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

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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.

Course Description: 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.

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

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

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

Curriculum Structure: 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.

Teaching and learning strategies: 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-curricular activities to achieve the learning outcomes of the program.

Academic program description form

University name: University of ....Baghdad.................

College/Institute: College of ......Sciences....................................

Scientific Department: Department of ......Mathematics...................

Name of the academic or professional program: ....Mathematics Department

Academic Program...........

Name of final degree: Master of Mathematics.......
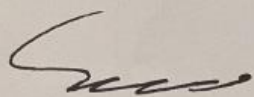
Academic system: semester

Description preparation date: 10/1/2023

Date of filling the file: 3/28/2024

the signature : *Name*

Name of scientific assistant:

the date :

the signature : Mohammed S. Hassein

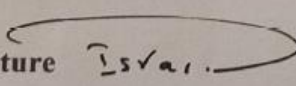Name of department head:

the date :
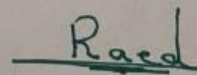

Check the file before

Division of Quality Assurance and University Performance

Name of the Director of the Quality Assurance and University Performance

Division:

the date

the signature *Isvai.*

Raed

Authentication of the Dean

3

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? both

5. Other external influences

Is there a sponsor for the program: No

6. Program structure

comments *	percentage	Study unit	Number of courses	Program structure

	20%	4	2	Enterprise requirements
	nothing		—	College requirements
	80%	24	10	Department requirements
			nothing	summer training
				Other

* ممكن ان تتضمن الملاحظات فيما اذا كان المقرر أساسي او اختياري .

7. Program description

Credit hours		Name of the course or course	Course or course code	Year/level
practical	theoretical			
	3	Functional Analysis (1)	MAT5101	Pure Master's degree Course1
	3	Abnormal algebra (1)	MAT5102	
	2	Topics in nodal analysis (1)	MAT5103	
	2	Topics in linear algebra	MAT5104	
	2	Topological groups	MAT5105	
	2	Topics in episodes	MAT5106	
	2	Field theory	MAT5107	
	2	Representation theory for quasi-groups	MAT5108	
	2	English	UOB5100	
	3	Functional analysis (2)	MAT5201	Pure Master's degree Course 2
	3	Abdali algebra (2)	MAT5202	
	2	Non-commutative rings	MAT5203	
	2	Topics in the arithmetic theory of group algebra	MAT5204	
	2	Theory of univalent function 1	MAT5205	
	2	Special functions	MAT5206	
	2	Fuzzy sets	MAT5207	

	2	Topics in nodal analysis (2)	MAT5208	
	2	Topics in differential topology 1	MAT5209	
	2	Scientific research method	UOB5200	
	3	Numerical analysis	MAT5109	**Applied Master Course 1**
	3	Dynamic Systems (1)	MAT5110	
	2	Inverse problems and their applications	MAT5111	
	2	Finite difference methods	MAT5112	
	2	Advanced numerical analysis	MAT5113	
	2	Fractional differential equations	MAT5114	
	2	Operations research	MAT5115	
	2	Optimization and introduction to control Compatibility	MAT5116	
	2	T-Regression analysis	MAT5117	
	2	English	UOB5100	
				Applied Master course2
	3	Fluid mechanics	MAT5210	
	3	Mathematical modeling	MAT5211	
	2	Dynamic Systems (2)	MAT5212	
	2	Topics in linear algebra	MAT5213	
	2	Mathematical techniques for image processing	MAT5214	

	2	Stability of hysteresis differential equations	MAT5215	
	2	Integral coefficients	MAT5216	
	2	Control theory	MAT5217	
	2	Methods of writing research	UOB5200	

8. Expected learning outcomes of the programme

Knowledge	
The skills and experiences that a student acquires while undergoing training or a study plan. You 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
Statement of learning outcomes 3	Learning outcomes 3
Value	
aLearning outcomes help to know what the student should learn and what he can do after completing the academic	D1 - Developing the

program he is enrolled in.	student's ability to dialogue and discuss. D2 - Developing the student's ability to deal with the Internet. D3 - Developing the student's ability to deal with multiple media. D4 - Developing the student's ability to deal with technical means

9. Teaching and learning strategies

How to display scientific materials on projectors: Data Show,Explanation and clarification through lectures- Self-learning viaThe internetAnd mini projects withinLectures-

10. Evaluation methods

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

11. The teaching staff

Faculty members

Preparing the teaching staff		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. Raed Kamel Naji

				mathematics	mathematics	Mr. Dr. Bahar Hamad Ahmed
				Pure/Algebra	mathematics	Mr. Dr. Wasan Khaled Hassan
				mathematics	mathematics	Mr. Dr. Buthaina Abdel Hassan Ahmed
				Algebra	mathematics	Mr. Dr. Alaa Abbas Aliwi
				Nodal analysis	mathematics	Mr. Dr. Qasim Abdul Hamid Jassim
				mathematics	mathematics	Mr. Dr. Zeina Zaki is beautiful
				mathematics	mathematics	Mr. Dr. Hassan Fadel Reda
				Applied	mathematics	Mr. Dr. Sadiq Naji Nasser
				Nodal analysis	mathematics	A.M.D. Heba Fawzi Sabaa
				mathematics	mathematics	A.M.D. Iman Ali is torment
				mathematics	mathematics	A.M.D. Liqaa Zaki Hammadi
				Applied	mathematics	A.M.D. Dalia Khaled Bahloul
				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
				Dynamic systems	mathematics	A.M.D. Sherine Rasoul Jawad

Professional development
Orienting new faculty members
Briefly describes the process used to orient new, visiting, full-time, and part-time faculty at the institution and department levels.
Professional development for faculty members
Briefly describe the academic and professional development plan and arrangements for faculty members such as teaching and learning strategies, assessment of learning outcomes, professional development, etc..

12. Acceptance criterion

It is required for the student applying for admission to the master's programMust have a 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

<table>
<tr><td colspan="16" align="center">مخطط مهارات البرنامج</td></tr>
<tr><td colspan="12">Outputs Learning required from the program</td><td rowspan="3">اساسي أم اختياري</td><td rowspan="3">name The decision</td><td rowspan="3">CodeThe decision</td><td rowspan="3">the year / the level</td></tr>
<tr><td colspan="4">القيم</td><td colspan="4">المهارات</td><td colspan="4">المعرفة</td></tr>
<tr><td>C4</td><td>C3</td><td>C2</td><td>C1</td><td>B4</td><td>B3</td><td>B2</td><td>B 1</td><td>A4</td><td>A3</td><td>A2</td><td>A1</td></tr>
<tr><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>Basic</td><td>Functional Analysis (1)</td><td>MAT5101</td><td></td></tr>
<tr><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>Basic</td><td>Abnormal algebra (1)</td><td>MAT5102</td><td></td></tr>
<tr><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>my choice</td><td>Topics in nodal analysis (1)</td><td>MAT5103</td><td></td></tr>
<tr><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>my choice</td><td>Topics in linear algebra</td><td>MAT5104</td><td></td></tr>
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<tr><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>my choice</td><td>Topics in ring theory</td><td>MAT5106</td><td></td></tr>
<tr><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>my choice</td><td>Field theory</td><td>MAT5107</td><td></td></tr>
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<tr><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>٭</td><td>my choice</td><td>English</td><td>UOB5100</td><td></td></tr>
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</table>

∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	Basic	Abdali algebra (2)	MAT5202
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Non-commutative rings	MAT5203
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Topics in the arithmetic theory of group algebra	MAT5204
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Theory of univalent function 1	MAT5205
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Special functional	MAT5206
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Fuzzy sets	MAT5207
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Topics in nodal analysis (2)	MAT5208
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Topics in differential topology 1	MAT5209
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Scientific research method	UOB5200
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	Basic	Numerical analysis	MAT5109
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	Basic	Dynamic Systems (1)	MAT5110
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Inverse problems and their applications	MAT5111
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Finite difference methods	MAT5112
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Applied functional analysis	MAT5113

∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Fractional differential equations	MAT5114
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Operations research	MAT5115
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Optimization and introduction to combinatorial control	MAT5116
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Regression analysis	MAT5117
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	English	UOB5100
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗			
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	Basic	Fluid mechanics	MAT5210
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	Basic	Mathematical modeling	MAT5211
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Dynamic Systems (2)	MAT5212
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Topics in linear algebra	MAT5213
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Mathematical techniques for image processing	MAT5214
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Stability of hysteresis differential equations	MAT5215
∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	∗	my choice	Integral coefficients	MAT5216

※	※	※	※	※	※	※	※	※	※	※	※	my choice	Control theory	MAT5217
※	※	※	※	※	※	※	※	※	※	※	※	my choice	Methods of writing research	UOB5200

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

1. Course name
Functional analysis (1)

2. Course code
MAT5101

3. Semester/year
Pure Master's degree/first course/2023-2024

4. The date this description was prepared
10/1/2023

5. Available attendance forms
Presence weekly

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)

zeana.zaki@sc.uobaghdad.edu.iq Email:	Name: A.D. Zeina Zaki is beautiful

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	Objectives of the study subject

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.	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	Review of vector space	Concept of vector space	3	the first
General questions and discussion	theoretical	The concept of normed spaces	Normal space	3	the second
General questions and discussion	theoretical	Advance example of normal spaces	Some example of normal space	3	the third
General questions and discussion	theoretical	Concept of banach space	Banach space	3	the fourth
General questions and discussion	theoretical	Review of linear transformation	Linear transformation	3	Fifth
General questions and discussion	theoretical	The concept of L(N,N)	The space linear transformation	3	VI
General questions and discussion	theoretical	Review of bounded LT	Bounded linear transformation	3	Seventh
General questions and discussion	theoretical	The concept of dual space	The dual space	3	VIII
First semester exam	theoretical	Review of dual space	The dual space	3	Ninth
General questions and discussion	theoretical	The concept of internal product space	The linear product space	3	The tenth
General questions and discussion	theoretical	Review of internal product of normed space	The connection between liner product as normal space	3	eleventh

General questions and discussion	theoretical	Review of Riezer reprentation theorm	Rieze reprisnat theorem	3	twelveth
General questions and discussion	theoretical	Concept of adjoint of LT.	The adjoint of linear	3	Thirteenth
General questions and discussion	theoretical	Concept of Hilbert spaces	Hilbert space	3	fourteenth
General questions and discussion	theoretical	The orthonormal system Hilbertspace	orthonormal system Hilbert space	3	Fifteenth

11. Course evaluation

12. Learning and teaching resources

Introduction to Hibert space" berberian, SK2016	Required textbooks (methodology, if any)
A Hilbert space problem book. Halmos, P.R.2017"	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. Library locations in some international universities.	Electronic references, websites

Model Course description

1. Course name
Commutative algebra 1
2. Course code
MAT5102
3. Semester/year
Pure Master's degree/first course/2023-2024
4. The date this description was prepared
10/1/2023
5. Available attendance forms
Presence weekly
6. Number of study hours (total) / number of units (total)

45					

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

wasan.hasan@sc.uobaghdad.edu.iq Email:	Name: Wasan Khaled 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 skillsBuilding 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 projectsaFor scientific visits.	The strategy

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Definition of modules	Definition of model	3	1
Questions and discussion	theoretical	R-homomorphisms	Learn some basic definitions	3	2
Questions and	theoretical	Direct sum & direct product of modules	Learn about direct multiplication and	3	3

			direct addition		
Questions and discussion	theoretical	Simple modules and Schours lemma	Getting to know a simple model	3	4
Questions and discussion	theoretical	Noethrian and Artinian modules	Some important definitions	3	5
Questions and discussion	theoretical	Theorems on Noetherian modules	Some important theories	3	6
Questions and discussion	theoretical	Free modules	Identify the Hurra model	3	7
Questions and discussion	theoretical	Properties of free modules	Learn about the features of the Hurra model	3	8
Questions and discussion	theoretical	Short exact sequences	Identify short perfect sequences	3	9
Questions and discussion	theoretical	Split sequences	Identify the types of sequences	3	10
Questions and discussion	theoretical	Torsion and divisible modules	Recognition	3	11
Questions and discussion	theoretical	Projective modules	Identify some types of models	3	12
Questions and discussion	theoretical	Properties of Projective modules	Learn about some properties	3	13
Questions and discussion	theoretical	Injective modules and Bear criterion	Get to know another model	3	14
Exam					15

11. Course evaluation

12. Learning and teaching resources

DM Burton, Abstract Algebra, WNC Brown publisher, 2019	Required textbooks (methodology, if any)
C. Faith, Algebra, ring, modules and categories, Springer-verlage, Berlin, New York, 2017 I. Kaplinsky, Commutative, University of Chicago, 1974	Main references (sources)
F.Kasch, Modules and rings, academic press, NewYork, 1982	Recommended supporting books and references (scientific journals, reports....)

	Electronic references, websites
• Discreet websites. • Virtual library. Library locations in some international universities.	

Model Course description

1. Course name
Topics in nodal analysis 1
2. Course code
MAT5103
3. Semester/year
Pure Master's degree/first course/2023-2024
4. The date this description was prepared
10/1/2023
5. Available attendance forms
Presence weekly
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)

abdulrahman.majeed@sc.uobaghdad.edu.iqWhich :kassim.jassim@sc.uobaghdad.edu.iq	Name: Abdul Rahman Hamid Name H.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 mathematical sciences through diversification in learning and teaching methods and training students to	Objectives of the study subject

| apply the acquired knowledge and skills to solve real-world problems.
 • Encouraging research programs and participating in scientific conferences and seminars | |

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 projects and 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	Why study functions of a complex variable	Learn about the importance of complex functions	2	the first
General questions and discussion	theoretical	Complex number in exponential form	Know how to write a complex number in exponential form	2	the second
General questions and discussion	theoretical	Functions of complex variable	Identify complex functions	2	the third
General questions and discussion	theoretical	Limits, continuous and derivatives	Knowledge of purpose, continuity and derivation	2	the fourth
General questions and discussion	theoretical	Equivalent condition for (Cauchy-Riemann equations)	Identify equivalent conditions	2	Fifth
General questions and discussion	theoretical	Exponential and logarithmic function trigonometric and hyperbolic functions	Learn about exponential functions, logarithms, etc	2	VI
General question	theoretical	Definite integrals of complex valued	Learn about definite integration of complex	2	Seventh

s and discussion		functions	functions		
General questions and discussion	theoretical	The Cauchy integral formula	Learn about Cauchy's integral formula	2	VIII
General questions and discussion	theoretical	Power series	Identify power series	2	Ninth
General questions and discussion	theoretical	The residual theorem	Learn about the remainder theorem	2	The tenth
General questions and discussion	theoretical	Zeros and poles of analytic functions	Learn about zeros and poles of analytical functions	2	eleven
General questions and discussion	theoretical	Calculus of residues	Knowing the remaining account	2	twelve
General questions and discussion	theoretical	Mobius transform and others	Knowledge of Mobias transformation and other transformations	2	thirteen
General questions and discussion	theoretical	Conformal mapping	Identifying animals that keep angles	2	Fourteen
General questions and discussion	theoretical	More on Harmonic functions	Learn more about harmonic functions	2	fifteen

11. Course evaluation

12. Learning and teaching resources

Complex analysis by Alfors, LV2017	Required textbooks (methodology, if any)
Complex analysis by Bak, J. 2019	Main references (sources)

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

Model Course description

1. Course name
<mark>English</mark>
2. Course code
UOB5100
3. Semester/year
Pure Master's degree/first course/2023-2024
4. The date this description was prepared
10/1/2023
5. Available attendance forms
Presenceweekly
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:
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 skillsBuilding 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, plasma screens. - Self-learning through homework and mini-projects within lectures. - Graduation projects and scientific visits	The strategy

10. Course structure

roadEvaluation	Teaching method	Unit name (topic)	Required educational outcomes	hours	the week
Questions and discussion	theoretical	International student	Getting to know students from different parts of the world and talking to them	2	the second
Questions and discussion	theoretical	Vocabulary development	Knowledge of the development of speech vocabulary	2	the third
Questions and discussion	theoretical	Where in the world	Identify a location in the world	2	the fourth
Questions and discussion	theoretical	Newspaper articles	Identify articles and how to read magazines	2	Fifth
Questions and discussion	theoretical	Modern technology	Learn about the technology of his speech	2	VI
Questions and discussion	theoretical	Conferences and visits	Identify the style of writing in conferences	2	Seventh
Questions and discussion	theoretical	Science and our world	Science and our world	2	VIII
Questions and discussion	theoretical	Writing trends	Identify the characteristics of writing	2	Ninth
Questions and discussion	theoretical	Reading air pollution	Identify the characteristics of pollution using the reading method	2	The tenth
Questions and discussion	theoretical	Past and present	Learn about the rules of the present and past tense	2	eleventh
Questions and discussion	theoretical	The world of IT	Identify the basic characteristics of the nature of scientific material	2	twelveth
Questions and discussion	theoretical	Inventions, discoveries	Identify the characteristics of breakthroughs and discoveries	2	Thirteenth

Questions and discussion	theoretical	Processes	Identify the basic processes of the nature of matter	2	fourteenth
Questions and discussion	theoretical	Travel and tourism	Learn about tourism and travel	2	Fifteenth

11. Course evaluation

12. Learning and teaching resources

New hand way:- Academic skills reading writing 2019	Required textbooks (methodology, if any)
Academic skills reading writing 2018	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. Library locations in some international universities.	Electronic references, websites

Model Course description

1. Course name
Topics in linear algebra
2. Course code
MAT5104
3. Semester/year
Pure Master's degree/first course/2023-2024
4. The date this description was prepared
10/1/2023
5. Available attendance forms
Presence weekly
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)
iman.athab@sc.uobaghdad.edu.iq   Name: Dr. Iman Ali ali.abd@sc.uobaghdad.edu.iq   Dr.. 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, plasma screens. - Self-learning through homework and mini-projects within lectures. - Graduation projectsWaFor scientific visits.	The strategy
10. Course structure	

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Basic Concepts	Basic principles	2	1
Questions and discussion	theoretical	Vector space over an arbitrary field	Matrix algebra	2	2
Questions and discussion	theoretical	Subspaces of vector space	Vector space	2	3
Questions and discussion	theoretical	Span and independence	Basic properties of space	2	4
Questions and discussion	theoretical	Bases and finite dimensional vector space	Subspace	2	5
Questions and discussion	theoretical	Bases and infinite dimensional vector space	Complementary subspace	2	6
Questions and discussion	theoretical	Dragonalization	quotient space	2	7
Questions and discussion	theoretical	Liner mappings	Basis and dimension	2	8
Questions and discussion	theoretical	Eigen values and eigen vectors	Examples and exercises	2	9
Questions and discussion	theoretical	Isometry andQuotnent space	Foundation theories	2	10
Questions and discussion	theoretical	Orthonormal sat	The basis of the space of division and completion	2	11

11. Course evaluation

12. Learning and teaching resources

1)Strang G Linear Algebra and applied Academic press 1976 2) Advanced Linear Algebra, second edition, Brue N Cooperstein	Required textbooks (methodology, if any)
Bernard Coleman Introduction to Linear Algebra with its ApplicationsaTranslated by Adel Ghassan and Basil Atta Al-Hashemi - University of Baghdad2000	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....)
The most important books and special sources on the foundations of mathematics are in the central library, the science library, and the department.	Electronic references, websites

modelCourse description

1. Course name
Topics in episodes
2. Course code
MAT5106
3. Semester/year
Master's degree/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)

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8. Course objectives

- Preparing graduates specialized in mathematics to contribute to the development of the country - Meeting the needs of the education sector with highly qualified cadres - Encouraging distinguished people to work in the department - Encouraging research programs and participating in scientific conferences and seminars - Achieving quality and academic accreditation	Objectives of the study subject

9. Teaching and learning strategies

- Paper lectures - Presentations - Electronic screen	The strategy

	Telegram, electronic classes, and websites				

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	In-person lectures	CERTAIN SPECIAL IDEALS		2	the first
General questions and discussion	In-person lectures	The relationship between some kinds of ideals		2	the second
General questions, discussion, and exams	In-person lectures			2	the third
Duties are general	In-person lectures	Jacobson radical		2	the fourth
Annie's test	In-person lectures	Local rings		2	Fifth
General questions and discussion	In-person lectures	Regular rings		2	VI
Duties are general	In-person lectures	Boolean rings		2	Seventh
Monthly exam	In-person lectures	Monthly exam		2	VIII
General questions and discussion	In-person lectures	Polynomial rings		2	Ninth
Monthly exam	In-person lectures	Extension of field		2	The tenth
General questions and discussion	In-person lectures	Prime radical		2	eleventh
Duties are general	In-person lectures	Discussing and solving assignments		2	twelveth
Monthly exam	In-person lectures	Monthly exam		2	Thirteenth
General questions and discussion	In-person lectures	Rings of Fraction		2	fourteenth
General questions and discussion	In-person lectures	Rings with chain condition		2	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. Library locations in some international universities.	Electronic references, websites

Model Course description

1. Course name
Commutative algebra(2)
2. Course code
MAT5202
3. Semester/year
Pure Master's degree/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 name is mentioned)
[bahar.ahmed@sc.uobaghdad.edu.iq Email](mailto:bahar.ahmed@sc.uobaghdad.edu.iq) :   Name: Bahar Hamad Ahmed

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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projectsWaFor 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 submodule	Learn about some concepts	(3)	the first
General questions and discussion	theoretical	Uniform module	Learn about some theories	(3)	the second
General questions and discussion	theoretical	Relative complement	Knowledge of the theories used	(3)	the third
General questions and discussion	theoretical	Closed submodule	Some theories and examples	(3)	the fourth
General questions and discussion	theoretical	Small submodule	Theories and their applications	(3)	Fifth
General questions and discussion	theoretical	Hollow module	Some classifications used	(3)	VI

General questions and discussion	theoretical	Local module	Learn about some concepts	(3)	Seventh
General questions and discussion	theoretical	Internal and external direct sum	Learn about some concepts	(3)	VIII
First semester exam	theoretical	Injective module	Learn about some concepts	(3)	Ninth
General questions and discussion	theoretical	Injective hull	Learn about some concepts	(3)	The tenth
General questions and discussion	theoretical	Projective cover	Learn about some concepts	(3)	eleventh
General questions and discussion	theoretical	The socle of a module	Learn about some concepts	(3)	twelveth
General questions and discussion	theoretical	Semi simple module	Learn about some concepts	(3)	Thirteenth
General questions and discussion	theoretical	Singular submodule	Learn about some concepts	(3)	fourteenth
		Exam			fifteen

11. Course evaluation

12. Learning and teaching resources

DM Burton, Abstract Algebra, WNC Brown publisher, 2017	Required textbooks (methodology, if any)
C. Faith, Algebra, ring, modules and categories, Springer-verlage, Berlin, New York,2015 I. Kaplnsky, Commutative, University of Chicago, 2016	Main references (sources)
F.Kasch, Modules and rings, academic press, NewYork, 1982	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites. • Virtual library. Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name
For function analysis (2)
2. Course code
MAT5201
3. Semester/year
Pure Master's degree/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 name is mentioned)

buthaina.a@sc.uobaghdad.edu.iq Email:	Name: Buthaina Abdel Hassan Ahmed

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 skillsBuilding 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

	The strategy
• Explanation and clarification through lectures. • How to display scientific materials using display devices: data shows, smart boards, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projectsWaFor 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	Bounded linear operator	Learn about some concepts	(3)	the first
General questions and discussion	theoretical	Basic spectral theory	Learn about some theories	(3)	the second
General questions and discussion	theoretical	Basic spectral theory	Knowledge of the theories used	(3)	the third
General questions and discussion	theoretical	The spectrum and resolved sets	Some theories and examples	(3)	the fourth
General questions and discussion	theoretical	The spectral mapping theorem	Theories and their applications	(3)	Fifth
General questions and discussion	theoretical	Classification of points in the	Some classifications used	(3)	VI
General questions and discussion	theoretical	. spectral radius	Learn about some concepts	(3)	Seventh
General questions and discussion	theoretical	Duality	Learn about some concepts	(3)	VIII
First semester exam	theoretical	Adjoints of Hilbert space operator	Learn about some concepts	(3)	Ninth
General questions and discussion	theoretical	Elementary types of operator	Types of primers used	(3)	The tenth

General questions and discussion	theoretical	The big three classical theorems	Classifications of the three main theories	(3)	eleventh
General questions and discussion	theoretical	The big three classical theorems	Classifications of the three main theories	(3)	twelveth
General questions and discussion	theoretical	The big three classical theorems	Classifications of the three main theories	(3)	Thirteenth
General questions and discussion	theoretical	The big three classical theorems	Classifications of the three main theories	(3)	fourteenth
Exam					fifteen

11. Course evaluation

12. Learning and teaching resources

Barbara D. Mac Cluer, "Elementary functional analysis", springer, 2013	Required textbooks (methodology, if any)
Bryan P. Rynee and Martine A. Youngson, linear functional analysis, 2016"	Main references (sources)
Balmohan V. Limaye, Functional analysis, new age international, 2006	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites. • Virtual library. Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name

Non-commutative rings

2. Course code

MAT5203

3. Semester/year

Pure Master's degree/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)

abdulrahman.majeed@sc.uobaghdad.edu.iq Email:	Name: Abdul Rahman 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 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, and screensnoZama. - Self-learning through homework and mini-projects within lectures. - Graduation projectsWaFor scientific visits	The strategy

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions	theoretical	Ring-theorem preliminaries	Learn about ring theory	2	the first

General questions and discussion					
General questions and discussion	theoretical	Some formula results	Some vocabulary and results	2	the second
General questions and discussion	theoretical	Premiere rings	Learn about a specific model of rings	2	the third
General questions and discussion	theoretical	Generalized polynomial identities	A generalization for neutral polynomials	2	the fourth
General questions and discussion	theoretical	Central polynomials	Learn about a type of polynomial	2	Fifth
General questions and discussion	theoretical	Central ears	Identify one type of user	2	VI
General questions and discussion	theoretical	Regularity conditions	Familiar terms and how to use them	2	Seventh
General questions and discussion	theoretical	Osborn's theorem	Osborne theory	2	VIII
General questions and discussion	theoretical	Positive definiteness	An approach to positive definitions	2	Ninth
General questions and discussion	theoretical	A skewed version of Osborn's theorem	Learn about the deviant versions of Osborne's theory	2	The tenth
General questions and discussion	theoretical	Regular skew elements	Knowing what elements The usual deviation	2	eleven
General questions and discussion	theoretical	Some theorems of Montgomery	Discuss some of the theories used	2	twelve
General questions and discussion	theoretical	Division rings	Partition rings	2	thirteen
General questions and discussion	theoretical	More On division rings	Other uses and applications of dividing rings	2	Fourteen

General questions and discussion	theoretical	n-Jordan mapping	N-Jordan app	2	fifteen

11. Course evaluation

12. Learning and teaching resources

Algebraic division ring extensions by C.Fouth 2017	Required textbooks (methodology, if any)
Rings with involutions by IN Herstein 2016	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. Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name

Special functions

2. Course code

MAT5206

3. Semester/year

Pure Master's degree/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)

hiba.f@sc.uobaghdad.edu.iq Email :   Name: 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. Teaching and learning strategies

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

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Through tests and...nThrough general questions and discussion	theoretical		1- Gamma Function and Related Functions. 2- Asymptotic expansions. 3- The Gamma function.$\Gamma(z)$	(2)	the first
General questions and discussion	theoretical		4- Euler's product for gamma function and some important identities. 5- Asymptotic expansion of the gamma function for large |z|.	(2)	the second

General questions, discussion, and exams	theoretical		6- Beta function and some of the properties of the Beta function. 7- Some important alternative proofs.	(2)	the third
General questions and discussion	theoretical		8- Factorial function and its main properties. 9- The probability integral. 10- Asymptotic expansion of probability integral.	(2)	the fourth
Annie's test	theoretical		11- The exponential integral. 12- Asymptotic expansion of exponential integral.	(2)	Fifth
General questions and discussion	theoretical		13- Hypergeometric function. 14- Riemann P-function and transformation of solution. 15- Identification of Hypergeometric integrals with fundamental solutions.	(2)	VI
General questions and discussion	theoretical		16- Elementary properties of the Hypergeometric function. 17- The Confluent Hypergeometric function.	(2)	Seventh
Annie's test	theoretical			(2)	VIII
General questions and discussion	theoretical		18- Elementary properties of the Confluent Hypergeometric function. 19- Integral representation of the Confluent Hypergeometric function.	(2)	Ninth
Monthly exam	theoretical		20- Asymptotic representation of the Confluent Hypergeometric function for large $|z|$.	(2)	The tenth
General questions and discussion	theoretical		21- Bessel Functions. 22- Recurrence relations of Bessel Function and its of integral order.	(2)	eleventh
onThrough testing or through	theoretical		23- Generating function of Bessel Function of first kind.	(2)	twelveth

			Schlafli's contour integral. -24		
General questions and discussion	theoretical		Integral representation of the -25 Bessel Function of integral order. Bessel functions of third kind. -26	(2)	Thirteenth
General questions and discussion	theoretical		Contour integral solution of the Bessel equation.	(2)	fourteenth
General questions and discussion	theoretical		Properties of Hankel function.	(2)	Fifteenth

11. Course evaluation

12. Learning and teaching resources

Fuzzy Sets and Fuzzy Techniques by Joakim Lindblad 2016	Required textbooks (methodology, if any)
Dubois and Henri Prade (2014), Fuzzy Sets and Systems: Theory and Applications, Reading, MA: Addison-Wesley.	Main references (sources)
The most important books and special sources on chaos theory located 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 references, websites

modelCourse description

1. Course name

Nodal analysis 2

2. Course code

MAT5208

3. Semester/year	
Pure Master's degree/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.iq Email:	Name: 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 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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projectsWaFor 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	Review complex analysis	Learn about the importance of complex functions	2	the first
General questions and discussion	theoretical	Basic concept	Know the basic concepts	2	the second
General questions and discussion	theoretical	Basic lemmas	Identify the basic issues	2	the third
General questions and discussion	theoretical	Transforms theorems	Knowledge of conversion theories	2	the fourth
General questions and discussion	theoretical	Review of area theorem 1	Getting to know the theory 1	2	Fifth
General questions and discussion	theoretical	Review of area theorem 2	Learn about theory 2	2	VI
General questions and discussion	theoretical	Applications of area theorems	Applications: space theories	2	Seventh
General questions and discussion	theoretical	Bieberbunch principle	Learn about the principle of Birbankh	2	VIII
General questions and discussion	theoretical	Koebe principle	Learn about the Quibi principle	2	Ninth
General questions and discussion	theoretical	Growth principle	Learn about the principle of growth	2	The tenth
General questions and discussion	theoretical	Distortion principle	Learn about the theories and principles of distortion	2	eleven
General questions and discussion	theoretical	Main corollaries	Find out the main results	2	twelve
General questions	theoretical	Application distortion	Misrepresentation applications	2	thirteen

and discussion					
General questions and discussion	theoretical	Application on growth theorem	Applications of growth theory	2	Fourteen
Monthly exam					fifteen

11. Course evaluation

12. Learning and teaching resources

Complex analysis by Alfors, L.V. 2020	Required textbooks (methodology, if any)
Complex analysis by Alfors, L.V. 2020	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. Library locations in some international universities.	Electronic references, websites

Model Course description

1. Course name
Scientific research method

2. Course code
UOB5200

3. Semester/year
Pure Master's degree/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)

asawer.d@sc.uobaghdad.edu.iq Email:	Name: Duraid Hamdi bracelets

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

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
			The strategy		

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

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Type of writing	Scientific Articles Research papers	1	1
Questions and discussion	theoretical	Proposals	purpose of Proposals components of Proposals	1	2
Questions and discussion	theoretical	Titles	Point to check in your own writing	1	3
Questions and discussion	theoretical	Planning your writing	Putting your ideas in order	1	4
Questions and discussion	theoretical	Paragraph writing	Placing the main idea in the paragraph	1	5
Questions and discussion	theoretical	Abstract and introduction	Problems, Literature review and Referring	1	6
Questions and discussion	theoretical	Problem statement purpose	Main objective of paper	1	7
Questions and discussion	theoretical	Writing the main body	Use of illustrations General information	1	8
Questions and discussion	theoretical	Results	Summarizing what was done	1	9
Questions and discussion	theoretical	Discussion	Did the research support the hypothesis	1	10
Questions and discussion	theoretical	Tables and Graphs	Describing graphsDescribing Tables	1	11
Questions and	theoretical	Referencing	Types of references style sheets	1	12

discussion					
Questions and discussion	theoretical	Format of reference	Ref. to book, article and unpublished work	1	13
Questions and discussion	theoretical	Useful phrases	Phrases that used in research paper	1	14
Exam	-	Examined	-	1	15

11. Course evaluation	

12. Learning and teaching resources	
Z. subodova, writing in English apractical handbook for scientific technical writers, Technical University Bron, 2013.	Required textbooks (methodology, if any)
bodova, writing in English apractical handbook for scientific technical writers, Technical University Bron, 2013. A. wallwork, English for research: usage style and grammar, springer .Newyork .Headelborg Dordrecht London.2000 T.panston, Aconcise grammar for English language teachers, Ireland 2003 Guidance on writing university theses and scientific research (Issam Fadel Al-Jumaili - Zahra Mahmoud Al-Khafaji)2009	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 Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name	
Topics in the arithmetic theory of group algebra	
2. Course code	
MAT5204	
3. Semester/year	
Pure Master's degree/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)					
ali.abd@sc.uobaghdad.edu.iq Email:			Name: Ali Abd 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, plasma screens. - Self-learning through homework and mini-projects within lectures. Graduation projects For 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	In-person lectures	Introduction to CGT.	What is CGT?	2	the first
General questions and discussion	In-person lectures	Crash course to finite group theory	General result on group theory	2	the second
General questions,	In-person lectures	Crash course to finite group theory	Symmetric group with application	2	the third

discussion, and exams					
Duties are general	In-person lectures	Crash course to finite group theory	Group Action and Orbits	2	the fourth
Annie's test	In-person lectures	Crash course to graph theory	General result on graph theory	2	Fifth
General questions and discussion	In-person lectures	Crash course to graph theory	Properties of graphs	2	VI
Duties are general	In-person lectures	The GAP System	What is GAP?	2	Seventh
Annie's test	In-person lectures	The GAP System	GAP Manual	2	VIII
General questions and discussion	In-person lectures	Algorithm in CGT	Example of CGT Algorithm with application in GAP	2	Ninth
Monthly exam	In-person lectures	Application in CGT	Using the Online Atlas	2	The tenth
General questions and discussion	In-person lectures	YAGS Graph System	A Gentle Tutorial	2	eleventh
Duties are general	In-person lectures	Application in CGT	Basic results on communication graphs	2	twelveth
Annie's test	In-person lectures	Application in CGT	Application on communication graphs	2	Thirteenth
General questions and discussion	In-person lectures	Application in CGT	Basic results on A4-graphs	2	fourteenth
General questions and discussion	In-person lectures	Application in CGT	Application on A4-graphs	2	Fifteenth

11. Course evaluation

12. Learning and teaching resources

D. F. Holt, B. Eick, and E. A. Brien, "Handbook of computational group theory." Discrete Mathematics and its Applications (Boca Raton). Chapman & Hall/CRC, 2005.	Required textbooks (methodology, if any)
The GAP Group., "GAP Groups, Algorithms, and [1] Programming", Version 4.11.1, http://www.gap-system.org, 2021.	Main references (sources)

C. Cedillo, R. MacKinney-Romero, MA Pizaa, [2] IA Robles and R. Villarroel-Flores, "Yet Another Graph System, YAGS", Version 0.0.5. 2021.	
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 references, websites

modelCourse description

1. Course name
Dynamic Systems (1)

2. Course code
MAT5110

3. Semester/year
Applied Master/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)

shireen.jawad@sc.uobaghdad.edu.iq Email:	Name: Sherine Rasoul

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.	The strategy

- How to display scientific materials using display devices: data shows, smart boards, plasma screens.
- Self-learning through homework and mini-projects within lectures.
- Graduation projectsWaFor scientific visits

10. Course structure

Evaluation method	Teaching method	Unit name (topic)	Required educational outcomes	hours	the week
General questions and discussions	theoretical	Iterates of functions, Graphical representation of an orbit, attracting and repelling fixed points, nonhyperbolic fixed points	Identify the basic characteristics of the nature of scientific material	(3)	1
General questions and discussions	theoretical	Families of function, bifurcation of family of function, period doubling bifurcation, fold bifurcation, period – 3 points	Identify the basic characteristics of the nature of scientific material	(3)	2
General questions and discussions	theoretical	Chaos in one dimension, lyapunov exponents, transitivity and strong chaos	Identify the basic characteristics of the nature of scientific material	(3)	3
General questions and discussions	theoretical	Chaotic function,strongly chaotic,conjugacy,	Identify the basic characteristics of the nature of scientific material	(3)	4
General questions and discussions	theoretical	Two dimensional maps, dynamics of linear maps	Identify the basic characteristics of the nature of scientific material	(3)	5
General questions and discussions	theoretical	Similar matrices, invariant set, linear conjugate, attracting, repelling, and saddle point of linear function	Identify the basic characteristics of the nature of scientific material	(3)	6
General questions and discussions	theoretical	Solution of linear system, the general solution of linear systems	Identify the basic characteristics of the nature of scientific material	(3)	7
General questions and discussions	theoretical	Stability of two-dimensional maps	Identify the basic characteristics of the nature of scientific material	(3)	8
General questions and discussions	theoretical	Nonlinear maps	Identify the basic characteristics of the nature of scientific material	(3)	9
General questions and discussions	theoretical	Attracting, repelling, saddle point of nonlinear maps	Identify the basic characteristics of the nature of scientific material	(3)	10

General questions and discussions	theoretical	Hartman-Groman theorem, area contracting, area expanding maps.	Identify the basic characteristics of the nature of scientific material	(3)	11
General questions and discussions	theoretical	The behavior of F near a saddle points, stable and unstable manifold theorem, stability via linearization	Identify the basic characteristics of the nature of scientific material	(3)	12
General questions and discussions	theoretical	Lyapunove function for nonlinear map, Lyapunove stability theorem	Identify the basic characteristics of the nature of scientific material	(3)	13
General questions and discussions	theoretical	LaSalle's invariance principle, Lyapunov's invariance theorem	Identify the basic characteristics of the nature of scientific material	(3)	14
Exam					15

11. Course evaluation

12. Learning and teaching resources

Denny Guliclc, Encounters with chaos, MCGrow Hill 2015	Required textbooks (methodology, if any)
Robert L. Devany, An introduction to chaotic dynamical system, second edition, Addison - wesely publishing company, Inc. 2016	Main references (sources)
Saber N. Elaydi, Discrete Chaos, Second Edition. Terinity University Chapman and Hall\ CRC, 2008	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites. • Virtual library. Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name
Advanced numerical analysis(1)
2. Course code
MAT5109
3. Semester/year
Applied Master/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)

ahmed.abdulhadi@sc.uobaghdad.edu.iq : sadiq.n@sc.uobaghdad.edu.iq	Name: Ahmed Mouloud Abdel Hadi Name: Sadiq Naji Nasser

8. Course objectives

Encouraging and developing scientific research in the field of mathematics in general.	Objectives of the study subject

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

9. Teaching and learning strategies

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

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Introduction 1	Concept and basic	3	1
Questions and discussion	theoretical	Errors	Concept and basic	3	2
Questions and discussion	theoretical	Finding roots (theory)	Def. and theorems	3	3
Questions and discussion	theoretical	Finding roots (theory)	Concept and examples	3	4
Questions and discussion	theoretical	Interpolation (theory)	Def. and theorems	3	5
Questions and discussion	theoretical	Interpolation (theory)	Concept and basic	3	6
Questions and discussion	theoretical	spline	Def. and remarks	3	7
Questions	theoretical	spline	Concept and examples	3	8

and discussion					
Questions and discussion	theoretical	Similarity	Concept and basic	3	9
Questions and discussion	theoretical	Differentiation and integration	Concept and examples	3	10
Questions and discussion	theoretical	Differentiation and integration	Def. and theorems	3	11
Questions and discussion	theoretical	Numerical solution of linear system (theory)	Concept and examples	3	12
Questions and discussion	theoretical	Numerical solution of linear system (theory)	Def. and theorems	3	13
Questions and discussion	theoretical	Numerical solution of linear system (theory)	Concept and examples	3	14
Exam	-		-		15

11. Course evaluation

12. Learning and teaching resources

Introduction to applied numerical analysis by Richard Hamming 2014	Required textbooks (methodology, if any)
Numerical methods for scientists and engineers by Richard Hamming 2016	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. Library locations in some international universities	Electronic references, websites

Model Course description

1. Course name	
Inverse problems and their applications	
2. Course code	
MAT5111	
3. Semester/year	
Applied Master/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)	
mmmsh@sc.uobaghdad.edu.iqEmail:	Name: Muhammad Sabah Hussein
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.	The strategy

- How to display scientific materials using display devices: data shows, smart boards, plasma screens.
- Self-learning through homework and mini-projects within lectures.
- Graduation projectsWaFor scientific visits

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Introduction to inverse problems	Def. ,remarks and examples	2	1
Questions and discussion	theoretical	Preliminaries and examples	Concept and some remarks	2	2
Questions and discussion	theoretical	Definitions	Theorems and application	2	3
Questions and discussion	theoretical	Examples of ill-posed problems	Def. and theorems	2	4
Questions and discussion	theoretical	Least-squares method	Def. andremark	2	5
Questions and discussion	theoretical	Tikhonov's regularization method	Concept and examples	2	6
Questions and discussion	theoretical	Singular value decomposition	Def. and remarks	2	7
Questions and discussion	theoretical	Conjugate gradient method	Def. and remarks	2	8
Questions and discussion	theoretical	Applications and further methods	Def. and remarks	2	9
Questions and discussion	theoretical	Cauchy problem for Laplace's equation	Def. and properties	2	10
Questions and discussion	theoretical	Backward heat conduction problem	Def. and properties	2	11
Questions and discussion	theoretical	Inverse heat conduction problem	Def. and properties	2	12
Questions and discussion	theoretical	Inverse source problems	Def. and properties	2	13
Questions and discussion	theoretical	Inverse coefficient problems	Concept and examples	2	14

		Exam			15

11. Course evaluation	

12. Learning and teaching resources	
Inverse problem theory, Albert Tarntola, 2019	Required textbooks (methodology, if any)
An introduction to the mathematical theory of inverse problems by Andreas Kirsch 2016	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. • Library locations in some international universities.	Electronic references, websites

Model Course description

1. Course name
English

2. Course code
UOB5100

3. Semester/year
Applied Master/first course/2023-2024

4. The date this description was prepared
10/1/2023

5. Available attendance forms
Presenceweekly

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.iq Email: asawer.d@sc.uobaghdad.edu.iq Email:	Name: Ali Abd Obaid Name: Duraid bracelets

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	Objectives of the study subject

	• Preparing a stimulating environment for faculty members to develop their knowledge and educational and research skillsBuilding 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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projects and scientific visits	The strategy

10. Course structure

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

Questions and discussion	theoretical	The world of IT	Identify the basic characteristics of the nature of scientific material	2	twelveth
Questions and discussion	theoretical	Inventions, discoveries	Identify the characteristics of breakthroughs and discoveries	2	Thirteenth
Questions and discussion	theoretical	Processes	Identify the basic processes of the nature of matter	2	fourteenth
Questions and discussion	theoretical	Travel and tourism	Learn about tourism and travel	2	Fifteenth

11. Course evaluation

12. Learning and teaching resources

New hand way:- Academic skills reading writing 2019	Required textbooks (methodology, if any)
Academic skills reading writing 2018	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. Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name
Operations Research
2. Course code
MAT5115
3. Semester/year
Applied Master/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)

iraq.t@sc.uobaghdad.edu.iq
Email: Name: Dr. 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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projectsWaFor scientific visits	The strategy

10. Course structure

Evaluation method	Teaching method	Unit name (topic)	Required educational outcomes	hours	the week
General questions and discussions	theoretical	Effective Organization and Time Management,	Identify the basic characteristics of the nature of scientific material	(2)	1
General questions	theoretical	Informal Retrieval	Identify the basic characteristics of	(2)	2

General questions and discussions			the nature of scientific material		
General questions and discussions	theoretical	Critical Reading	Identify the basic characteristics of the nature of scientific material	(2)	3
General questions and discussions	theoretical	Writing a paper	Identify the basic characteristics of the nature of scientific material	(2)	4
General questions and discussions	theoretical	Writing and defending your thesis	Identify the basic characteristics of the nature of scientific material	(2)	5
General questions and discussions	theoretical	What is a scientific paper?	Identify the basic characteristics of the nature of scientific material	(2)	6
General questions and discussions	theoretical	Getting started	Identify the basic characteristics of the nature of scientific material	(2)	7
General questions and discussions	theoretical	Standard format of a paper	Identify the basic characteristics of the nature of scientific material	(2)	8
General questions and discussions	theoretical	The purpose of a thesis	Identify the basic characteristics of the nature of scientific material	(2)	9
General questions and discussions	theoretical	Have a plan	Identify the basic characteristics of the nature of scientific material	(2)	10
General questions and discussions	theoretical	The structure of your thesis	Identify the basic characteristics of the nature of scientific material	(2)	11
General questions and discussions	theoretical	Writing your thesis	Identify the basic characteristics of the nature of scientific material	(2)	12
General questions and discussions	theoretical	Writing style	Identify the basic characteristics of the nature of scientific material	(2)	13
General questions and discussions	theoretical	The oral examination	Identify the basic characteristics of the nature of scientific material	(2)	14
Exam					15

11. Course evaluation

Monthly and daily exam and quest from 40, final from 60	
12. Learning and teaching resources	
Research methodology methods & techniques, CRKothari	Required textbooks (methodology, if any)
Research Methodology: Methods And Techniques (Multi Color Edition) Paperback – December 11, 2008	Main references (sources)
The reality of libraries in some international universities.	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites. • Virtual library. Library locations in some international universities.	Electronic references, websites

1. Course name

Finite difference methods

2. Course code

MAT5112

3. Semester/year

Applied Master/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)

dahlia.khaled@sc.uobaghdad.edu.iq Email: Name: Dalia 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 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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projectsWaFor scientific visits			The strategy	

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Overview of PDE's	introduction	2	1
Questions and discussion	theoretical	Classification of PDE's	Some important classifications	2	2
Questions and discussion	theoretical	Explicit methods for 1-D heat	Explicit methods for the heat equation	2	3
Questions and discussion	theoretical	Explicit methods diffusion equation	Explicit methods for the diffusion equation	2	4
Questions and discussion	theoretical	Implicit backward Euler method	Implicit methods of Euler's methods	2	5
Questions and discussion	theoretical	Numerical implementation of the implicit backward	Numerical applications of explicit posterior methods	2	6
Questions and discussion	theoretical	Finite difference	Final differences	2	7
Questions and discussion	theoretical	Discretization	Some important definitions	2	8
Questions and discussion	theoretical	Consistency	Some important definitions	2	9
Questions and discussion	theoretical	Stability and fundamentals of fluid flow	Stability and fluid flow fundamentals	2	10
Questions and discussion	theoretical	Conservative property	See some features	2	11
Questions and discussion	theoretical	The upwind scheme	See some features	2	12
Questions and discussion	theoretical	Transportive property	See some features	2	13

Questions and discussion	theoretical	Upwind difference and artificial viscosity	Some important classifications	2	14
		Test			15

11. Course evaluation

12. Learning and teaching resources

Calculus of infinite difference, George Boole.2016	Required textbooks (methodology, if any)
Finite difference methods for partial differential equations, George E. Forsythe & Wolfgang R. Wasow2015	Main references (sources)
1. Finite difference equations, H.Levy & F.Lessman.2013 2. Finite difference methods for ordinary and partial differential equations2012	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites. • Virtual library. Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name
Mathematical modeling

2. Course code
MAT5211

3. Semester/year
Applied Master/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 name is mentioned)
raid.naji@sc.uobaghdad.edu.iq   Email: Name: Raed Kamel Naji

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

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

10. Course structure

Evaluation method	Teaching method	Unit name (topic)	Required educational outcomes	hours	the week
General questions and discussions	theoretical	Introduction to mathematical modeling with basic modeling concepts	Identify the basic characteristics of the nature of scientific material	(3)	1
General questions and discussions	theoretical	Introduction to mathematical modeling with basic modeling concepts	Identify the basic characteristics of the nature of scientific material	(3)	2
General questions and discussions	theoretical	Modeling growth and decay with various applications	Identify the basic characteristics of the nature of scientific material	(3)	3
General questions and discussions	theoretical	Modeling growth and decay with various applications	Identify the basic characteristics of the nature of scientific material	(3)	4
General questions and discussions	theoretical	Mathematical modeling using first-order differential equations	Identify the basic characteristics of the nature of scientific material	(3)	5
General questions and discussions	theoretical	Mathematical modeling using first-order differential equations	Identify the basic characteristics of the nature of scientific material	(3)	6
General questions and discussions	theoretical	Mathematical modeling using first-order differential equations	Identify the basic characteristics of the nature of scientific material	(3)	7
General questions and discussions	theoretical	Mathematical modeling using second-order differential equations	Identify the basic characteristics of the nature of scientific material	(3)	8
General questions and discussions	theoretical	Mathematical modeling using a system of differential equations	Identify the basic characteristics of the nature of scientific material	(3)	9
General questions	theoretical	Mathematical modeling using a system of	Identify the basic characteristics of the	(3)	10

and discussions		differential equations with applications in biology	nature of scientific material		
General questions and discussions	theoretical	Mathematical modeling using a system of differential equations with applications in biology	Identify the basic characteristics of the nature of scientific material	(3)	11
General questions and discussions	theoretical	Mathematical modeling using a system of differential equations with applications in biology	Identify the basic characteristics of the nature of scientific material	(3)	12
General questions and discussions	theoretical	Mathematical modeling using a system of differential equations with applications in epidemiology	Identify the basic characteristics of the nature of scientific material	(3)	13
General questions and discussions	theoretical	Mathematical modeling using a system of differential equations with applications in epidemiology	Identify the basic characteristics of the nature of scientific material	(3)	14
Exam		Mathematical modeling using a system of differential equations with applications in epidemiology			15

11. Course evaluation

12. Learning and teaching resources

Modeling with differential equations. By DN Burghes and MS Borrie. Ellis Horwood Ltd. 2020	Required textbooks (methodology, if any)
Mathematical Models in Biology and Medicine. By JN Kapur, Affiliated East-West press private limited 2016. Mathematical Modeling. By JN Kapur, New Age International (P) Ltd. 2000.	Main references (sources)
A First Course in Mathematical Modeling, Fifth edition Frank R. Giordano, William P. Fox and Steven B. Horton. Brooks/Cole, Cengage Learning, 2014	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites. • Virtual library. Library locations in some international universities.	Electronic references, websites

<h1 style="text-align: center">modelCourse description</h1>

1. Course name
Fluid mechanics
2. Course code
MAT5210
3. Semester/year
Applied Master/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 name is mentioned)	
ahmed.abdulhadi@sc.uobaghdad.edu.iq Email:	Name: Ahmed Mouloud Abdel Hadi

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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projectsWaFor scientific visits	The strategy

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Basic definitions(Ch1)	Concept and basic	3	1
Questions and discussion	theoretical	Basic definitions(Ch1)	Concept and basic	3	2
Questions and discussion	theoretical	Kinematic fluid mechanics(Ch2)	Def. and theorems	3	3
Questions and discussion	theoretical	Kinematic fluid mechanics(Ch2)	Concept and examples	3	4
Questions	theoretical	Dynamic fluid mechanics(Ch3)	Def. and theorems	3	5

and discussion					
Questions and discussion	theoretical	Dynamic fluid mechanics(Ch3)	Concept and basic	3	6
Questions and discussion	theoretical	The fluid mechanics problem	Def. and remarks	3	7
Questions and discussion	theoretical	Applications on the fluid mechanics problem	Concept and examples	3	8
Questions and discussion	theoretical	Dimensionless analysis and Similarity(Ch4)	Concept and basic	3	9
Questions and discussion	theoretical	Dimensionless analysis and Similarity(Ch4)	Concept and examples	3	10
Questions and discussion	theoretical	Formulation of boundary layer and BLM(Ch5)	Def. and theorems	3	11
Questions and discussion	theoretical	Formulation of boundary layer and BLM(Ch5)	Concept and examples	3	12
Questions and discussion	theoretical	Turbulent flow(Ch6)	Def. and theorems	3	13
Questions and discussion	theoretical	Turbulent flow(Ch6)	Concept and examples	3	14
Exam	-		-	3	15

11. Course evaluation

12. Learning and teaching resources

Fluid mechanics, Frank M. White2019	Required textbooks (methodology, if any)
Fluid mechanics, MK Jain 2017	Main references (sources)
Fluid mechanics: Fundmentals and application 4th edition 2010	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites. • Virtual library. Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name
Control theory
2. Course code
MAT5217
3. Semester/year
Applied Master/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)
sadiq.n@sc.uobaghdad.edu.iq Email: Name: Sadiq Naji Nasser

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	Objectives of the study subject

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, plasma screens. - Self-learning through homework and mini-projects within lectures. - Graduation projectsWaFor scientific visits	The strategy

10. Course structure

Evaluation method	Teaching method	Unit name (topic)	Required educational outcomes	hours	the week
General questions and discussions	theoretical	The basic optimal control problem	Identify the basic concepts of the nature of scientific material	(2)	1
General questions and discussions	theoretical	Parameter optimization problems - Constrained and unconstrained optimization	Learn about finding the optimal solution in the presence of restrictions and without restrictions	2	2
General questions and discussions	theoretical	The first and second -order conditions	Necessary conditions	(2)	3
General questions and discussions	theoretical	one variable optimal control problem for (continuous case)	Continuous control problems with one variable	(2)	4
General questions and discussions	theoretical	Optimal control problems - special forms	Control issues in particular	(2)	5
General questions and discussions	theoretical	The Mayer Problems of Optimal Control	IssuesMayer	(2)	6
General questions and discussions	theoretical	Simplest Problem— Necessary Conditions with Sufficiency and Interpretations	Identify the basic characteristics of the nature of scientific material	(2)	7
General questions	theoretical	Problems for several variables	Issues of controlling more than one	(2)	8

and discussions			variable		
General questions and discussions	theoretical	Bounded Controls with further Control Constraint	Control issues with multiple constraints	(2)	9
General questions and discussions	theoretical	Discontinuous and Bang-Bang Control	Some types of optimal solutions	(2)	10
General questions and discussions	theoretical	The Pontryagin Maximum Principle, with further Sufficiency Theorems	principlePontryagin the Great and theories related to him	(2)	11
General questions and discussions	theoretical	Alternative Formulations and state Variable Inequality Constraints	Some other formulas	(2)	12
General questions and discussions	theoretical	The basic discrete optimal control problems for one and several variables.	Fundamentals of intermittent control theory	(2)	13
General questions and discussions	theoretical	Other notes and properties	General notes and features	(2)	14
General questions and discussions		Some applications to optimal control theory.	Some applications and examples	(2)	15

11. Course evaluation

12. Learning and teaching resources

-CP Simon Mathematics for Economists, (2020) -Sethi SP and Thompson GL, Optimal Control Theory: Applications to Management Science and Economics 2nd edition, Springer (2016).	Required textbooks (methodology, if any)
Alpha Chaing Element of dynamic optimization Hill(1992) -A.E. Bryson, Jr. Yu-Chi Ho "Applied Optimal Controloptimization, estimation and control" Taylor & Francis Newyork,(1975) - Lamberto Cesari "optimization theory and applications" Springer-Verlag (1983)	Main references (sources)
Clark C., Mathematical Bioeconomics: The Optimal Management of Renewable Resources, 2nd edition, Wiley (1990).	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites.	Electronic references, websites

• The virtual library and library sites in some international universities.

modelCourse description

1. Course name
Topics in linear algebra
2. Course code
MAT5213
3. Semester/year
Applied Master/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)	
huda.oun@sc.uobaghdad.edu.iq Amyto:	Name: Hoda Abdel Sattar

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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projectsWaFor scientific visits	The strategy

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Basic Concepts	Basic Concepts ;Vector space - subspace- Linear combination-linear dependent and linear independent- basis- span	2	1
Questions and discussion	theoretical	Basic of sub space	Basic concepts of matrix ; Properties of arithmetic matrix – inverse matrix	2	2
Questions and	theoretical	Some Concepts	Linear algebra solution;Solution- Gaussian	2	3

			elimination- regular case-pivoting and permutations –		
Questions and discussion	theoretical	Isomorphism basic	General Linear system;homogenous system- Determine	2	4
Questions and discussion	theoretical	Matrices of linear maps	Eigenvalue and Eigenvectors	2	5
Questions and discussion	theoretical	Examples and transformation matrices	Matrices of linear maps;Algebra of linear maps	2	6
Questions and discussion	theoretical	Some proposition	Exam	2	7
Questions and discussion	theoretical	Some proposition	Application of linear algebra	2	8
Questions and discussion	theoretical	Some thm about this	Minimization and least square	2	9
Questions and discussion	theoretical	Orthogonal matrices	Applications to curve fitting and circuits	2	10
Questions and discussion	theoretical	Some thm +definite symmetric	Applications to curve fitting and circuits	2	11
Questions and discussion	theoretical	Self adjoint	Some theorem about applied linear algebra	2	12
Questions and discussion	theoretical	Give some prop. And thm.	Application of linear Algebra	2	13
Questions and discussion	theoretical	Give some prop. And thm.	Inner products and norms	2	14
Questions and discussion	theoretical	Give some prop. And thm.	Exam	2	15

11. Course evaluation

12. Learning and teaching resources

BERNARD KOLMAN and DAVID R. HILL, linear algebra with application	Required textbooks (methodology, if any)
Peter J. Olver and Chehrzad Shakiban, -1 Applied Linear Algebra, 2010.Bernard Coleman Introduction to Linear Algebra with its	Main references (sources)

Applications Translated by Adel Ghassan and Basil Atta Al-Hashimi - University of Baghdad2000	
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 references, websites

Model Course description

1. Course name
Methods of writing research
2. Course code
UOB5200
3. Semester/year
Applied Master/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)

asawer.d@sc.uobaghdad.edu.iq Email :	Name: Duraid bracelets
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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projectsWaFor scientific visits	The strategy	

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
Questions and discussion	theoretical	Type of writing	Scientific Articles Research papers	1	1
Questions and discussion	theoretical	Proposals	purpose of Proposals components of Proposals	1	2
Questions and discussion	theoretical	Titles	Point to check in your own writing	1	3
Questions and discussion	theoretical	Planning your writing	Putting your ideas in order	1	4
Questions and discussion	theoretical	Paragraph writing	Placing the main idea in the paragraph	1	5
Questions and	theoretical	Abstract and introduction	Problems, Literature review and Referring	1	6

discussion					
Questions and discussion	theoretical	Problem statement purpose	Main objective of paper	1	7
Questions and discussion	theoretical	Writing the main body	Use of illustrations General information	1	8
Questions and discussion	theoretical	Results	Summarizing what was done	1	9
Questions and discussion	theoretical	Discussion	Did the research support the hypothesis	1	10
Questions and discussion	theoretical	Tables and Graphs	Describing graphsDescribing Tables	1	11
Questions and discussion	theoretical	Referencing	Types of references style sheets	1	12
Questions and discussion	theoretical	Format of reference	Ref. to book, article and unpublished work	1	13
Questions and discussion	theoretical	Useful phrases	Phrases that used in research paper	1	14
Exam	-	Examined	-	1	15

11. Course evaluation

12. Learning and teaching resources

Z. subodova, writing in English apractical handbook for scientific technical writers, Technical University Bron, 2013.	Required textbooks (methodology, if any)
bodova, writing in English apractical handbook for scientific technical writers, Technical University Bron, 2013. A. wallwork, English for research: usage style and grammar, springer .Newyork .Headelborg Dordrecht London.2000 T.panston, Aconcise grammar for English language teachers, Ireland 2003 Guidelines for writing university theses and scientific research (Issam Fadel Al-Jumaili - Zahra Mahmoud Al-Khafaji) 2009	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 Library locations in some international universities.	Electronic references, websites

modelCourse description

1. Course name
Stability of hysteresis differential equations
2. Course code
MAT5215
3. Semester/year
Applied Master/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)	
hassan.fadhil.r@sc.uobaghdad.edu.iqEmail:	Name: Hassan Fadel Reda

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, plasma screens. • Self-learning through homework and mini-projects within lectures. • Graduation projects For 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	In-person lectures	History of Delay Differential Equation	Identify the basic concepts of the nature of scientific material	2	the first
General	In-person	Classification of Delay		2	the

questions and discussion	lectures	Differential Equations	Identify the basic concepts of the nature of scientific material		second
General questions, discussion, and exams	In-person lectures	Types of Delay Differential Equation	Identify the basic concepts of the nature of scientific material	2	the third
Duties are general	In-person lectures	Applications of Delay Differential Equation	Identify the basic concepts of the nature of scientific material	2	the fourth
Annie's test	In-person lectures	Solution of Delay Differential Equation	Identify the basic concepts of the nature of scientific material	2	Fifth
General questions and discussion	In-person lectures	Linear Delay Differential Equations	Identify the basic concepts of the nature of scientific material	2	VI
Duties are general	In-person lectures	Uniqueness and Existence of Delay Differential Equation	Identify the basic concepts of the nature of scientific material	2	Seventh
Annie's test	In-person lectures	Methods for solving of Delay Differential Equation	Identify the basic concepts of the nature of scientific material	2	VIII
General questions and discussion	In-person lectures	Solution of the first Order Delay Differential Equations	Identify the basic concepts of the nature of scientific material	2	Ninth
Monthly exam	In-person lectures	Exam	Identify the basic concepts of the nature of scientific material	2	The tenth
General questions and discussion	In-person lectures	Discussing reports	Identify the basic concepts of the nature of scientific material	2	eleventh
Duties are general	In-person lectures	The Method of Successive Integrations	Identify the basic concepts of the nature of scientific material	2	twelveth

				2	Thirteenth
Annie's test	In-person lectures	Example	Identify the basic concepts of the nature of scientific material	2	Thirteenth
General questions and discussion	In-person lectures	Laplace Transformation Method	Identify the basic concepts of the nature of scientific material	2	fourteenth
General questions and discussion	In-person lectures	STEPS Examples		2	Fifteenth

11. Course evaluation

12. Learning and teaching resources

Delay Differential Equations and Applications,edited byO. ArinoUniversity of Pau, France 2019 ML Hbid University Cadi Ayyad, Marrakech, Morocco 2018 and E. Ait Dads University Cadi Ayyad, Marrakech, Morocco2019	Required textbooks (methodology, if any)
An Introduction to Delay Differential Equations with Sciences Applications to the Life ByHal Smith 2003	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. • Library locations in some international universities.	Electronic references, websites

Model Course description

1. Course name
Mathematical techniques for image processing

2. Course code
MAT5214

3. Semester/year
Applied Master/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)

[Saad.m@sc.uobaghdad.edu.iq Email](mailto:Saad.m@sc.uobaghdad.edu.iq):	Name: Saad Muhammad Ali Al-Mumen

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 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

9. Teaching and learning strategies

- Explanation and clarification through lectures. - How to display scientific materials using display devices: data shows, smart boards, plasma screens. - Self-learning through homework and mini-projects within lectures. - Graduation projectsWaFor scientific visits - Paper lectures - Presentations - Electronic screen - Telegram, electronic classes, and websites	The strategy

10. Course structure

Evaluation method	Teaching method	Name of the unit/topic	Required learning outcomes	hours	the week
General questions and discussion	In-person lectures	Grayscale Digital Images • Working with Images in • MATLAB Images and Statistical • Description of Quantitative Data Image histograms •	Basics of Digital Images	2 Theoretical	the first
General questions and discussion	In-person lectures	Measurements of Center • and Spread Color Images and Color • Spaces	Basics of Digital Images	2 Theoretical	the second
General questions, discussion, and exams	In-person lectures	Power Functions and • Gamma-Correction Exponential Functions and • Image Transformations Logarithmic Functions and • Image Transformations	Lightening & Darkening of Grayscale Image	2 Theoretical	the third

Duties are general	In-person lectures	• Linear Functions and Contrast Stretching • Automation of Image Enhancement	Lightening & Darkening of Grayscale Image	2 Theoretical	the fourth
Annie's test	In-person lectures	• Discrete and Continuous Random Variables • Transformation of Random Variables • Image Equalization and Histogram Matching	Probability, Random Variables, & Histogram Processing	2 Theoretical	Fifth
General questions and discussion	In-person lectures	• Basic Operations on Matrices • Linear Transformations and Their Matrices • Homogeneous Coordinates and Projective Transformations	Matrices &Linear Transformations	2 Theoretical	VI
Duties are general	In-person lectures	• Image Blurring and Noise Reduction • Discrete Linear Convolution • Circular Convolution • Algebraic Properties of Convolution	Convolution & Image Filtering	2 Theoretical	Seventh
Annie's test	In-person lectures	• Convolution as a Linear Transformation • Convolution in Two Dimensions	Convolution & Image Filtering	2 Theoretical	VIII
General questions and discussion	In-person lectures	• Partial Derivatives and the Gradient Edge Detector • Directional Derivatives and the Roberts Cross Operator • The Prewitt and Sobel Edge Detectors	Edge Detection	2 Theoretical	Ninth
Monthly exam	In-person lectures	• Laplacian Edge Detection • Edge Detection in Noisy Images	Edge Detection	2 Theoretical	The tenth

General questions and discussion	In-person lectures	Fourier Series Expansion • 1D Discrete Fourier • Transform DFT 2D Discrete Fourier • Transform DFT	Analysis and processing of images in the Frequency Domain	2 Theoretical	eleventh
Duties are general	In-person lectures	Frequency Domain • Processing of Digital Images	Analysis and processing of images in the Frequency Domain	2 Theoretical	twelveth
Annie's test	In-person lectures	Fundamentals • Lowpass (Smoothing) • Frequency Domain Filters Highpass (Sharpening) • Frequency Domain Filters Bandreject and Bandpass • Filters	Application of Filtering in the Frequency Domain	2 Theoretical	Thirteenth
General questions and discussion	In-person lectures	Erosion and dilation • Opening and closing • The Hit-or-Miss • transformation Various morphological • algorithms for binary images	Mathematical morphology	2 Theoretical	fourteenth
General questions and discussion	In-person lectures	Image pyramids • Subband coding • Multiresolution expansions • The Haartransform • Wavelet transform in one • and two dimensions Discrete wavelet transform •	Wavelets and multiresolution processing	2 Theoretical	Fifteenth

11. Course evaluation

12. Learning and teaching resources

Galperin, Yevgeniy V. An Image Processing Tour of • College Mathematics. CRC Press, 2021. Bovik, Alan C., ed. The essential guide to image processing. academic press,2019	Required textbooks (methodology, if any)
Gonzalez, Rafael C., Richard E. Woods, and Steven L. • Eddins. 2009. Digital Image processing using MATLAB®, Gatesmark Publishing, 2009. Solomon, Chris, and Toby Breckon. Fundamentals of	Main references (sources)

84

Digital Image Processing: A practical approach with examples in Matlab. John Wiley & Sons, 2011.	
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 references, websites

Model Course description

1. Course name	
Dynamic Systems (2)	
2. Course code	
MAT5212	
3. Semester/year	
Applied Master/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)	
shireen.jawad@sc.uobaghdad.edu.iq Email:	Name: Sherine Rasoul

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.	The strategy

- How to display scientific materials using display devices: data shows, smart boards, plasma screens.
- Self-learning through homework and mini-projects within lectures.
- Graduation projectsWaFor scientific visits

10. Course structure

Evaluation method	Teaching method	Unit name (topic)	Required educational outcomes	hours	the week
General questions and discussions	theoretical	A review of the basic concepts in the course of dynamical systems	**Identify the basic characteristics of the nature of scientific material**	2	1
General questions and discussions	theoretical	Families of function and bifurcation	**Identify the basic characteristics of the nature of scientific material**	2	2
General questions and discussions	theoretical	Period- 3 point and relative lemma and theorems	**Identify the basic characteristics of the nature of scientific material**	2	3
General questions and discussions	theoretical	Singers theorem, Basin of attraction of periodic points	**Identify the basic characteristics of the nature of scientific material**	2	4
General questions and discussions	theoretical	Chaos in one dimension, transitivity, Lyapunove exponents, transitivity and strong chaos	**Identify the basic characteristics of the nature of scientific material**	2	5
General questions and discussions	theoretical	Conjugacy and its properties	**Identify the basic characteristics of the nature of scientific material**	2	6
General questions and discussions	theoretical	two dimensional maps,the dynamics of linear maps	**Identify the basic characteristics of the nature of scientific material**	2	7
General questions and discussions	theoretical	Similar matrices, invariant set, linear conjugate, attracting, repelling and saddle point of linear function	**Identify the basic characteristics of the nature of scientific material**	2	8
General questions and discussions	theoretical	The difference equations and their solutions	**Identify the basic characteristics of the nature of scientific material**	2	9
General questions	theoretical	Solution of linear system, the general solution of	**Identify the basic characteristics of**	2	10

and discussions		linear systems	**the nature of scientific material**		
General questions and discussions	theoretical	Stability of two-dimensional maps (nonlinear)	**Identify the basic characteristics of the nature of scientific material**	2	11
General questions and discussions	theoretical	Attracting, repelling, saddle point of nonlinear maps	Identify the basic characteristics of the nature of scientific material	2	12
General questions and discussions	theoretical	Hartman-Grobman theorem, area contracting and area expanding maps, the behavior of F near a saddle point, stable and unstable manifold theorem, stability via linearization	Identify the basic characteristics of the nature of scientific material	2	13
General questions and discussions	theoretical	Lyapunove function for nonlinear map, Lyapunove stability theorem,LaSalles invariance principle, Lyapunove stability theorem	Identify the basic characteristics of the nature of scientific material	2	14
Exam					15

11. Course evaluation

12. Learning and teaching resources

Encounters with chaos • Denny Gulick 1992-McGraw-Hill.	Required textbooks (methodology, if any)
Robert L.Devany, An introduction to • chaotic dynamical system, second edition, Addition – wesely publishing company, Inc. 1989 Saber N.Elaydi, Discrete Chaos, Second • edition. Terinity University chapman and hall.	Main references (sources)
Saber N. Elaydi, Discrete Chaos, Second Edition. Terinity University Chapman and Hall\ CRC, 2008	Recommended supporting books and references (scientific journals, reports....)
• Discreet websites. • Virtual library. Library locations in some international	Electronic references, websites

universities.	