code
MAT6104

3.	Semester/year
$\boldsymbol{\cdot}$	Demester/year

PhD in Applied Mathematics/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)				
huda.oun@sc.uobaghdad.edu.iqEmail:	Name: A.M.D. Hoda Abdel Sattar			
8. Course objectives				
 1. Encouraging and developing scientific research in the field of mathematics in general. 2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. 4. Encouraging research programs and participating in scientific conferences and seminars. 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and 				
9. Teaching and learning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 	The strategy			
10. Course structure				

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Basic Concepts ;Vector space - subspace- Linear combination-linear dependent and linear independent- basis- span	Def. and properties	2	the first
General questions and discussion	theoretical	Basic concepts of matrix ; Properties of arithmetic matrix – inverse matrix	Def. and properties	2	the second
General questions and discussion	theoretical	Linear algebra solution;Solution- Gaussian elimination- regular case- pivoting and permutations –	Def. and properties	2	the third
General questions and discussion	theoretical	General Linear system;homogenous system- Determine	Def. and properties	2	the fourth
General questions and discussion	theoretical	Matrices of linear maps;Algebra of linear maps	Def. and properties	2	Fifth
General questions and discussion	theoretical	Application of linear algebra	Def. and properties	2	VI
General questions and discussion	theoretical	Minimization and least square	Def. and properties	2	Seventh
General questions and discussion	theoretical	Exam	Def. and properties	2	VIII
First semester exam	theoretical	Some theorem about applied linear algebra	Def. and properties	2	Ninth
General questions and discussion	theoretical	Dynamics: Basic solution techniques existence and uniqueness	Def. and properties	2	The tenth
General questions and discussion	theoretical	Stability of linear systems- two dim. systems	Def. and properties	2	eleventh
General questions and discussion	theoretical	Dynamic of structures	Def. and properties	2	twelveth
General questions and discussion	theoretical	Application of linear Algebra	Def. and properties	2	Thirteenth
General questions and discussion	theoretical	Iteration; linear iterative system		2	fourteenth

Exam				Fifteenth	
11. Course	11. Course evaluation				
12. Learnin	g and tea	ching resources			
			Required textbooks (m	ethodology, if any)	
			Main references (source	ces)	
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.			Recommended supporting books and references (scientific journals, reports)		
Discreet weVirtual libr	ebsites. ary.		Electronic references,	websites	

1. Course name				
Fluid mechanics and heat transfer				
2. Course code				
MAT6102				
3. Semester/year				
General Ph.D./first course/2023-2024				
4. The date this description was prepared				
10/1/2023				
5. Available attendance forms				
My presence				
6. Number of study hours (total) / number of units (tota	l)			
3/45				
7. Name of the course administrator (if more than one name is mentioned)				
ahmed.abdulhadi@sc.uobaghdad.edu.iqEmail: liqaa. hummady@sc.uobaghdad.edu.iq	Name: A.D. Ahmed Mawlud Name: A.M.D. Meet			

	Zaki	
8. Course objectives		
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject	
9. Teaching and learning strategies		
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 	The strategy	
10. Course structure		

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General		Introduction	Def. and properties	2	1 6
discussion	theoretical			3	the first
General		Heat transfer methods	Def. and properties		tha
questions and	theoretical			3	second
discussion					second
General		Heat transfer methods	Def. and properties		
questions and	theoretical			3	the third
discussion					
General		Energy equation in 1-	Def. and properties		
questions and	theoretical	dim		3	the fourth
discussion					
General		Energy equation in 2-	Def. and properties		
questions and	theoretical	dim		3	Fifth
discussion					
General		Energy equation in 3-	Def. and properties		
----------------	-------------	------------------------	---------------------	---	------------
questions and	theoretical	dim		3	VI
discussion					
General		applications	Def. and properties		
questions and	theoretical			3	Seventh
discussion					
General		applications	Def. and properties		
questions and	theoretical			3	VIII
discussion					
First semester	theoretical	Energy equation in 1-	Def. and properties	2	Ninth
exam	theoretical	dim		3	INIIIUI
General		Energy equation in 1-	Def. and properties		
questions and	theoretical	dim		3	The tenth
discussion					
General		Thermal boundary layer	Def. and properties		
questions and	theoretical			3	eleventh
discussion					
General		Thermal boundary layer	Def. and properties		
questions and	theoretical			3	twelveth
discussion					
General		Thermal boundary layer	Def. and properties		
questions and	theoretical			3	Thirteenth
discussion					
General		Application thermal	Def. and properties		
questions and	theoretical	boundary layer	• •	3	fourteenth
discussion					
Exam				3	Fifteenth

11. Course evaluation

Daily and monthly exam, quest from 40 and final from 60

12. Learning and teaching resources

— — — — — — — — — — — — — — — — — — — —	
Fundamentals of heat and mass transfer by	Required textbooks (methodology, if
Frank P. Incropera 2017	any)
Heat and mass transfer: Fundamentals & Applications by Afshin Jahanshahi and Yungus A. Cengel 2015	Main references (sources)
Heat and mass transfer: Fundamentals & Applications- McGraw-Hill 2013	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

modelCourse description

1. Course name

English

2. Course code

UOB6100

3. Semester/year

PhD in Applied Mathematics/first course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

ali.abd@sc.uobaghdad.edu.iqEmail:	Name: A.M.D. Ali Abed Obaid
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 	Objectives of the study subject
9. Teaching and learning strategies	
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards 	The strategy

• Self-learning through homework and mini-projects within lectures.

Graduation projectsAndaFor scientific visits.						
10. Course structure						
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	g hours	the week	
General questions and discussion	theoretical			2	the first	
General questions and discussion	theoretical			2	the second	
General questions and discussion	theoretical			2	the third	
General questions and discussion	theoretical			2	the fourth	
General questions and discussion	theoretical			2	Fifth	
General questions and discussion	theoretical			2	VI	
General questions and discussion	theoretical			2	Seventh	
General questions and discussion	theoretical			2	VIII	
First semester exam	theoretical			2	Ninth	
General questions and discussion	theoretical			2	The tenth	
General questions and discussion	theoretical			2	eleventh	
General questions and discussion	theoretical			2	twelveth	
General questions and discussion	theoretical			2	Thirteenth	
General questions and discussion	theoretical			2	fourteenth	
Exam					Fifteenth	

11. Course evaluation

Daily and monthly exam, the pursuit is 40, and the final is 60

12. Learning and teaching resources

	Required textbooks (methodology, if any)	
	Main references (sources)	
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)	
Discreet websites.Virtual library.	Electronic references, websites	

modelCourse description

1. Course name	
Numerical analysis	
2. Course code	
MAT6202	
3. Semester/year	
PhD in Applied Mathematics/Second Course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total)	
3/45	
7. Name of the course administrator (if more than one nam	me is mentioned)
mmmsh@sc.uobaghdad.edu.iqEmail:	Name: A.M. Dr. Muhammad Sabah
8. Course objectives	
1. Encouraging and developing scientific research in the field of mathematics in general	Objectives of the

 Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private sectors and society with all its various institutions. 					dy subj	ect
9. Teac	hing and	learning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 						
10. Cou	rse struc	eture				
Evaluation	Teaching	Name of the unit/tonic	Required learning		1	the week
method	method	Name of the unit topic	outcomes		nours	the week
General questions and discussion	theoretical	1- Polynomial Interpolation Preliminaries; Lagrange interpolation; differentiation. Newton divided differences; properties; construction; differentiation.	outcomes Learn about the bas principles of Lacran polynomials and fin differences	ic ge ite	3	the first
General questions and discussion General questions and discussion	theoretical	Ivalic of the unit topic 1- Polynomial Interpolation Preliminaries; Lagrange interpolation; differentiation. Newton divided differences; properties; construction; differentiation. Interpolation error; rounding error; Runge phenomenon; optimal node distribution. Approximation; norms; best approximation; Weierstrass' theorem; Bernstein polynomials.	Outcomes Learn about the bas principles of Lacran polynomials and fine differences Calculating and analyse errors, as well as identifying the Rin phenomenon. Approximation and optimal approximation	ic ge ite zing g 1 on	3 3	the first the second
General questions and discussion General questions and discussion General questions and discussion	method theoretical theoretical	Ivalic of the unit topic 1- Polynomial Interpolation Preliminaries; Lagrange interpolation; differentiation. Newton divided differences; properties; construction; differentiation. Interpolation error; rounding error; Runge phenomenon; optimal node distribution. Approximation; norms; best approximation; Weierstrass' theorem; Bernstein polynomials. Examples: Polynomial Interpolation 2-Minimax Approximation; ad hoc linear and quadratic best approximations.	outcomes Learn about the bas principles of Lacran polynomials and finit differences Calculating and analys errors, as well as identifying the Rin, phenomenon. Approximation and optimal approximation Smallest magnification and least squares approximation	ic ge ite zing g 1 on ons	3 3 3	the first the second the third
General questions and discussion General questions and discussion General questions and discussion General questions and discussion	method theoretical theoretical theoretical	1- Polynomial Interpolation Preliminaries; Lagrange interpolation; differentiation. Newton divided differences; properties; construction; differentiation. Interpolation error; rounding error; Runge phenomenon; optimal node distribution. Approximation; norms; best approximation; weierstrass' theorem; Bernstein polynomials. Examples: Polynomial Interpolation 2-Minimax Approximation; Minimax approximation; ad hoc linear and quadratic best approximations. Theorems of de la Vall'ee-Poussin and Chebyshev; Remes algorithm; Chebyshev polynomials.	outcomes Learn about the bas principles of Lacran polynomials and fine differences Calculating and analyse errors, as well as identifying the Rin phenomenon. Approximation and optimal approximation Smallest magnification and least squares approximation De La Ville-Poissoo theorem, Jebyshev polynomials, and th importance of Reme algorithm	ic ge ite zing g d on ons n z's	3 3 3 3	the first the second the third the fourth

and discussion		approximations Decay of Fourier coefficients; near- minimax approximation Chebyshev interpolation; minimum- norm of monic polynomials; minimum Lagrange error.	theory of optimal approximation, learning about the calculation of polynomials with fluctuations, and the approximation of instantaneous coefficients.		
General questions and discussion	theoretical	Forced oscillation of the Chebyshev error; approximate Fourier coefficients. Spectrally accurate calculation of Fourier coefficients. Examples: Lp Norms and Minimax Approximation	Learn about calculating fluctuating polynomials and approximating instantaneous coefficients	3	VI
General questions and discussion	theoretical	Finite-Difference Operators – Finite differences in 1-D; accuracy and order. – Finite-difference operators for 1st derivatives.	End differences	3	Seventh
General questions and discussion	theoretical	Examples: Chebyshev Approximation and Interpolation Finite-difference operators for higher derivatives.	High-order finite differences	3	VIII
First semester exam	theoretical	Mehrstellenverfahren: compact molecules – FD formulae in 2-D; Laplacian operator; molecules, stencils. – Higher-order FD approximations; error via Mehrstellen reduction verfahren	Finite differences for two- dimensional problems	3	Ninth
General questions and discussion	theoretical	Matrix norms and Gerschgorin disks – Matrix norms; spectral radius; diagonal dominance; eigenvalue theorems; sparse systems. Examples: Finite-Difference Operators	Methods for solving linear systems	3	The tenth
General questions and discussion	theoretical	Toeplitz matrices and Cholesky decomposition – Cholesky factorization; Jacobi, Gauss-Seidel & SOR iterative schemes.	Methods for solving linear systems	3	eleventh
General questions and discussion	theoretical	Iteration matrices and convergence rates – Convergence of iterative schemes; optimum SOR parameter.	Solve linear systems iteratively	3	twelveth
General questions and discussion	theoretical	Theoretical optimum SOR parameter for 2-cyclic matrices. 2-D Elliptic Dirichlet BVPs; permuting finite-difference matrices into 2-cyclic form.	Calculating the solution of incomplete differential equation problems with Dirichlet conditions.	3	Thirteenth
General questions and discussion	theoretical	Examples: Solution of Linear Algebraic Equations 2-D Elliptic Neumann and Robin BVPs; Richardson extrapolation	Practical examples	3	fourteenth
Exam			Exam		Fifteenth
11. Course	evaluation				

Daily and monthly exam, the pursuit is 40, and the final is 60						
12. Learning and teaching resources						
Numerical Analysis NINTH EDITION, Richard L. Burden Youngstown State University J. Douglas Faires Youngstown State University, 2011	Required textbooks (methodology, if any)					
Introduction to Numerical Analysis S. Baskar,2013	Main references (sources)					
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)					
Discreet websites.Virtual library.	Electronic references, websites					

1. Course name	
Control theory	
2. Course code	
MAT6204	
3. Semester/year	
PhD in Applied Mathematics/Second Course/2023-2024	
4. The date this description was prepared	
10/1/2023	
5. Available attendance forms	
My presence	
6. Number of study hours (total) / number of units (total)	
2/30	
7. Name of the course administrator (if more than one nam	me is mentioned)
sadiq.n@sc.uobaghdad.edu.iqEmail:	Name: Prof. Dr. Sadiq Naji
8. Course objectives	
 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of 	Objectives of the study subject

mathematics, be compatible with meet the needs 3. Preparing an requirements of mathematical set teaching metho knowledge and 4. Encouraging conferences and 5. Preparing a set develop their knowledge Building and deprivate sectors					
J. Teaching		ning strategies			
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 					ду
10. Course	structure				
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	1- Basic Concepts, Definitions and examples: Attainable sets and controllability	Def. and propertie	s 2	the first
General questions and discussion	theoretical	2- The necessary conditions and sufficient conditions for optimality	Def. and propertie	s 2	the second
General questions and discussion	theoretical	3- The Mayer, Lagrange and Bolza problems.	Def. and propertie	s 2	the third
General questions and discussion	theoretical	4- Continuous time problems.	Def. and propertie	s 2	the fourth
General questions and discussion	theoretical	5- Properties of finite autonomy and infinite horizon problems.	Def. and propertie	s 2	Fifth
General questions and discussion	theoretical	6- Existence Theorems with Convexity Assumptions.	Def. and propertie	s 2	VI
General questions and discussion	theoretical	7- The linear quadratic problem.	Def. and propertie	s 2	Seventh

General questions and discussion	theoretical	8- The interpretation of the adjoint variables.	Def. and properties	2	VIII	
First semester exam	theoretical	9- State conditions at the final time, states with fixed endpoints and bounded controls.	Def. and properties	2	Ninth	
General questions and discussion	theoretical	10- Linear dependence on the control, and Bang- Bang controls.	Def. and properties	2	The tenth	
General questions and discussion	theoretical	11- Discrete-Time Optimal Control Problems (discrete Maximum Principle).	Def. and properties	2	eleventh	
General questions and discussion	theoretical	12- Control Applied to Biological Models and Financing model in both cases continuous time and discrete time.	Def. and properties	2	twelveth	
General questions and discussion	theoretical	13- Optimal control of several variables.	Def. and properties	2	Thirteenth	
General questions and discussion	theoretical	14- Other properties on the optimal control solutions with applications.	Def. and properties	2	fourteenth	
Exam					Fifteenth	
11 Course evaluation						

Daily and monthly exam, the pursuit is 40, and the final is 60

12. Learning and teaching resources			
	Required textbooks (methodology, if any)		
	Main references (sources)		
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)		
Discreet websites.Virtual library.	Electronic references, websites		

modelCourse description

1. Course name

Topics in partial differential equations

2. Course code

MAT6205

3. Semester/year

PhD in Applied Mathematics/Second Course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

ahmed.abdulhadi@sc.uobaghdad.edu.iqEmail:	Name: A.D. Ahmed Mawlud

8. Course objectives

 Encouraging and developing scientific research in the field of mathematics in general. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. Encouraging research programs and participating in scientific conferences and seminars. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills- Building and developing partnerships with the governmental and private acaters and acaiety with all its various institutions. 	Objectives of the study subject
0. Teaching and learning strategies	
9. Teaching and learning strategies	
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. 	The strategy

Graduation	projectsAnd	aFor scientific visits.			
10. Course structure					
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	1- Classifications of PDE	Def. and properties	5 3	the first
General questions and discussion	theoretical	 2- Canonical forms 3- Canonical models for hyperbolic equation 4- Canonical forms for parabolic equation 5- Canonical forms for elliptic equation 	Def. and properties	3	the second
General questions and discussion	theoretical	6- Elliptic differential equations	Def. and properties	5 3	the third
General questions and discussion	theoretical	7- Dirichlet problem for a rectangle	Def. and properties	5 3	the fourth
General questions and discussion	theoretical	8- Neumann problem for a circle	Def. and properties	5 3	Fifth
General questions and discussion	theoretical	9- Exterior Canonical problem forms a circle 10- Interior canonical problem forms a circle	Def. and properties	5 3	VI
General questions and discussion	theoretical	11- Parabolic differential equations	Def. and properties	3	Seventh
General questions and discussion	theoretical	12- Hyperbolic differential equations	Def. and properties	3	VIII
First semester exam	theoretical	13-Green's function	Def. and properties	⁵ 3	Ninth
General questions and discussion	theoretical	14- Laplace transform methods	Def. and properties	5 3	The tenth
General questions and discussion	theoretical	15- Solution of diffusion equation 16- Solution of wave equation	Def. and properties	3	eleventh
General questions and discussion	theoretical	17- Fourier transform methods	Def. and properties	5 3	twelveth
General questions and	theoretical	18- Solution of diffusion equation	Def. and properties	3	Thirteenth

discussion		19- Solution of wave equation			
General questions and discussion	theoretical	20- Solution of diffusion equation 21- Solution of wave equation	Def. and properties	3	fourteenth
Exam				3	Fifteenth
11. Course	11. Course evaluation				
Daily and monthly exam, quest from 40 and final from 60					
12. Learning and teaching resources					
			Required textbooks (methodology, if any)		
Main references (sources)					
	Recommended supporting books and references (scientific journals, reports)			ks and reports)	
Discreet we	bsites.				
• Virtual libra	ary.		Electronic references, websites		

1. Course name

Topics in hysteresis differential equations

2. Course code

MAT6205

3. Semester/year

PhD in Applied Mathematics/Second Course/2023-2024

4. The date this description was prepared						
10/1/2023						
5. Available	e attendan	ce forms				
My presence)					
6. Number	of study h	ours (total) / numbe	r of units (total)			
3/45						
7. Name of	the course	e administrator (if m	ore than one na	me	is mer	ntioned)
hassan.fadhi	il.r@sc.uol	baghdad.edu.iq Email	:	Na Fa	ame: A. l idel	Dahsan
8. Course o	bjectives					
 and the field of the sector is an end of the field of the sector is an end of the sector is and the sector is and the sector is and the sector is the sector is and the sector is an end to be set of the sector is an end to be set of the sector is and the sector is an end to be set of the sector is an end tof the sector is an end to be set of the sector is an end			Objectives of the study subject			
9. Teaching	and learn	ning strategies				
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 			The strategy			
10. Course structure						
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes		hours	the week
General questions and discussion	theoretical	Delay Differential Equations.	Def. and propertie	S	3	the first

General	41	Types of Delay	Def. and properties	3	the
questions and	theoretical	its Applications			second
General		Linear Delay Differential	Def and properties	2	
General questions and	theoretical	Equations (LDDEs)	Delland properties	5	the third
discussion	lifeoretical	Equations (EDDES).			the till d
General		Basic Mathematical	Dof and properties	3	
questions and	theoretical	properties of DDEs.	Dei. allu properties	5	the fourth
discussion	incoretical	F F			the fourth
General		Uniqueness and Existence	Def and properties	3	
questions and	theoretical	of DDEs.	Dell and properties	5	Fifth
discussion	licoretical				1 mui
General		Methods and methodology	Def and properties	3	
questions and	theoretical	for solving LDDE.	Den una properties	5	VI
discussion	licoreticui	C			, ,
General		The analytical solution of	Def. and properties	3	
questions and	theoretical	DDEs.	ben ana properties	5	Seventh
discussion	lineoretieur				50 ventili
General		The Delayed Logistic	Def. and properties	3	
questions and	theoretical	Model.	FF	-	VIII
discussion					
First semester		Delayed SIR Model.	Def. and properties	3	
exam	theoretical				Ninth
General		Stability and Bifurcation	Def. and properties	3	
questions and	theoretical	for DDEs.			The tenth
discussion					
General		Linearization of DDEs.	Def. and properties	3	
questions and	theoretical				eleventh
discussion					
General		DDE with one discrete	Def. and properties	3	
questions and	theoretical	delays.			twelveth
discussion					
General		DDE with multiple	Def. and properties	3	
questions and	theoretical	discrete delays.			Thirteenth
discussion					
General		First order Neutral delay	Def. and properties	3	
questions and	theoretical	equation, Characteristic			fourteenth
discussion		roots of delayed systems			
Exam					Fifteenth
11. Course	evaluatior	1			
Daily and monthly exam, the pursuit is 40, and the final is 60					
12. Learning and teaching resources					

Required textbooks (methodology, if any)
Main references (sources)

The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
• Discreet websites.	
• Virtual library.	Electronic references, websites

1.	Course	name
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Reliability

2. Course code

MAT203

3. Semester/year

PhD in Applied Mathematics/Second Course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

tasnim.h@sc.uobaghdad.edu.iq Email:

Name: A.M.D. Tasneem Hassan

8. Course objectives

1. Encouraging and developing scientific research in the field of	
mathematics in general.	
2. Providing distinguished academic programs in the field of	
mathematics, both morphological and applied, so that they are	
compatible with international standards of academic quality to	Objectives of the
meet the needs of the education sector with highly qualified	
cadres.	study subject
3. Preparing and qualifying specialist students to meet the	
requirements of work in the private and public sectors in	
mathematical sciences through diversification in learning and	
teaching methods and training students to apply the acquired	

kn	knowledge and skills to solve real-world problems.					
4.	Encouraging research programs and participating in scientific					
co	nferences and seminars.					
5.	Preparing a stimulating environment for faculty members to					
de	velop their knowledge and educational and research skills-					
Building and developing partnerships with the governmental and						
pri	vate sectors and society with all its various institutions.					
_						
9.	Teaching and learning strategies					
9 .	Teaching and learning strategies Explanation and clarification through lectures.					
9. •	Teaching and learning strategies Explanation and clarification through lectures. How to display scientific materials using display devices: data shows,					
9. •	Teaching and learning strategies Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards	The strategy				
9. • •	Teaching and learning strategies Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures.	The strategy				

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Ch.1 Failure Models: State Variable, Time to Failure, Reliability Function, Failure Rate Function	Def. ,remarks and examples	2	the first
General questions and discussion	theoretical	Mean Time to Failure, Median Life and Mode, Mean Residual Life	Concept and some remarks	2	the second
General questions and discussion	theoretical	Ch. 2 General Models for Reliability Data: The Binomial and Geometric Distributions, The Exponential Distribution	Theorems and application	2	the third
General questions and discussion	theoretical	The Homogeneous Poisson Process	Def. and theorems	2	the fourth
General questions and discussion	theoretical	The Gamma and related Distributions, The Weibull Distribution	Def. andremark	2	Fifth
General questions and discussion	theoretical	The Normal Distribution, The Lognormal Distribution	Concept and examples	2	VI
General questions and discussion	theoretical	The Inverse Gaussian Distribution	Def. and remarks	2	Seventh
General questions and discussion	theoretical	The Extreme Value Distributions: The Gumble Distribution of the Smallest Extreme, The Gumble Distribution of the Largest Extreme, The Weibull Distribution of the Smallest Extreme	Def. and remarks	2	VIII
First semester exam	theoretical	Stressor-Dependent Modeling, IFR and DFR Distributions	Def. and remarks	2	Ninth
General	theoretical	IFRA and DFRA	Def. and properties	2	The tenth

questions and discussion		Distributions, NBU and NWU Distributions, NBUE and NWUE Distributions				
General questions and discussion	theoretical	Ch.3 Structure Functions: The Series Structure, The Parallel Structure, The k out of n Structure		Def. and properties	2	eleventh
General questions and discussion	theoretical	Minimal Path and Minimal Cut Sets, Examples		Def. and properties	2	twelveth
General questions and discussion	theoretical	Mid-Term Exam		Def. and properties	2	Thirteenth
General questions and discussion	theoretical	Reliability of Systems of Independent Components: Series System		Def. and properties	2	fourteenth
Exam						Fifteenth
11. Course	evaluation	n				
Daily and m	onthly exa	am, the pursuit is 40, ar	nd t	he final is 60		
12. Learnin	g and tea	ching resources				
Lawless JF (20	17) Statistica	al Models and Methods of Li	fe			
Time Data; John Wiley.						
-Meeker, W.Q. and Escobar, L. (2012): Statistical Methods			Required textbooks	(method	ology, if	
for Reliability Data. New York: Wiley.				any)	(01085, 11
-Rausand, M. and Hoyland, A. (2015): System Reliability Theory: Models and Statistical Methods. Second Edition, John Wiley & Sons Inc						
-Barlow RE an	d Proschan	F. (1985). Statistical Theory	of			
Reliability an	d Life Testir	ng; Holt, Rinehart and Winst	on.			
-Bain LJ and	Engelhardt	(1991) Statistical Analysis	of	Main africant (ar		
Reliabilit	y and Life T	esting Models; Marcel Dekk	ter.	Main references (sources)		
-Nelson, W. (1982) Applied Life Data analysis; John Wiley.						
-Zacks S. Reliability Theory, Springer.						
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.				Recommended suppreferences (scientifi reports)	oorting bo c journal	ooks and s,
• Discreet we	bsites.					
• Virtual library.				Electronic reference	es, websit	tes

1. Course name

Integral transformations and their applications

2. Course code

MAT6206

3. Semester/year

PhD in Applied Mathematics/Second Course/2023-2024

4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

2/30

7. Name of the course administrator (if more than one name is mentioned)

azhar.majeed@sc.uobaghdad.edu.iqEmail:

Name: Prof. Dr. Azhar Abbas

8. Course objectives
 1. Encouraging and developing scientific research in the field of mathematics in general. 2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to meet the needs of the education sector with highly qualified cadres. 3. Preparing and qualifying specialist students to meet the requirements of work in the private and public sectors in mathematical sciences through diversification in learning and the study teaching methods and training students to apply the acquired knowledge and skills to solve real-world problems. 4. Encouraging research programs and participating in scientific conferences and seminars. 5. Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skills-Building and developing partnerships with the governmental and private sectors and society with all its various institutions.

9. Teaching and learning strategies					
 Explanation How to disponent to the second sec	The strategy				
10. Course	structure				
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	theoretical	Definition of infinite Fourier transform	Def. and properties	2	the first
General questions and discussion	theoretical	sine and cosine transform, properties of Fourier transform, properties of Fourier cosine and sine transforms	Def. and properties	2	the second
General questions and discussion	theoretical	inversion theorem (inverse of Fourier transform), convolution theorem, algebraic properties of convolution theorem	Def. and properties	2	the third
General questions and discussion	theoretical	Perseval's identity, general Perseval's relationship, finite Fourier sine and cosine transform, Dirichlet's conditions for existence of Fourier transform	Def. and properties	2	the fourth
General questions and discussion	theoretical	Fourier transform of derivatives, application of Fourier transform (evaluation of integrals	Def. and properties	2	Fifth
General		, Solving of deferential	Def. and properties		

equation, solution for

boundary value problems

Laplace transforms and their

basic properties

existence for the Laplace

transform

basic properties of the

Laplace transforms with

proofs and examples

Laplace transform of

derivatives

Definition of the Laplace

transform and examples

VI

Seventh

VIII

Ninth

The tenth

eleventh

2

2

2

2

2

questions and

discussion

General

questions and

discussion

General

questions and discussion

First semester

exam

General

questions and

discussion

General

theoretical

theoretical

theoretical

theoretical

theoretical

theoretical

Def. and properties

questions and discussion					
General		the Convolution theorem and	Def. and properties	2	
questions and	theoretical	properties of Convolution			twelveth
discussion					
General		the inverse of Laplace	Def. and properties	2	
questions and	theoretical	transforms and examples			Thirteenth
discussion					
General		Computation of the	Def. and properties	2	
questions and	theoretical	Laplace transform inverse by			fourteenth
discussion		partial fraction method			
Exam					Fifteenth

11. Course evaluation

Daily and monthly exam, the pursuit is 40, and the final is 60

12. Learning and teaching resources

Lokenath Debnath and Dambaru Bhatta, "INTEGRAL TRANSFORMS AND THEIR APPLICATIONS, THIRD EDITION	Required textbooks (methodology, if any)
	Main references (sources)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)
Discreet websites.Virtual library.	Electronic references, websites

modelCourse description

1. Course name

Scientific research method

2. Course code

UOB200

3. Semester/year

PhD in Applied Mathematics/	Second Course/2023-2024
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4. The date this description was prepared

10/1/2023

5. Available attendance forms

My presence

6. Number of study hours (total) / number of units (total)

30					
7. Name of th	he course	administrator (if m	ore than one na	me is me	ntioned)
<u>iraq.t@sc.uobaghdad.edu.iq</u> Email:			Name: A.M. Daaraq Tariq		
8. Course ob	jectives				
8. Course objectives1. Encouraging and developing scientific research in the field of mathematics in general.2. Providing distinguished academic programs in the field of mathematics, both morphological and applied, so that they are compatible with international standards of academic quality to 				es of the bject	
9. Teaching and learning strategies					
 Explanation and clarification through lectures. How to display scientific materials using display devices: data shows, smart boards Self-learning through homework and mini-projects within lectures. Graduation projectsAndaFor scientific visits. 10. Course structure 			sy		
Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week

		1 Introduction to	Def and properties		
General		1- Introduction to Research Mathedology	Def. and properties		
questions and	theoretical	(PM) Passarch definition		2	the first
discussion		and origin.			
General		2- Basic Levels of	Def. and properties	2	a
questions and	theoretical	Research.	1 1		the
discussion					second
General		3- Steps for Writing.	Def. and properties	2	
questions and	theoretical			_	the third
discussion					
General		4-Scientific Research.	Def and properties	2	
questions and	theoretical		Den una properties	_	the fourth
discussion	dicoretical				the routin
General		5- Main Research Parts	Def and properties	2	
questions and	theoretical		Dell and properties	2	Fifth
discussion	incoretical				1 mm
General		6- First Exam Short	Def and properties	2	
questions and	theoretical	research at the study level	Dei. allu properties	Δ	VI
discussion	uleoretical	Undergraduate (Bachelor).			V I
General		7 Advanced Research at	Dof and properties	2	
Oelieral avaations and	theoretical	the Thesis Level (Master	Dei. allu properties		Sourceth
discussion	theoretical	Thesis).			Seventin
Comparel		A dyanaad Basaarah	Def and properties	2	
General	theoretical	o- Advanced Research	Del. and properties	Z	VIII
questions and	theoretical	Level Doctoral mesis.			VIII
		0. Original Research	Def and man outing	2	
First semester	theoretical	9- Original Research.	Def. and properties	2	Ninth
exam		10. Deterried	Defendencesting		
General		10- Patented.	Def. and properties	2	TT1 ((1
questions and	theoretical				The tenth
discussion		11 Designed Article			
General		11- Review Article.	Def. and properties	2	1 .1
questions and	theoretical				eleventh
discussion					
General		12- Steps for Writing A	Def. and properties	2	
questions and	theoretical	Scientific Research.			twelveth
discussion					
General		13- A Research Topic.	Def. and properties	2	
questions and	theoretical				Thirteenth
discussion					
General		14- The majority of	Def. and properties	2	
questions and	theoretical	research errors.			fourteenth
discussion					
Exam		15- Literature review.			Fifteenth
11. Course	evaluation	1			
Daily and m	onthly exa	um, the pursuit is 40, a	and the final is 60		
-	•	- '			

12. Learning and teaching resources

	Required textbooks (methodology, if any)		
	Main references (sources)		
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Recommended supporting books and references (scientific journals, reports)		
Discreet websites.Virtual library.	Electronic references, websites		