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

ACADEMIC PROGRAM DESCRIPTION GUIDE UNDERGRADUATE STUDIES TERM SYSTEM

2025-2026

Academic Program Description Form

University Name: Al-Nahrain University

Faculty/Institute: College of Scinces

Scientific Department: Department of Mathematics and Computer Applications

Academic or Professional Program Name: Bachelors

Final Certificate Name: Bachelors in Mathematics and Computer Applications

Academic System: Semester

Description Preparation Date: 2025-2026

File Completion Date: 28/ 10/ 2025

جامعة النهرين / كلية العلوم
قسم الرياضيات
و
تطبيقات الحاسوب

Signature:

Head of Department Name:

Prof. Dr. Fadhel Subhi Fadhel

Date: 6 / 11 / 2025

Signature:

Scientific Associate Name:

Assist. Prof. Dr. Manaf Adnan Saleh

Date: 6 / 11 / 2025

The file is checked by: Dr. Orooba Nadhim

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Lect. Dr. Orooba Nadhim Harbi

Date: 9 / 11 /2025

Signature:

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة النهرين كلية العلوم
مكتب العميد
Dean's office
Republic of Iraq
Ministry of Higher Education and Scientific Research
Al-Nahrain University / College of Science

Approval of the Dean

Prof. Dr. Asmaa Hadi Mohammed

1. Program Vision

That the graduating students be academically, research-wise, and innovatively distinguished, qualifying them to engage efficiently in the labor market.

2. Program Mission

The mission of the academic program (Bachelor's) is for the Department of Mathematics and Computer Applications to provide distinguished academic education that aligns with quality and accreditation standards, combining theoretical foundations with contemporary applications that meet the changing demands of the job market. It also aims to prepare qualified scientific competencies capable of critical and analytical thinking, offering consultations that serve the community and promote sustainable development, as well as enriching scientific research.

3. Program Goals

1- Enabling graduates to link academic and applied sciences according to the needs of society by understanding that mathematics and computer applications have great importance in planning and decision-making through analyzing data from state institutions, for example: banks, the Ministry of Defense, the Ministry of Planning, Health, Industry, and insurance companies, in a way that serves and contributes to the development of all the mentioned fields in the country.

2- The ability to design and conduct experiments, analyzes them, and estimates their results in the lab. This is achieved by creating mathematical models that simulate real scientific scenarios and then studying the results of these models with the possibility of developing them in the future in a way that aligns with available data and goals and serves the job market practically, in addition to the ability to deduce, analyze, and innovate.

3- Enabling bachelor's program graduates to secure a successful future and

aspire to pursue higher studies in the field of mathematics and related areas.

4- Professionalism in various applications of mathematics, using the knowledge acquired to solve real-life and practical problems arising within the requirements of the labor market.

5- Instill a sense of awareness of ethical and professional responsibilities through the academic and practical journey toward the community in a way that does not conflict with societal norms and traditions.

4. Program Accreditation

Does the program have program accreditation? And from which agency?

-No

5. Other external influences

Is there a sponsor for the program?

-There isn't any.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	8	13	9%	
College Requirements	5	15	10%	
Department Requirements	32	118	81%	
Summer Training	___	Fulfilled (Zero Credit)	____	One-month summer training for third-year students (in July or August).
Other	____	____	____	

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Stage One	MATH 141	Calculus I	4	
	MATH 142	Calculus II	4	
	MATH 112	Finite Mathematics	4	
	MATH 114	Foundation of Mathematics I	4	
	MATH 115	Foundation of Mathematics II	4	
	MATH 113	Analytic Geometry	4	
	UREQ 110	English Language I	2	
	UREQ 111	English Language II	2	
	UREQ 151	Programming Fundamentals	2	3
	UREQ 150	Introduction to Computer	2	3
	PHYS161	Mechanics	2	2
	PHYS162	Electricity and Magnetism	2	2
Stage two	MATH 210	Advanced Calculus I	4	
	MATH 211	Advanced Calculus II	4	
	COMP 251	Programming	2	3
	COMP 253	Computer Graphics	2	3
	MATH 212	Linear Algebra I	4	
	MATH 213	Linear Algebra II	4	
	MATH 214	Optimization I	2	3
	MATH 243	Probability and Statistics	3	
	MATH 216	Solution of ODE	4	
	CHEM 271	General Chemistry	2	
	URIQ 201	Arabic Language I	2	
	URIQ 202	Arabic Language II	2	
Third Stage	MATH 316	Applied Mathematics	4	
	MATH 319	Optimization II	2	
	MATH 312	Abstract Algebra I	4	
	MATH 313	Abstract Algebra II	4	
	MATH 317	Fuzzy Sets	3	
	MATH 314	Numerical Analysis I	2	3
	MATH 315	Numerical Analysis II	2	3
	MATH 310	Real Analysis I	4	

	MATH 311	**Real Analysis II**	**4**	
	UREQ 420	**Democracy and Human Rights**	**1**	
	MATH 318	**Theory of Ordinary Differential Equations**	**4**	
	URMETHO	**Scientific Research Methodology**	**1**	
Stage Four	**MATH 411**	**Complex Analysis I**	**4**	
	MATH 412	**Complex Analysis II**	**4**	
	MATH 413	**Mathematical Statistics I**	**4**	
	MATH 414	**Mathematical Statistics II**	**4**	
	MATH 415	**Topology I**	**4**	
	MATH 416	**Topology II**	**4**	
	MATH 430	**Topics in Pure Mathematics**	**4**	
	MATH 410	**Partial Differential Equations**	**4**	
	MATH421	**Research Project**	**4**	
		Ethics		

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	1- Creating a strong foundation for the student in the subject of pure and applied mathematics. 2- Creating advanced thinking in understanding most mathematics topics. 3- The student knows how to use computer programs to find solutions to mathematical equations and enables him to read the literature of the specialized scientific subject. 4- The student will acquire as much specialized terminology as possible and be able to convert practical applications to mathematical equations.
Skills	
Learning Outcomes 2	1- Injecting a fair amount of specialized information, terminology, and equations related to the scientific subject. 2- The student gains experience in using computer programs and experience in solving many life problems. 3- Urging the student to build a self-study plan and teaching them how to progress towards achieving this plan through self-learning. 4- To be guided by the department head and its council in this regard and to benefit from the experience of professors with long

	experience in the field of personal development.
Ethics	
Learning Outcomes 4	1- Increasing the student's cognitive and scientific awareness. 2- Enabling the student to use mathematical concepts, both applied and pure. 3- Understanding and solving life applications of various types. 4- The student's knowledge of linking mathematical concepts to each other.

9. Teaching and Learning Strategies

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

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

Teaching strategies include a set of organized plans and methods followed by the subject teacher in order to guide students towards achieving learning goals, including cognitive goals for theoretical subjects, skill goals in proofs in a mathematical manner through sequential and ordered steps, and emotional and value goals through sensory perception of the theorems' statements and results and then their proofs and how to use their syntax theoretically, as well as introducing the student and expanding their programming skills using specialized computer programs to solve mathematical problems numerically and model mathematical and real-life problems programmatically; that is done through specific teaching and learning methods in order for the student to acquire transferable general and qualifying skills.

10. Evaluation methods

- Daily participation.

2- Daily exams.

3- Monthly exam.

4- Reports.

5- Discussion sessions (seminars).

6- Graduation projects.

7- Homework.

11. Faculty

Faculty Members

Name & Academic Position	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Mathematics	Applied Mathematics / Integral transform			1	
Professor	Mathematics	Numerical Analysis / Approximation Theory			1	
Professor	Mathematics	Fuzzy set Theory and its Applications			1	
Professor	Mathematics	Operations Research			1	
Associate Professor	Mathematics	Functional Analysis			1	
Associate Professor	Mechanical Engineering	Operations Research			1	
Associate Professor	Mathematics	Dynamical Systems			1	

Associate Professor	Mathematics	Control Systems			1	
Instructor	Mathematics	Numerical Control			1	
Instructor	Mathematics	Functional Analysis			1	
Instructor	Mathematics	Applied Mathematics			4	
Instructor	Mathematics	Algebraic Graph Theory			1	
Instructor	Mathematics	Complex Analysis			1	
Instructor	Arabic Language	Grammer			1	
Instructor	Mathematics	Stability of Fuzzy Differential Equations			1	
Instructor	Mathematics	Mathematical Statistics			2	
Instructor	Mathematics	Numerical Solutions of Fractal partial Differential Equations			1	
Instructor	Mathematics	Linear Programming			1	
Assistant Instructor	Computer Science	Computer Graphics			1	
Assistant Instructor	Mathematics	Applied Mathematics			1	
Assistant Instructor	Mathematics	Mathematical Statistics			2	

Assistant Instructor	Mathematics	Approximate Solutions of Integro-Differential Equations			1	
Assistant Instructor	Mathematics	Algebra			3	
Assistant Instructor	Mathematics	Ordinary Differential Equations			1	
Assistant Instructor	Mathematics	Numerical Solutions of Boundary Value Problems			1	
Assistant Instructor	Mathematics	Integro-Differential Equations			1	
Assistant Instructor	Mathematics	Biomathematics			1	
Assistant Instructor	Mathematics	Topology			1	

Professional Development

Mentoring new faculty members

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

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

3- Creating joint research groups.

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

Professional development of faculty members

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

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

and administrative staff.

3- Communication between faculty members and students.

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

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

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

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

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

12. Acceptance Criterion

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

13. The most important sources of information about the program

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

-The College of Science Handbook (Guide).

14. Program Development Plan

Based on the results and statistics of the surveys and feedback from students and employers, the following are part of the department's plan to update and develop the program:

1- Twinning between the department and the peer departments in the other Iraqi, regional and international Universities.

2- Achieving the connection between the academic and applied sciences according to the society needs and according to the development centers in Iraq.

3- Initiating new subdivisions of the department, namely: Statistics, operations Research, and Pure Mathematics.

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
Stage One	MATH 141	Calculus I	Basic\ College Requirement	X	X			X				X	X		
	MATH 142	Calculus II	Basic\ College Requirement	X	X			X				X	X		
	MATH 112	Finite Mathematics	Basic\ Department Requirement	X	X		X	X				X	X	X	X
	MATH 114	Foundation of Mathematics I	Basic\ Department Requirement	X	X	X		X				X	X	X	
	MATH 115	Foundation of Mathematics II	Basic\ Department Requirement	X	X	X		X				X	X	X	
	MATH 113	Analytic Geometry	Basic\ Department Requirement	X	X			X	X	X					
	UREQ 110	English Language I	Basic\ University Requirement	X	X			X	X	X		X	X	X	
	UREQ 111	English Language II	Basic\ University Requirement	X	X			X	X	X		X			
	UREQ 151	Programming Fundamentals	Basic\ University Requirement	X	X	X		X	X	X		X			
	UREQ 150	Introduction to Computer	Basic\ University Requirement	X	X	X		X	X	X		X			

	PHYS161	Mechanics	Basic\ College Requirement				X	X				X		X	
	PHYS162	Electricity and Magnetism	Basic\ College Requirement				X	X				X		X	
Stage two	MATH 210	Advanced Calculus I	Basic\ Department Requirement	X	X	X	X	X	X	X		X	X		
	MATH 211	Advanced Calculus II	Basic\ Department Requirement	X	X	X	X	X	X	X		X	X		
	COMP 251	Programming	Basic\ College Requirement	X	X			X	X			X			
	COMP 253	Computer Graphics	Basic\ College Requirement	X	X	X	X	X	X	X	X	X	X		
	MATH 212	Linear Algebra I	Basic\ Department Requirement	X	X			X							
	MATH 213	Linear Algebra II	Basic\ Department Requirement	X	X		X	X				X	X	X	X
	MATH 214	Optimization I	Basic\ Department Requirement	X	X			X							
	MATH 243	Probability and Statistics	Basic\ College Requirement	X	X	X	X	X	X	X	X	X			
	MATH 216	Solution of ODE	Basic\ Department Requirement	X	X	X	X	X	X						
	CHEM 271	General Chemistry	Basic\ College Requirement	X	X	X	X	X	X						
	UREQ 201	Arabic Language I	Basic\ University Requirement	X	X			X				X	X	X	

	URIQ 202	Arabic Language II	Basic\ University Requirement	X	X			X				X	X	X	
Third Stage	MATH 316	Applied Mathematics	Basic\ Department Requirement	X	X	X		X							
	MATH 319	Optimization II	Basic\ Department Requirement	X	X			X				X	X		
	MATH 312	Abstract Algebra I	Basic\ Department Requirement	X	X			X				X	X		
	MATH 313	Abstract Algebra II	Basic\ Department Requirement	X	X			X	X	X		X	X	X	
	MATH 317	Fuzzy sets	Optional\Department Requirement	X	X			X	X			X	X	X	
	MATH 314	Numerical Analysis I	Basic\ Department Requirement	X	X	X		X	X			X	X		
	MATH 315	Numerical Analysis II	Basic\ Department Requirement	X	X	X		X	X			X	X	X	
	MATH 310	Real Analysis I	Basic\ Department Requirement	X	X	X	X	X	X			X			
	MATH 311	Real Analysis II	Basic\ Department Requirement	X	X	X		X	X						
	URDEMT	Democracy and Human Rights	Basic\ University Requirement	X	X		X	X				X			
	MATH 318	Theory of ODE	Basic\ Department Requirement	X	X	X		X	X						
	URMETHO	Research Methodology	Basic\ University Requirement				X		X	X	X	X	X		

Stage Four	MATH 411	Complex Analysis I	Optional\Department Requirement	X	X	X		X	X			X	X		
	MATH 412	Complex Analysis II	Optional\Department Requirement	X	X	X		X	X			X	X		
	MATH 413	Mathematical Statistics I	Basic\ Department Requirement	X	X	X		X				X	X		
	MATH 414	Mathematical Statistics II	Basic\ Department Requirement	X	X	X		X	X	X		X	X		
	MATH 415	Topology I	Optional\Department Requirement	X	X			X	X			X	X		
	MATH 416	Topology II	Optional\Department Requirement	X	X			X				X	X		
	MATH 430	Topics in Pure Mathematics	Optional\ Department Requirement	X	X	X		X	X			X	X	X	
	MATH 410	Partial Differential Equations	Basic\ Department Requirement	X	X	X		X	X			X	X	X	
	MATH421	Research Project	Basic\ Department Requirement	X						X	X	X		X	
		Ethics	Basic\ University Requirement				X		X	X	X	X	X		

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

Fourth Stage\ First Term

Course Description Form

1. Course Name:
Partial Differential Equations
2. Course Code:
MATH 410
3. Semester / Year:
First Semester / Fourth Class
4. Description Preparation Date:
1/10/2025
5. Available Attendance Forms:
6. Number of Credit Hours (Total) / Number of Units (Total):
60 Hours/ 3Unit
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Ahmed Ayyoub Yousif Email: ahmed.ayyoub@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• **The student knows how to solve a differential equation of the first and second order.** • **The student knows how to make a system of differential equations of the first order.** • **The student knows how to use transformations of integration in place of partial differential equations.**

9. Teaching and Learning Strategies

Strategy	1- Daily Post. 2- Daily Exams. 3- The Monthly Exam. 4- Home Works.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1st & 2nd	8	Introduction to partial differential equations and the separation of variables.		Give Lectures	Daily Exams and H.W.
3rd & 4th	8	Transforming nonhomogeneous Bcs to homogeneous ones and solving more complicated problems.		Give Lectures	Daily Exams and H.W.

5th & 6th	8	Transforming hard equations into easier ones and solving nonhomogeneous PDE using eigenvector expansion method.		Give Lectures	Daily Exams and H.W.
7th & 8th	8	Integral transform (sine and cosine transform.		Give Lectures	Daily Exams and H.W.
9th & 10th	8	The Fourier series and transforms and its application to PDEs		Give Lectures	Daily Exams and H.W.
11th & 12th	8	The Laplace transform and its application to PDEs		Give Lectures	Daily Exams and H.W.
13th & 14th	8	The one dimensional wave equation (hyperbolic equation)		Give Lectures	Daily Exams and H.W.
15th	4	The D'alembert solution of the wave equation and the finite vibrating string (standing waves) and Elliptic type problems (the Laplacian)		Give Lectures	Daily Exams and H.W.

11. Course Evaluation

Monthly exams 70%
Daily preparation 10%
Daily exams 10%
Home works 10%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Partial differential equations for scientists a engineers By Stanley J. Farlow
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Mathematical Statistics I
2. Course Code:
MATH413
3. Semester / Year:
First/ Fourth Class 2025−2026
4. Description Preparation Date:
1/10/2025
5. Available Attendance Forms:
Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
60 ours/ 4 credits
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Akram Abbas Al-Sabbagh Email: akram.alsabbagh@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Learning the basic concepts of mathematical statistics • the definition of random variables and statistical distributions • introducing some of the most common statistical distributions with some properties and applications

9. Teaching and Learning Strategies	
Strategy	The strategy is to provide the students with as much information about mathematical statistics as possible by attending lectures to maximize the connection between the students and the lecturer in order to solve as many real-life statistical applications as possible. The lectures, some homework and some other additional exercises is also shared on Google Classroom.

10. Course Structure

Week	Hours	Required Learning	Unit or subject	Learning	Evaluation

		Outcomes	name	method	method
1	4	Basic concepts	Introduction to Statistics	lectures	
2-8	28	Statistical distributions	Distribution of Random Variables	lectures	
8-15	28	Common statistical distributions	Some Special Mathematical Distributions	lectures	

11. Course Evaluation

Midterm exam: 40 marks
Final exam: 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to the Theory Statistics, Alixander Mood,
Main references (sources)	-Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. - Mathematical Statistics w Applications, Dennis D. Wacke William Mendenhall III, Richard Scheaffer, Thomson Brooks, 2008.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:	
Topology I	
2. Course Code:	
MATH 415	
3. Semester / Year:	
First / Fourth Year / 2025-2026	
4. Description Preparation Date:	
18-11-2025	
5. Available Attendance Forms:	
Attendance lectures in the classroom and combined online learning	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / 4 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Fadhel Subhi Fadhel Email: fadhel.subhi@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• To strength the theoretical mathematical backgrounds of the undergraduate students and to prepare them for the post graduate studies. • To give clear statements of pertinent definitions, principles and theorems together with illustrative descriptive examples. • Improve student's thinking capacity to prove theoretical statements (theorems, propositions, remarks, etc.), which are given as a homework. • Studying the structures, components and properties of different questions, without smooth deformations, so that these properties remain similar under the formation processes related to the tearing process or leaving openings in the transition from one to the other and vice versa, as well. • Generalize all the concepts of real analysis topic. • To cover topics including the basic properties of topological, metric and norms spaces, the separation axioms, compactness, the product topology, and connectedness, as well as, state and prove theorems related to these concepts.
9. Teaching and Learning Strategies	
Strategy	The teaching and learning strategy is considered a set of tools and practices carried out by both the teacher and the student in order to comprehend the academic subject or course, namely topology, in the best possible way. This depends on two basic factors: good transmission by the subject teacher, which is supported by teaching strategies, and good reception by the

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Basic concepts, their definitions and characteristics in set theory	Set Theory	Attendance interactive lectures	Ask questions and give assignments
2	4	An introduction to topological spaces and their related definitions, along with basic concepts and illustrative examples.	Topological Spaces	Attendance interactive lectures	Ask questions and give assignments
3	4	Giving definitions of well-known examples in topology (non-discrete, discrete, ordinary and cofinite topology)	Examples on topological spaces	Attendance interactive lectures	Ask questions and give assignments
4	4	Study of derived sets and set closure	Topological Spaces	Attendance interactive lectures	Ask questions and give some homework's
5	4	Studying interior, exterior, and boundary points	Topological Spaces	Attendance interactive lectures	Ask questions and give assignments
6	4	Basis and local basis	Topological Spaces	Attendance interactive lectures	Ask questions and give assignments
7	4	Connected and Disconnected sets	Topological spaces with specific characteristics	Attendance interactive lectures	Ask questions and give assignments
8	4	Continuous, open and closed mappings	Mappings	Attendance interactive lectures	Ask questions, give assignments, and make a 1st attendance mid

					exam
9	4	Additional concepts related to continuous, open, and closed mappings	Mappings	Attendance interactive lectures	Ask questions and give assignments
10	4	Cartesian topological product spaces	Mappings	Attendance interactive lectures	Ask questions and give assignments
11	4	Definition and examples of homotopy	The homotopy	Attendance interactive lectures	Ask questions and give assignments
12	4	The state and the proof of the Mean Value Theorem	Mean Value Theorem	Attendance interactive lectures	Ask questions and give assignments
13	4	Definition of homeomorphic functions and their fundamental theorems	Homeomorphisms and homeomorphic spaces	Attendance interactive lectures	Ask questions, give assignments, and make a 2nd attendance mid exam
14	4	The relationship between homeomorphic and open, closed, and continuous functions	Homeomorphisms and homeomorphic spaces	Attendance interactive lectures	Ask questions and give assignments
15	4	Homeomorphic spaces and topological properties	Homeomorphisms and homeomorphic spaces	Attendance interactive lectures	Ask questions and give assignments

11. Course Evaluation

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

30% monthly written exams

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

60% written final exam

12. Learning and Teaching Resources

Required textbooks (curricular books any)	1. Introduction to General Topology, by: K. Joshi 2. Theory and problems of general topology, I Seymour Lipchitz, Schuam's series,1965
Main references (sources)	1- Lecture Notes on Topology, by: John Rognes, 2018. 2- General Topology, by: Tom Leinster, 2014
Recommended books and referenc (scientific journals, reports...)	1- Lecture Notes- General Topology, by: Ziad Khalil, 2022.

	General Topology, by: Jesper M. Mϕller.
Electronic References, Websites	1-lecturervv3JNSPKeEU

Course Description Form

1. Course Name: Complex Analysis I

2. Course Code: MATH411

3. Semester / Year: First/2025-2026

4. Description Preparation Date:

15/9/2025

5. Available Attendance Forms: Attendance

6. Number of Credit Hours (Total) / Number of Units (Total)60 hours

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

Name: Dr. Iman A. Hussain
Email: iman a. hussain@nahrainuniv.edu.iq
Modulr Tutor:Batool Imkhilif
Email :

8. Course Objectives

Course Objectives	**1-To study the techniques of complex variable and functions together with their derivatives, contour integration and transformations.** **2-To study complex power series, classification of singularities.** **3-To study calculus of residues and its applications the evaluation integrals and other concepts and properties**

9. Teaching and Learning Strategies

Strategy	Lectures, Homework, some activities in the class, Electronic referenc

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	12	Field of com numbers	Chapter 1	lectures	
4-8	20	Analytic Functions	Chapter 2	lectures	

9-11	12	Elementary Functions	Chapter 3	lectures	
12-15	16	Elementary Mapping	Chapter 4	lectures	

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Complex variables and applications Ruel v. Churchill 2-Complex analysis Theodore
Main references (sources)	1. Ablowitz, M. J., Fokas, A. S. (2003). *Complex variables: introduction and applications* (2nd ed). Cambridge University Press. 2. Brown, J. W., Churchill, R. V. (2009). *Complex Variables and Applications.* 8th Edition. New York: McGraw-Hill Higher Education. 3. Lundmark, H. (2004). *Visualizing complex analytic functions using domain coloring.* 4. Needham, T. (1997). *Visual Complex Analysis.* Oxford University Press, Oxford.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Fourth Stage\ Second Term

Course Description Form

1. Course Name:	
Topology II	
2. Course Code:	
MATH 416	
3. Semester / Year:	
Second / Fourth Year / 2025-2026	
4. Description Preparation Date:	
18-11-20225	
5. Available Attendance Forms:	
Attendance lectures in the classroom and combined online learning	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / 4 units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Fadhel Subhi Fadhel Email: fadhel.subhi@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	• To strength the theoretical mathematical backgrounds of the undergraduate students and to prepare them for the post graduate studies. • To give clear statements of pertinent definitions, principles and theorems together with illustrative descriptive examples. • Improve student's thinking capacity to prove theoretical statements (theorems, propositions, remarks, etc.), which are given as a homework. • Studying the structures, components and properties of different questions, without smooth deformations, so that these properties remain similar under the formation processes related to the tearing process or leaving openings in the transition from one to the other and vice versa, as well. • Generalize all the concepts of real analysis topic. • To cover topics including the basic properties of topological, metric and norms spaces, the separation axioms, compactness, the product topology, and connectedness, as well as, state and prove theorems related to these concepts.
9. Teaching and Learning Strategies	
Strategy	The teaching and learning strategy is considered a set of tools and practices carried out by both the teacher and the student in order to comprehend the academic subject or course, namely topology, in the best possible way. This depends on two basic

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

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Dense and not dense spaces, and disjoint groups	Topological spaces with certain properties	Attendance interactive lectures	Ask questions and give assignments
2	4	Compact topological spaces	Open cover, definition of compact set, and illustrative examples	Attendance interactive lectures	Ask questions and give assignments
3	4	Compact topological spaces	Theorems and basic properties of compact sets	Attendance interactive lectures	Ask questions and give assignments
4	4	Topological and hereditary properties	Definition of subspace, examples, and theorems	Attendance interactive lectures	Ask questions and give some homework's
5	4	Topological and hereditary properties	Definition of subspace, examples, and theorems	Attendance interactive lectures	Ask questions and give assignments
6	4	Connectedness in topological spaces	Basic definitions and examples with some properties	Attendance interactive lectures	Ask questions and give assignments
7	4	Connectedness in topological spaces	Closed paths and pricewise connected paths	Attendance interactive lectures	Ask questions and give assignments
8	4	Simply connected spaces and locally connected	Definitions and Theorems	Attendance interactive lectures	Ask questions, give assignments, and make a 1st attendance mid exam
9	4	T0 and T1 spaces and fundamental theorems	Separation axioms	Attendance interactive lectures	Ask questions and give assignments
10	4	T2 space (Hausdorff space)	Separation axioms	Attendance interactive	Ask questions and give assignments

		and its relationship to T1 space and theorems		lectures	
11	4	Regular spaces, T3 space, and its relationship with T2 space	Separation axioms	Attendance interactive lectures	Ask questions and give assignments
12	4	Normal spaces, T4 space, and their relationship with T3 space	Separation axioms	Attendance interactive lectures	Ask questions and give assignments
13	4	Additional theorems regarding separation axioms	Separation axioms	Attendance interactive lectures	Ask questions, give assignments, and make a 2nd attendance mid exam
14	4	Compactness and separation axioms	The relationship between compact spaces and separation axioms spaces	Attendance interactive lectures	Ask questions and give assignments
15	4	The relationship between topological spaces and metric spaces	Theorems and their proofs	Attendance interactive lectures	Ask questions and give assignments

11. Course Evaluation

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

30% monthly written exams

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

60% written final exam

12. Learning and Teaching Resources

Required textbooks (curricular boo if any)	1. Introduction to General Topology, by: K. Joshi 2. Theory and problems of general topology, l Seymour Lipchitz, Schuam's series,1965
Main references (sources)	1- Lecture Notes on Topology, by: John Rognes, 2018. 2- General Topology, by: Tom Leinster, 2014
Recommended books and referenc (scientific journals, reports...)	1- Lecture Notes- General Topology, by: Ziad Khalil, 2022. General Topology, by: Jesper M. Mϕller.
Electronic References, Websites	1-lecturervv3JNSPKeEU

Course Description Form

1. Course Name:
Mathematical Statistics II
2. Course Code:
MATH414
3. Semester / Year:
Second/ Fourth Class 2025−2026
4. Description Preparation Date:
1/10/2025
5. Available Attendance Forms:
Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
60 ours/ 4 credits
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Akram Abbas Al-Sabbagh Email: akram.alsabbagh@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• Learning the basic concepts of multivariate mathematical statistics • the definition of variable transformation and Order Statistics • Statistical Estimations
9. Teaching and Learning Strategies	
Strategy	The strategy is to provide the students with as much information about mathematical statistics as possible by attending lectures to maximize the connection between the students and the lecturer in order to solve as many real-life statistical applications as possible. The lectures, some homework and some other additional exercises is also shared on Google Classroom.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-5	20	Multivariate	Multivariate	lectures	

		statistics	Probability Distribution		
6-9	16	Statistical transformations	Function of Random Variable	lectures	
10-12	12	Statistical distribution for order statistics	Sampling Distribution	lectures	
12-15	12	Parameter estimation	Estimation	lecture	

11. Course Evaluation

Midterm exam: 40 marks
Final exam: 60 marks

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to the Theory Statistics, Alixander Mood,
Main references (sources)	-Modern Mathematical Statistics with Applications, Jay L. Devore, Kenneth N. Berk, Springer, 2012. - Mathematical Statistics w Applications, Dennis D. Wacke William Mendenhall III, Richard Scheaffer, Thomson Brooks, 2008.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name:
Professional Ethics
2. Course Code:
3. Semester / Year:
Second semester / Academic year 2025/2026
4. Description Preparation Date:
01/02/2026
5. Available Attendance Forms:
Lectures
6. Number of Credit Hours (Total) / Number of Units (Total)
15 hours
7. Course administrator's name (mention all, if more than one name)
Name: lecturer Ranen Zaed Ahmood Email: ranen.z.ahmood@nahrainuniv.edu.iq
8. Course Objectives

Course Objectives	• To introduce students to the concept of professional ethics and its importance in academic and professional life. • To develop awareness of core professional values such as integrity, honesty, and responsibility. • To promote ethical conduct in scientific research and the use of technology. • To prepare students to be responsible professionals capable of making ethical decisions.
9. Teaching and Learning Strategies	
Strategy	• Theoretical lectures • Classroom discussions • Case studies • Presentations • Analysis of real-life ethical situations

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	1 hour /(lecture)	1. Introduction to Professional Ethics 2. The Concept of Ethics and its Sources 3. Work, Profession, and Craft 4. Characteristics of Professional Ethics and Qualities of a Professional	Introduction to Professional Ethics	Lectures Presentations Real-Life Examples Discussion	Exams, weekly assignments, homework, open-ended questions with specific answers (oral questions), quizzes
2	1 hour /(lecture)		The Concept of Ethics and its Sources		
3	1 hour /(lecture)		The importance of ethics in real life		
4	1 hour /(lecture)		Work, Profession, and Craft		
5	1 hour /(lecture)		Characteristics of Professional Ethics		
6	1 hour /(lecture)		Qualities of a Professional		
7	1 hour /(lecture)	Professional values (honesty, integrity, responsibility, excellence)	Core professional values	Lectures Presentations Real-Life Examples Discussion	Exams, weekly assignments, homework, open-ended questions with specific answers (oral questions), quizzes
8	1 hour /(lecture)		Midterm exam		
9	1 hour /(lecture)	Research ethics	Research ethics		
10	1 hour /(lecture)	Scientific theft and plagiarism	Scientific theft and plagiarism		
11	1 hour /(lecture)	Ethics of computer and information technology use	Computer ethics	Lectures Presentations Real-Life Examples Discussion	Exams, weekly assignments, homework, open-ended questions with specific answers (oral questions), quizzes
12	1 hour /(lecture)	Information security and privacy	Information security and privacy		
13	1 hour /(lecture)	unethical conduct in the profession	unethical conduct		
14	1 hour /(lecture)	Administrative corruption	Administrative corruption		
15	1 hour /(lecture)	blogs of professional ethics	blogs of ethics		
16	1 hour /(lecture)		Lessons Review		

Course Evaluation

Midterm exam: 40 marks
Final exam: 60 marks

11. Learning and Teaching Resources

Required textbooks (curricular books, if any)	

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

Course Description Form

1. Course Name: Complex Analysis II

2. Course Code: MATH 412

3. Semester / Year: Second /2025-2026

2. Description Preparation Date:

15/9/2025

3. Available Attendance Forms: Attendance

4. Number of Credit Hours (Total) / Number of Units (Total)60 hours/4 Units

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

Name: Dr. Iman A. Hussain
Email: iman a. hussain@nahrainuniv.edu.iq
Module Tutor:Batool Imkhilif
Email:

6. Course Objectives

Course Objectives	**1-To study integral together with various technique with their derivatives, contour integration and transformations.** **2-To study complex sequence and series and conformal mappings a Rimman sphere.**

7. Teaching and Learning Strategies

Strategy	Lectures, Homework, some activities in the class, Electronic referenc

8. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1-3	12	Integral	Chapter 4	lectures	
4-8	20	Complex sequence	Chapter 5	lectures	
9-11	12	Conformal	Chapter6	lectures	

		mapping			
12-15	16	Sphere surface	Chapter 7	lectures	

9. Course Evaluation

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

10. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1-Complex variables and applications Ruel v. Churchill 2-Complex analysis Theodore
Main references (sources)	5. Ablowitz, M. J., Fokas, A. S. (2003). *Complex variables: introduction and applications* (2nd ed). Cambridge University Press. 6. Brown, J. W., Churchill, R. V. (2009). *Complex Variables and Applications.* 8th Edition. New York: McGraw-Hill Higher Education. 7. Lundmark, H. (2004). *Visualizing complex analytic functions using domain coloring.* 8. Needham, T. (1997). *Visual Complex Analysis.* Oxford University Press, Oxford.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form

1. Course Name: Topics in Pure Mathematics	
2. Course Code: MATH430	
3. Semester / Year: second/fourth 2025-2026	
4. Description Preparation Date:2025	
5. Available Attendance Forms:	
6. Number of Credit Hours (Total) / Number of Units (Total):60hours/4	
7. Course administrator's name (mention all, if more than one name)	
Name: Ruqayah Saadi Hashem Email: ruqayah.saadi@nahrainuniv.edu.iq	
8. Course Objectives	
Course Objectives	1-Enable students to obtain knowledge and understanding some of the basic principles of Fields. 2-Empowering and raising the students skills to obtain knowledge and understanding of the Algebra
9. Teaching and Learning Strategies	
Strategy	• Introductory written lectures and various activities and assignments which are given in the classroom. • Answering the quick questions raised in the hall and the possibility of solving them by the student. • Adopting the principle of preparing reports by students.

10. Course Structure

Week	Hours	Required Learning	Unit or	Learning method	Evaluation

		Outcomes	subject name		method
1	4	Definition of the Fields, some examples of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments
2	4	Some Properties and Theorems of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments
3	4	Some Properties and Theorems of Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments
4	4	Subfields and Prime Fields	Field Theory	Attendance interactive lectures	Ask questions and give assignments
5	4	Maximal Ideals with Some Examples	Certain Special Ideals	Attendance interactive lectures	Ask questions, give assignments, and make a 1st attence mid exam
6	4	Some Properties of Maximal Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
7	4	Some Theorems of Maximal Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
8	4	Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
9	4	Some examples and Theorems of Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
10	4	Some Theorems of Prime Ideals	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
11	4	The Radical of A ring, Semisimple Ring	Certain Special Ideals	Attendance interactive lectures	Ask questions and give assignments
12	4	Some Theorems of Radical	Certain Special Ideals	endance interactive lectures	Ask questions, give assignments, and make a 2nd attence mid exam
13	4	Definition of Polynomial ring With some Examples	Polynomial Ring	Attendance interactive lectures	Ask questions and give assignments
14	4	Some Theorems of Polynomial Ring	Polynomial Ring	Attendance interactive lectures	Ask questions and give assignments
15	4	Some Theorems of Polynomial Ring	Polynomial Ring	Attendance interactive lectures	Ask questions and give assignments

11. Course Evaluation

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

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	A first Course in Abstract Algebra by J. B. Fraleigh

Main references (sources)	Introduction to to Modern Abstract Algebra by Burton
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	