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

2024

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 Diyala**

Faculty/Institute: **College of Science**

Scientific Department: **Mathematics**

Academic or Professional Program Name: **BSC–Mathematics Sciences**

Final Certificate Name: **BSC–Mathematics Sciences**

Academic System: Courses for 2nd, 3rd, 4th stages, Bologna process for 1st stage.

Description Preparation Date: **6 May 2024**

File Completion Date: **6 May 2024**

Signature:

Head of Department Name:

Assist. Prof. Dr. Fatima M ABOUD

Date:**6 May 2024**

Signature:

Scientific Associate Name:

Prof. Dr. Munther Hamza Rathi

Date: **6 May 2024**

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean

1. Program Vision

The Mathematics department keep pace with the scientific and technical development and access to the latest findings of modern mathematics in the world, and that the science of mathematics be an essential participant in the development of other sciences within the college.

Providing the student with the foundations of modern knowledge, advanced scientific research methods, high values, and developing the student's personality, making him a graduate capable of innovation, challenge, leadership, self-learning, teamwork, and competition locally, regionally, and globally.

Developing and updating school curricula in the light of contemporary global trends and subjecting them to a periodic calendar in accordance with international standards, taking into account local conditions.

2. Program Mission

Introducing the community to the science of mathematics and trying to remove barriers that make it difficult to understand mathematics by linking this science to practical application.

Graduating active and distinguished scientific cadres scientifically and practically.

Advance the pace of scientific research and encourage research creativity.

Access to academic accreditation nationally and globally.

3. Program Objectives

- Preparing graduates who hold a bachelor's degree in mathematics and possess distinguished scientific and mathematical skills that enable them to

work in relevant governmental or private institutions and have the ability to continue their postgraduate studies.

- Exchanging experiences and strengthening links with Iraqi, regional and international universities and scientific institutions in the field of specialization.
- 3. Providing research and advisory services to various community institutions and contributing positively to solving community problems. undergraduate research, internships, and study-abroad

4. Program Accreditation

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

Not yet.

5. Other external influences

Is there a sponsor for the program?

No sponsor.

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	5	10	%7	
College Requirements	6	18	%13	
Department Requirements	38	114	%86	
Summer Training	1	Without units		
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
	Math1101	Differential Calculus	7	-
	Math1102	Introduction to Foundation of Mathematics	7	-
	Math1103	Finite Mathematics	7	-
	Math1104	Introduction to computer science	5	-
	UOD1101	Freedom and democracy and Human Rights	2	-
	UOD1102	Arabic Language	2	-
	Math1211	Integral Calculus	7	-
	Math1212	Advanced Topics in Foundation of Mathematics	7	-
	Math1213	Introduction to Linear algebra	6	-
	Math1204	Computer\Office Applications	4	-
	COS1102	General Mechanics	4	-
	UOD1103	English Language	2	-
		Linear Algebra 2	3	-
		Probability and statistic	3	-
		Electricity and Magnetics I	2	-
		Computer I	2	2
		Advanced Calculus I	3	-
		Differential equation I	3	-
		Freedom and Democracy	2	-
		Mathematical statistics	3	-
		Electricity and Magnetics 2	2	-
		Computer 2	2	2
		Advanced Calculus 2	3	-
		Differential equation 2	3	-
		Geometry	3	-
		جرائم حزب البعث	2	-
		Real Analysis I	3	-
		Numerical Analysis I	3	2
		Groups	3	-

		Computer 1	2	2
		Number Theory 1	3	–
		Advanced Statistics	3	–
		Real Analysis 2	3	–
		Numerical Analysis 2	3	2
		Rings	3	–
		Computer 2	2	2
		Applies Mathematics	3	–
		Hypothesis Tests	3	–
		Complex Analysis 1	3	–
		Functional Analysis 1	3	–
		Topology 1	3	–
		Operational Research 1	3	–
		Partial Differential Equations 1	3	–
		Complex Analysis 2	3	–
		Functional Analysis 2	3	–
		Topology 2	3	–
		Operational Research 2	3	–
		Partial Differential Equations 2	3	–
		Project	2	–

8. **Expected learning outcomes of the program**	
Knowledge	
Learning Outcomes 1: *Identification of Complex Relationships*	A1: Graduates will be able to illustrate the structure and function of cellular components and explain how they interact in a living cell. A2::Good understanding of mathematics and statistics and their applications. A3::The ability to use the language of mathematics to explain and analyze mathematical ideas accurately. A4::The student is able to retrieve and remember information (facts, principles, rules, laws and theories as you know them). The ability to form mathematical proofs and conclusions.
Skills	
Learning Outcomes 2: *Oral and Written Communication, Laboratory, Field Studies, Scientific Knowledge, Data Analyses and Critical Thinking*	Learning Outcomes Statement 2: Graduates will be able to formally communicate the results of biological investigations using both oral and written communication skills. Learning Outcomes Statement 3: Graduates will be able to perform laboratory experiments and field studies, by using scientific equipment and computer technology while observing appropriate safety protocols. Graduates will be able to demonstrate a balanced concept of how scientific knowledge develops, including the historical development of foundational theories and laws and the nature of science. Graduates will be able to demonstrate scientific quantitative skills, such as the ability to conduct simple data analyses. Graduates will be able to use critical-thinking and problem-solving skills to develop a research project and/or paper.
Ethics	
Learning Outcomes 4	C1:: Creating a spirit of teamwork among students through laboratory groups, graduation projects, and reports. C2:: Boosting students' self-confidence through daily discussions via seminars. C3:: Enhancing students' confidence in facing challenges by completing their academic journey through
Learning Outcomes 5	C1:: Creating a spirit of teamwork among students through laboratory groups, graduation projects, and reports. C2:: Boosting students' self-confidence through daily discussions via seminars. C3:: Enhancing students' confidence in facing challenges by completing their academic journey through

9. Teaching and Learning Strategies

Teaching and learning strategies and methods adopted in the implementation of the program in general.

10. Evaluation methods

Implemented at all stages of the program in general.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Mathematics	Applied Algebra			1	
Professor	Mathematics	Algebraic Topology			1	
Assistant Professor	Mathematics	Applied Math			1	
Assistant Professor	Mathematics	Quantum Encryption			1	
Assistant Professor	Mathematics	Computational Mathematics			1	
Assistant Professor	Mathematics	Functional Analysis			1	
Assistant Professor	Mathematics	General Topology			2	
Assistant Professor	Mathematics	Optimization			1	

Assistant Professor	Mathematics	Number Theory			1	
Assistant Professor	Mathematics	Scheduling Machine			1	
Lecturer	Mathematics	Algebraic topology			1	
Lecturer	Mathematics	Fuzzy algebraic topology			1	
Lecturer	Mathematics	Dynamical system			1	
Lecturer	Mathematics	Fractional Differential Equations			1	
Lecturer	Mathematics	Mathematical Statistics			1	
Lecturer	Mathematics	Applied Mathematics			1	
Lecturer	Mathematics	Statistics			1	
Lecturer	Mathematics	Optimization			1	
Lecturer	Physics	Material and solid state			1	
Assistant Lecturer	Mathematics	Numerical Analysis			2	
Assistant Lecturer	Mathematics	Dynamical system			1	
Assistant Lecturer	Mathematics	Statistics			1	
Assistant Lecturer	Mathematics	Optimization control theory			1	

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

12. **Acceptance Criterion**
(Setting regulations related to enrollment in the college or institute, whether central admission or others)

13. **The most important sources of information about the program**
State briefly the sources of information about the program.

14. Program Development Plan
The curricula are developed by adding modern topics that keep pace with the continuous development in mathematics and its applications. This is done through developing and training faculty members through their participation in seminars, courses, and attendance at scientific conferences for the purpose of being informed of the latest developments.

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
	Math1101	Differential Calculus	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	Math1102	Introduction to Foundation of Mathematics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	Math1103	Finite Mathematics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	Math1104	Introduction to computer science	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOD1101	Freedom and democracy and Human Rights	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	UOD1102	Arabic Language	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	Math1211	Integral Calculus	Basic	√	√	√	√	√	√	√	√	√	√	√	√
	Math1212	Advanced Topics in Foundation of Mathematics	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Introduction to Linear algebra	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Computer\Office Applications	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		General Mechanics	Basic	√	√	√	√	√	√	√	√	√	√	√	√

		Subject	Type												
		English Language	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Linear Algebra 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Probability and statistic	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Electricity and Magnetics 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Computer 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Advanced Calculus 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Differential equation 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Freedom and Democracy	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Mathematical statistics	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Electricity and Magnetics 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Computer 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Advanced Calculus 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Differential equation 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√

		Geometry	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		جرائم حزب البعث	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Real Analysis 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Numerical Analysis 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Groups	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Computer 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Number Theory	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√
		Advanced Statistics	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√
		Real Analysis 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Numerical Analysis 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Rings	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Computer 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Applied Mathematics	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√

		Hypothesis tests	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√
		Real Analysis 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Numerical Analysis 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Groups	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Complex Analysis 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Functional Analysis	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√
		Topology 1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Operational Research	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√
		Partial Differential Equations1	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Complex Analysis 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Measure Theory	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Topology 2	**Basic**	√	√	√	√	√	√	√	√	√	√	√	√
		Approximation Theory	**Optional**	√	√	√	√	√	√	√	√	√	√	√	√

		Partial Differential Equations 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Project	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Hypothesis tests	Optional	√	√	√	√	√	√	√	√	√	√	√	√
		Real Analysis 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Numerical Analysis 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Groups	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Complex Analysis 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Functional Analysis	Optional	√	√	√	√	√	√	√	√	√	√	√	√
		Topology 1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Operational Research	Optional	√	√	√	√	√	√	√	√	√	√	√	√
		Partial Differential Equations1	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Complex Analysis 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Measure Theory	Basic	√	√	√	√	√	√	√	√	√	√	√	√

		Topology 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Approximation Theory	Optional	√	√	√	√	√	√	√	√	√	√	√	√
		Partial Differential Equations 2	Basic	√	√	√	√	√	√	√	√	√	√	√	√
		Project	Basic	√	√	√	√	√	√	√	√	√	√	√	√

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

First Stage

Course Description Form of (Finite Mathematics)

1. Course Name:	
Finite Mathematics	
2. Course Code:	
3. Semester / Year:	
Semester/ First	
4. Description Preparation Date:	
2024	
5. Available Attendance Forms:	
Weekly- compulsory	
6. Number of Credit Hours (Total) / Number of Units (Total)	
90 hours	
7. Course administrator's name (mention all, if more than one name)	
Name: Amaal Mohi Nassief Email: amalmuhi@uodiyala.edu.iq	

8. Course Objectives

Course Objectives	- Students acquiring to knowledge of basic mathematics principles. - Gaining computer skills and the ability to work on computer. - Students acquiring to the skills that enable them to teach mathematics. - Working on acquiring students the skills of conducting scientific research in the field of mathematics. - Acquisition of mental and thinking skills in mathematics. - Introduce students to the importance of mathematics.

9. Teaching and Learning Strategies

A. Cognitive goals

1. Students' ability to distinguish and cognitive awareness to diagnose general theories and principles in the study.
2. Future planning to link what the student has learned to daily life.
3. Practicing different types of mathematical proofs.
   Self-reliance in the achievement of mathematics

B. The skill goals of the program

1. Thinking skill.
2. Conclusion and evaluation skill.
3. Analysis skill.
4. Observation skill

Teaching and Learning Methods
1. Giving lectures and using textbooks.
2. Solving problems related to the scientific subject.
3. Writing scientific reports and analyzing data.
4. Using e-learning in teaching according to the available capabilities.
Self-learning method.

Assessment methods
1. Conducting daily and monthly oral and written exams.
2. Writing scientific reports.

A. Affective and value goals
1. The student should make every effort to understand the principles of mathematics.
2. Support and express the views and discuss seriously.
3. The student should have self-confidence.
   The student should participate in the mathematics activities.

D. General and Transferable Skills (other skills relevant to employability and personal development).

1. Conducting laboratory experiments related to the lesson tool to develop students' skills.
   Conducting short tests to measure the level of understanding of the student.

10. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	Finite mathematics	An introduction to matrices	whiteboard	Quizzes, homework and final exams
2	=	=	Definitions of the matrix, square matrix, zero matrices and equality of matrices and providing examples	=	=
3	=	=	The addition of matrices, the properties of the addition of matrices and examples	=	=
4	=	=	The multiplications of matrices, the properties of multiplication of matrices and examples	=	=
5	=	=	Transposed matrix and its properties	=	=
6	=	=	The inverse of the matrix and theorems regarding that	=	=
7	=	=	Linear systems, geometric interpretation of them and elementary transformations of linear system	=	=
8	=	=	Gaussian elimination method	=	=
9	=	=	Gauss-Jordan elimination method	=	=

10	=	=	Determinant of the matrix	=	=
11	=	=	Minor determinate and the cofactor of an element	=	=
12	=	=	The properties of the determinate	=	=
13	=	=	The adjugate of the matrix	=	=
14	=	=	Solving the linear systems by using the inverse of the matrix	=	=
15	=	=	Cramer's Rule for solving the linear system	=	=

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)	An Introduction in linear Algebra
Main references (sources)	An Introduction in linear Algebra
Recommended books and references (scientific journals, reports…)	An Finite Mathematics Books.
Electronic References, Websites	

Course Description Form of (Differential Calculus)

13.	Course Name: Differential Calculus
14.	Course Code: Math 1011
15.	Semester / Year: first / 2023- 2014
16.	Description Preparation Date: 1/5/2024
17.Available Attendance Forms:
18.Number of Credit Hours (Total) / Number of Units (Total)
175

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

Name: Dr. Jamil Mahmoud Jamil
Email: jamilmahmoud@uodiyala.edu.iq

20.	Course Objectives

Course Objectives	**Define set of numbers and functions with properties** **Understand conical surface, the conic section** ..... **.students knows the rotation transformation** **Students should know traces and plane sections** **Define cylindrical** … .....

21.	Teaching and Learning Strategies

Strategy	

22. Course Structure

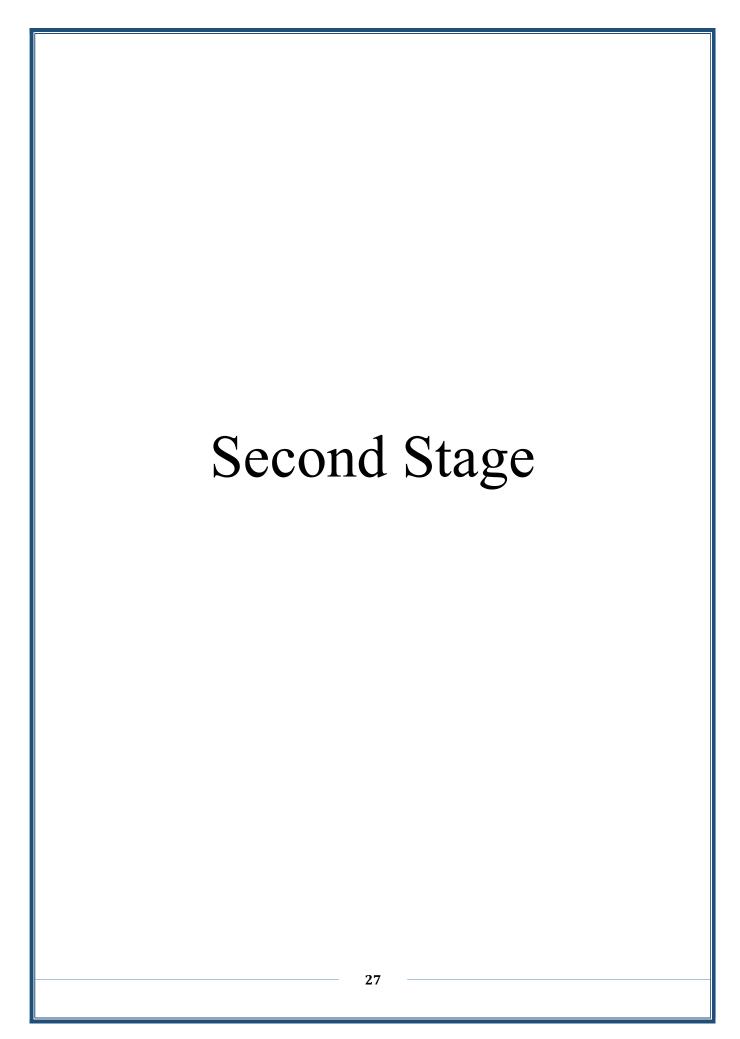| Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	7	**Fundamental Concepts**	**Fundamental Concepts**	**Lecture notes**	**home work**

		Absolute value Countable Sets Field Of real numbers			
2	7	The Cartesian Plane, Cartesian Coordinate Slope of Straight line	Cartesian plane	Lecture Note	Home Work
3	7	Conical Surface The conic section central conic	the conic sections	Lecture Notes	Home Work
4	7	The ellipse Reflection Properties Hyperbola Other definitions central con	Ellipse And Hyperbola	Lecture Notes	Report
5	7	The rotation Transformation The graph Of second Degree Equation	The rotation Transform-ation	Lecture Notes	Report
6	7	Some problems related to conic	conic	=	h.w
7	7	midterm exam	-		
8	7	geometric transformation symmetry reflection	Symmetry And Reflection	=	h.w
9	7	congruence	Congruence	=	=
10	7	the relation between these transformations	the relation between these	=	=

			transformations		
11	**7**	**Cartesian coordinates In three dimensional Spaces**	**Cartesian coordinates In three dimensional Spaces**	**=**	**=**
12	**7**	**Planes in three Dimensional spaces**	**Planes in three Dimensional spaces**	**=**	**=**
13	**7**	**Cylinders, cylindrical And spherical Coordinate Surfaces of Revolutions**	**Cylinders**		
14	**7**	**Traces and plane Sections of A surface Quadric surface**	**Traces and plane Sections**	**=**	**report**
15	**7**	**Preparatory week Before the final exam**			

23. Course Evaluation

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

24. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Second Stage

Course Description Form of 9 Ordinary differential equations)

1. Course Name: Ordinary differential equations

2. Course Code:

3.Semester / Year: First and second semester 2023-2024.

4.Description Preparation Date:4-5-2024.

5.Available Attendance Forms: Attend class

6.Number of Credit Hours (Total): 120Hours / Number of Units (Total): 4 units

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

Name: Dr.Ahmed murshed Kareem
Email: a.murshed@yahoo.com

8.Course Objectives

Course Objectives	1- Identify methods for solving first-order and first-order ordinary differential equatio 2- Identify methods for solving ordinary differential equations with homogeneous higher orders. 3. Identify methods for solving non-homogeneous higher-order ordinary differential equations

9.Teaching and Learning Strategies

Strategy	1- Motivating students to participate in the lecture by giving Grades. 2- Daily surprise tests and monthly exams. 3- Encouraging students to review some modern sources related to ordinary differential equations

10.Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Separable equations	Ordinary differential equations of first order and first degree.	In class using the board	Participate in the lecture
2	4	Equations from Homogeneous type	Ordinary differential equations of first order and first degree.	In class using the board	Participate in the lecture
3	4	Equations are interpreted To homogeneous.	Ordinary differential equations of first order and first degree.	In class using the board	Participate in the lecture
4	4	Exact equations	Ordinary differential equations of first order and first degree.	In class using the board	Participate in the lecture
5	4	Integrating factors	Ordinary differential equations of first order and first degree.	In class using the board	Participate in the lecture
6	4	Linear equations	Ordinary differential equations of first order and first degree.	In class using the board	Participate in the lecture
7	4	Bernoulli equation	Ordinary differential equations of first order and first degree.	In class using the board	Participate in the lecture
8	4	Converting derivatives functions into a first derivative	Higher order differential equations and variable coefficients	In class using the board	Participate in the lecture
9	4	Equations in state of non-existence Dependent variable	Higher order differential equations and variable coefficients	In class using the board	Participate in the lecture
1	4	Equations in state of non-existence Independent variable	Higher order differential equations and variable coefficients	In class using the board	Participate in the lecture
1	4	Differential effect method	Higher order differential equations And fixed transactions	In class using the board	Participate in the lecture
1	4	wronskian	Higher order differential equations And fixed transactions	In class using	Participate in the lecture

				the board	
1	4	Differential effect method	Higher order differential equations And fixed transactions	In class using the board	Participate in the lecture
1	4	Differential effect method	Differential equations of order second has fixed coefficients	In class using the board	Participate in the lecture
1	4	The two roots are real and different	Differential equations order second has fixed coefficients	In class using the board	Participate in the lecture
1	4	The two roots are fact and equal	Differential Equations of order second has fixed coefficients	In class using the board	
1	4	The two roots are Compound numbers	Differential equations of order second has fixed coefficients	In class using the board	Participate the lecture
1	4	Influencer Differential	Linear differential equations Homogeneous of order n with Fixed transactions	In class using the board	Daily exam
1	4	Transaction method Indefinite if the function is a polynomial	Non-homogeneous lin differential equations with constant coefficients	In class using the board	Daily exam
2	4	Transaction method Indefinite if the function is an exponential function	Non-homogeneous lin differential equations with constant coefficients	In class using the board	Daily exam
2	4	Transaction method	Non-homogeneous lin differential equations with constant coefficients	In class using the board	Daily exam

		Indefinite if the function is a trigonometric function			
2	4	Differential effect	Non-homogeneous lin differential equations with constant coefficients	In class using the board	
2	4	Change method Constants	Non-homogeneous lin differential equations with constant coefficients	In class using the board	Daily exam
2	4	Solve Euler equation	Euler equation	In class using the board	Daily exam
2	4	Laplace transform Functions	Laplace transforms	In class using the board	Daily exam
2	4	Inverse Laplace	Laplace transforms	In class using the board	Daily exam
2	4	Solve homogenous equations	Laplace transforms	In class using the board	Daily exam
2	4	Solve heterogeneity equations	Laplace transforms	In class using the board	Daily exam
2	4	Solve IVP	Laplace transforms	In class using the board	Daily exam
3	4	Comprehensive discussion	Methods for solving Ordinary differential equations	In class using the board	Daily exam

11. Course Evaluation

The monthly exam is 40 marks, the daily exam and assignments are 10 marks, and the final exam is 50 marks

12.Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Ordinary Differential Equations with Applications
Main references (sources)	
Recommended books and references (scientific journals, reports…)	Braun, M., & Golubitsky, M. (1983). *Differen equations and their applications* (Vol. 2). Ne York: Springer-Verlag.
Electronic References, Websites	https://link.springer.com/book/1

Course Description Form of (Geometry)

25. Course Name:	
Geometry	
26. Course Code:	
27. Semester / Year:	
2nd Session/ Second	

2nd Session/ Second

28. Description Preparation Date:
01/05/2024
29. Available Attendance Forms:
Weekly– compulsory
30. Number of Credit Hours (Total) / Number of Units (Total)
90 hours
31. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Hamza B. Habib Email:

32.	Course Objectives
Course Objectives	• Students get knowledge of basic mathematics principles • Students get the skills that enable them to teach mathematics. • Practice different types of mathematical proofs.

33.	Teaching and Learning Strategies
Strategy	Delivering and lecturing strategy with discussion and problem solving.

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Geometry	Introduction to axiomatic systems and their properties	Whiteboard with the head projector	Quizzes and homework, addition to midsession and final exams
2	=	=	Euclidean Geometry:	=	=

			Euclidean Postulates		
3	=	=	Some equivalent statements for Euclid's fifth axiom: the Playfair axiom	=	=
4	=	=	The Axiomatic System 1	=	=
5	=	=	Some theorems of the Axiomatic System 1	=	=
6	=	=	The Axiomatic System 2 with the theorems	=	=
7	=	=	The Axiomatic System 3: Fano's Geometry	=	=
8	=	=	Some Theorems of the Axiomatic System 3	=	=
9	=	=	The Axiomatic System 4: The Pappus Finite Geometry	=	=
10	=	=	Some Theorems of the Axiomatic System 4	=	=
11	=	=	The Axiomatic System 5	=	=
12	=	=	Some Theorems of the Axiomatic System 5	=	=
13	=	=	Hilbert's Incidence Axioms	=	=
14	=	=	Hilbert's Order Axioms	=	=
15	=	=	Hilbert's Congruence Axioms	=	=

35. Course Evaluation

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

36. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Euclidean Geometry
Main references (sources)	Books on plane geometry
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Third Stage

Course Description Form of (Number Theory)

37.	Course Name:
	Number Theory

38.	Course Code:

39.	Semester / Year:
1st Session/ Third	

40.	Description Preparation Date:
01/05/2024	

41. Available Attendance Forms:
Weekly– compulsory

42. Number of Credit Hours (Total) / Number of Units (Total)
90 hours

43.	Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Hamza B. Habib Email:	

44.	Course Objectives
Course Objectives	• Students get knowledge of basic mathematics principles • Students get the skills that enable them to teach mathematics. • Practice different types of mathematical proofs.

45.	Teaching and Learning Strategies
Strategy	Delivering and lecturing strategy with discussion and problem solving.

46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Number Theory	An introduction to Number Theory and its applications	Whiteboard with the head projector	Quizzes and homework, addition to midsession and final exams

2	=	=	Some Basic theorems and propositions		=	=
3	=	=	Prime numbers		=	=
4	=	=	The Greatest Common Divisor with basic theorems, gcd		=	=
5	=	=	The Fundamental Theorem of Arithmetic		=	=
6	=	=	The Division Algorithm Theorem with examples		=	=
7	=	=	The gcd theorem with examples		=	=
8	=	=	The Extension of Euclidian algorithm to find the gcd		=	=
9	=	=	The Congruence with some bas theorems		=	=
10	=	=	Linear congruences		=	=
11	=	=	Chinese Remainder Theorem		=	=
12	=	=	Euler's phi function		=	=
13	=	=	Euler's Theorem		=	=
14	=	=	Fermat's Little Theorem		=	=
15	=	=	Continued Fractions		=	=

47. 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

48. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elementary Number Theory and Applications
Main references (sources)	Elementary Number Theory and Applications
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form of (Real Analysis)

1. Course Name:
Real Analysis/ First and Second courses

2. Course Code:

3. Semester / Year:
course one and Two 2023−2024

4. Description Preparation Date:
5/5/2024

5. Available Attendance Forms:
Attendance

6. Number of Credit Hours (Total) / Number of Units (Total)
3

7. Course administrator's name (mention all, if more than one name)
Name: Dr. Lieth A Majed Email: liethen84@yahoo.com

8. Course Objectives

Course Objectives	Developing his analytical capabilities to reach logical solutions
	Identify the basic characteristics of mathematical analysis
	Develop logical thinking

9. Teaching and Learning Strategies

Strategy	Lectures Presentations Conducting oral and written examinations

10. Course Structure

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

1	6	Definitions	Real numbers	Board	Class exam, assignment
2	6	Bounded above	Bounded set	Board	Class exam, assignment
3	6	Proof	Density of rational number	Board	Class exam, assignment
4	6	properties	Density of irrational number	Board	Class exam, assignment
5	6	Examples	Cut set	Board	Class exam, assignment
6	6	Examples	Finite and infinite set	Board	Class exam, assignment
7	6	Theorems	Countable set	Board	Class exam, assignment
8	6	Definitions	Uncountable set	Board	Class exam, assignment
9	6	Examples	Metric space	Board	Class exam, assignment
10	6	Examples	Examples of metric space	Board	Class exam, assignment
11	6	Examples	Neighborhood	Board	Class exam, assignment
12	6	Examples	Interior set	Board	Class exam, assignment
13	6	Examples	Open set	Board	Class exam, assignment
14	6	Theorems	Limit point	Board	Class exam, assignment
15	6	Examples	Closed set	Board	Class exam, assignment
16	6	Properties	Properties of open and close	Board	Class exam, assignment
17	6	Definition	Separated set in metric space	Board	Class exam, assignment
18	6	Definition	Connected set	Board	Class exam, assignment
19	6	Theorems	Dense set	Board	Class exam, assignment
20	6	Proof	Cover set	Board	Class exam, assignment
21	6	Examples	Compact set	Board	Class exam, assignment
22	6	Theorems	Proprieties of compact set	Board	Class exam, assignment
23	6	Examples	Hein Borel Theorem	Board	Class exam, assignment
24	6	Examples	Sequences	Board	Class exam, assignment
25	6	Theorems	Convergence sequence	Board	Class exam, assignment
26	6	Definition	Divergence sequence	Board	Class exam, assignment
27	6	Examples	Cauchy sequence	Board	Class exam, assignment
28	6	Examples	Properties of sequences	Board	Class exam, assignment
29	6	Examples	Series	Board	Class exam, assignment
30	6	Examples	Test of series	Board	Class exam, assignment
		Properties	Continuous	Board	Class exam, assignment
		Examples	Derivative	Board	Class exam, assignment
		Definition	Integral	Board	Class exam, assignment
		Theorems	Riemann sum	Board	Class exam, assignment
			Riemann integral	Board	Class exam, assignment
			Measure set	Board	Class exam, assignment
			Lebesgue integral	Board	Class exam, assignment
			Properties	Board	Class exam, assignment

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)	مقدمة في التحليل الرياضي تاليف: الاستاذ الدكتور عادل غسان نعوم
Main references (sources)	Real analysis, Royden ,new York ,2010. Principles of Mathematical analysis,Rudin, 2000. Introduction of Mathematical analysis, WilliamR. 20

Recommended books and references (scientific journals, reports…)	The most important books and special sources on mathematical analysis located in the central library, the science library, and the department.
Electronic References, Websites	Virtual library Websites

Course Description Form of C++

3. Course Name:
Computer science c++

4. Course Code:

5. Semester / Year:
\ third

6. Description Preparation Date:
2024

7. Available Attendance Forms:
Weekly- compulsory

8. Number of Credit Hours (Total) / Number of Units (Total)
120 hours

9. Course administrator's name (mention all, if more than one name)
Name: Dr. Amaal Mohi Nassief   Asst .lec.Israa Najam Email: amalmuhi@uodiyala.edu.iq

10.	Course Objectives
Course Objectives	- Introducing the student to the basic principles of C++ programming, which are used in most applied mathematics topics, including engineering applications and all science departments. - Acquire the skill of using a computer and the ability to program. - Acquiring mental skills and thinking about mathematics solutions using computer programs. - Building algorithms, flowcharts, and teaching programming.

11.	Strategies

- Discussions that are presented during the lecture and an attempt to involve the largest number of students, address the details of the topics, and discuss them in an objective and directed discussion.

- Guiding students to use sources and training them on electronic research

12. Course Structure

Week	Hours		Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
	theoretical	practical				
1	2	2	Introducing the student to the principles of programming	Introduction to programming in C++ (Program interface, running and exiting the program, desktop, simple calculations and graphs)	Whiteboard+ computer	Quizzes, homework and final exams
2-3	4	4	Introducing the student to the principles of algorithms	study procedural programming principles	=	=
4-5	=	=	=	Algorithms and flowcharts, properties and design	=	=
6	2	2	The student defines the concept of variables in the programming language	C++ Language Basics (Character set, Identifiers, keywords Variables, Constants	=	=
7-8	4	4	Introducing the student to the concept of transactions in the language	C++ operators (Arithmetic Operators, Assignment operators, relational operator, comparison and logical operators, bitwise logical operators), type conversion	=	=
9-10	=	=	The student's definition of	Statements, getting started		

			programming sentences	with C++, order evaluation, The "math.h" Library, UnaryMinus, Increment and /decrement Operators.		
11-12	=		The student introduces the concept of choice sentences	Selection Statements (Selection Statements, The Single If Statement Structure, The Single If Statement Structure (Blocks), The If/else Statement Structure		
1316	=		=	Nested If and If/else Statements, else if statement		
14-19	2	2	The student's definition of conditional sentences	Switch statement, nested		
15	=	=	The student's definition of the repetition sentence	loop iteration Statements (while)Repetition Structure		
16	=	=	=	For Statement, More about		
17	=	=	The student's definition of repetitive phrases	Nested for Loops		
18	=	=	=	Break and Continue Contro		
19	=	=	=	Statements, goto		
20	=	=	=	Functions		
21	=	=		actual and formal arguments		

22-23	4	4	The student's definition of global and local variables	local and global variables,		
23-25	=	=	Student definition of Array	Arrays (Array of One)		
26-27			=	Two Dimension		
28-29	=	=	Student definition of series	string		

13. 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

14. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**C++ learning**
Main references (sources)	**step by step c++**
Recommended books and references (scientific journals, reports…)	**step by step c++**
Electronic References, Websites	

Course Description Form of (Advanced statistics)

1. Course Name:
Advanced statistics

2. Course Code:
MAAS 305

3. Semester / Year:
Semester

4. Description Preparation Date:
4/5/2024

5. Available Attendance Forms:

6. Number of Credit Hours (Total) / Number of Units (Total)
45 hours (an average of 3 hours in week

7. Course administrator's name (mention all, if more than one name)
Name: Huda Amer Abdule Ameer Email: hudaamer@uodiyala.edu.iq

8. Course Objectives	
Course Objectives	• **Introducing the student to the basic principles of advanced statistics, which are included in all fields of mathematics and its applications, which are included in engineering applications and all departments of science** • **Students acquire the skills that enable them to teach mathematics** • **Acquiring mental skills and thinking in mathematics**

9. Teaching and Learning Strategies	
Strategy	**Giving lectures and using methodological books** **Solving issues related to the scientific subject** **Writing scientific reports and analyzing data** **Using e-learning in teaching according to available capabilities**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	**Definition of the concept of samples and sample statistics**	**Random sample, a sample census that follows a normal distribution and other distributions**	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**

2	3	Define the concept of ordered statistics	The concept of ordered statistics, some of its applications	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
3	3	Define ordered statistics	Distribution of ranked statistics with their applications	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
4	3	Definition of sufficiency	The concept of sufficiency with examples	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
5	3	Family of exponential density functions, parameter space.	Definition of the family of exponential density functions, parameter space	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
6	3	Definition Efficiency function	The concept Efficiency function	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
7	3	Definition of the average square error of non-bias, consistency, modern probability density function	The concept of non-biased square error rate, consistency	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
8	3	Definition of Cramer-Rao efficiency, Fisher	The concept of Cramer-Rao efficiency, Fisher	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
9	3	Solve some different exercises on the topic of Estimation	Exercises and discussion	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
10	3	Definition of a concept that is estimated, unbiased, and has the least variance	What is the estimated, unbiased, and has the least variance	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
11	3	Definition of Rao-Blackwell and Ryman theorem	Rao-Blackwell and Ryman theorem with its application	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.

12	3	Defining the concept of estimation methods (likelihood).	Estimation methods (maximum odds and moments).	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
13	3	Definition of loss function, risk function	Definition of loss function, risk function	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
14	3	Methods of finding confidence limits, confidence limits for conditional non-parameters	Methods of finding confidence limits, confidence limits for conditional non-parameters	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
15	3	A week of preparation before the final exam		Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.

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, any)	1- Introduction to Mathematical Statistics Hogg and Cruisy Probability Theory , Mood'et-al.
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	**https://www.syriamath.net/library**

Course Description Form of (Test of Hypothesis)

13. Course Name:	
Test of Hypothesis	
14. Course Code:	
UoB12345	
15. Semester / Year:	
Semester	
16. Description Preparation Date:	
4/5/2024	
17. Available Attendance Forms:	
18. Number of Credit Hours (Total) / Number of Units (Total)	
45 hours (an average of 3 hours in week	
19. Course administrator's name (mention all, if more than one name)	
Name: Huda Amer Abdule Ameer Email: hudaamer@uodiyala.edu.iq	

20. Course Objectives

Course Objectives	• Introducing the student to the basic principles of Test of Hypothesis statistics, which are included in all fields of mathematics and its applications, which are included in engineering applications and all departments of science • Students acquire the skills that enable them to teach mathematics • Acquiring mental skills and thinking in mathematics

21. Teaching and Learning Strategies

Strategy	1- Giving lectures and using methodological books 2- Solving issues related to the scientific subject 3- Writing scientific reports and analyzing data 4- Using e-learning in teaching according to available capabilities

22. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	3	Hypothesis tests	Determine Hypothesis tests	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
2	3	Definition of the concept of testing and critical area	The concept of the concept of testing and critical area	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
3	3	Definition of the concept of errors	Types of errors: Type-one error and Type-two error	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
4	3	Definition of the concept of test power	Test power function	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
5	3	Solve some different exercises on the test topic	Solve some different exercises on the test topic	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
6	3	Neyman-Pearson test	The concept Neyman-Pearson test	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
7	3	Determine the sample size, the best critical area, and the best test force	Determine, the best critical area	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
8	3	Sampling From The Normal Distribution	The concept of Sampling From The Normal Distribution	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
9	3	Some rules for testing hypotheses using a normal distribution	The concept of Some rules for testing hypotheses using a normal distribution	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
10	3	Solve questions dealing with hypothesis testing	Solve questions	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to

		using the normal distribution			monthly and final exams.
11	3	Definition of rank odds ratio	Definition of rank odds ratio	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
12	3	Introduction to the SPRT test	Definition to the SPRT test	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
13	3	Estimating the optimal sample size in the case of SPRT	Definition Estimating the optimal sample size in the case of SPRT	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
14	3	Analysis of Variance	Definition Analysis of Variance	Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.
15	3	A week of preparation before the final exam		Blackboard, data show, and introductory videos	Daily exams and homework, in addition to monthly and final exams.

23. Course Evaluation

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

24. Learning and Teaching Resources

Required textbooks (curricular books, any)	2- **Introduction to Mathematical Statistics Hogg and Cruisy** **Probability Theory , Mood'et-al.**
Main references (sources)	
Recommended books and references (scientific journals, reports…)	1. Ash, R. B." Probability and Measure Theory" New York, 2000 2. Athreya. K.B.& Lahiri. S.N. " Measure Theory and Probability Theory " Springer, 2006 3. Banuelos. R, "Lecture Notes Measure Theory and Probability " 2003. 4. Billingsley "Probability and Measure" 1979 5. Charles M. G. & Lauriesnell. J. " Introduction To Probability"
Electronic References, Websites	**https://www.syriamath.net/library**

Course Description Form of (Number Theory)

15.	Course Name:

	Number Theory				
16.	Course Code:				
17.	Semester / Year:				
1st Session/ Third					
18.	Description Preparation Date:				
01/05/2024					
19.Available Attendance Forms:					
Weekly– compulsory					
20.Number of Credit Hours (Total) / Number of Units (Total)					
90 hours					
21.	Course administrator's name (mention all, if more than one name)				
Name: Assist. Prof. Hamza B. Habib Email:					
22.	Course Objectives				
Course Objectives	• Students get knowledge of basic mathematics principles • Students get the skills that enable them to teach mathematics. • Practice different types of mathematical proofs.				
23.	Teaching and Learning Strategies				
Strategy	Delivering and lecturing strategy with discussion and problem solving.				
24. Course Structure					

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Number Theory	An introduction to Number Theory and its applications	Whiteboard with the head projector	Quizzes and homework, addition to midsession and final exams
2	=	=	Some Basic theorems and propositions	=	=
3	=	=	Prime numbers	=	=

4	=	=	The Greatest Common Divisor with basic theorems, gcd	=	=
5	=	=	The Fundamental Theorem of Arithmetic	=	=
6	=	=	The Division Algorithm Theorem with examples	=	=
7	=	=	The gcd theorem with examples	=	=
8	=	=	The Extension of Euclidian algorithm to find the gcd	=	=
9	=	=	The Congruence with some bas theorems	=	=
10	=	=	Linear congruences	=	=
11	=	=	Chinese Remainder Theorem	=	=
12	=	=	Euler's phi function	=	=
13	=	=	Euler's Theorem	=	=
14	=	=	Fermat's Little Theorem	=	=
15	=	=	Continued Fractions	=	=

25. Course Evaluation

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

26. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elementary Number Theory and Applications
Main references (sources)	Elementary Number Theory and Applications
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form of (Geometry)

27.   Course Name:

Geometry		

28.	Course Code:	

29.	Semester / Year:	
2nd Session/ Second		

30.	Description Preparation Date:	
01/05/2024		

31. Available Attendance Forms:	
Weekly– compulsory	

32. Number of Credit Hours (Total) / Number of Units (Total)	
90 hours	

33.	Course administrator's name (mention all, if more than one name)	
Name: Assist. Prof. Hamza B. Habib Email:		

34.	Course Objectives	
Course Objectives	● Students get knowledge of basic mathematics principles ● Students get the skills that enable them to teach mathematics. ● Practice different types of mathematical proofs.	

35.	Teaching and Learning Strategies	
Strategy	Delivering and lecturing strategy with discussion and problem solving.	

36. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Geometry	Introduction to axiomatic systems and their properties	Whiteboard with the head projector	Quizzes and homework, addition to midsession and final exams
2	=	=	Euclidean Geometry: Euclidean Postulates	=	=
3	=	=	Some equivalent statements for Euclid's fifth axiom: the	=	=

			Playfair axiom			
4	=	=	The Axiomatic System 1		=	=
5	=	=	Some theorems of the Axiomatic System 1		=	=
6	=	=	The Axiomatic System 2 with the theorems		=	=
7	=	=	The Axiomatic System 3: Fano's Geometry		=	=
8	=	=	Some Theorems of the Axiomatic System 3		=	=
9	=	=	The Axiomatic System 4: The Pappus Finite Geometry		=	=
10	=	=	Some Theorems of the Axiomatic System 4		=	=
11	=	=	The Axiomatic System 5		=	=
12	=	=	Some Theorems of the Axiomatic System 5		=	=
13	=	=	Hilbert's Incidence Axioms		=	=
14	=	=	Hilbert's Order Axioms		=	=
15	=	=	Hilbert's Congruence Axioms		=	=

37. 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

38. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Introduction to Euclidean Geometry
Main references (sources)	Books on plane geometry
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Course Description Form of (Applied Mathematics)

25.	Course Name:

		Applied Mathematics			

26.	Course Code:

27.	Semester / Year:
2st Session/ Third	

28.	Description Preparation Date:
01/05/2024	

29.Available Attendance Forms:
Weekly– compulsory

30.Number of Credit Hours (Total) / Number of Units (Total)
90 hours

31.	Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Rifaat Z. Khalaf Email:	

32.	Course Objectives
Course Objectives	• Students get knowledge of basic mathematics principles • Students get the skills that enable them to teach mathematics • Practice different types of mathematical proofs.

33.	Teaching and Learning Strategies
Strategy	Delivering and lecturing strategy with discussion and problem solving.

34. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Applied Mathematics	Elementary Differenetial Equations	Whiteboard with the head projector	Quizzes and homework, addition to midsession and final exams
2	=	=	Ceaser Cipher	=	=
3	=	=	Vigener Cipher	=	=
4	=	=	Multiplicative Cipher	=	=
5	=	=	Hill-Cipher	=	=

6	=	=	Linear Feedback Shift Regis	=	=
7	=	=	Randomness	=	=
8	=	=	Randomness Methods	=	=
9	=	=	Difee-Hellman Protocol	=	=
10	=	=	Special Function	=	=
11	=	=	Gamma Function	=	=
12	=	=	Beta Function	=	=
13	=	=	Legendre and Beseel Functio	=	=
14	=	=	Perodic Function	=	=
15	=	=	Fourier Series	=	=

35. Course Evaluation

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

36. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Elementary Differenetial Equations
Main references (sources)	Elementary Differenetial Equations
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	

Fourth Class

Course Description Form of (Complex Analysis)

37.	Course Name:

Complex Analysis

38.	Course Code:

MAAS 305

39.	Semester / Year:

Semester

40.	Description Preparation Date:

4/5/2024

41.Available Attendance Forms:

42.Number of Credit Hours (Total) / Number of Units (Total)

60 hours (an average of 4 hours in week

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

Name: Asmaa Khawam AbdUL_rahman
Email: asmaaalshaibi@uodiyala.edu.iq

44.	Course Objectives
Course Objective	• **Introducing the student to the basic principles of** Complex Analysis, **which are included in all fields of mathematics and its applications, which are included in engineering applications and all departments of science** • **Students acquire the skills that enable them to teach mathematics** • **Acquiring mental skills and thinking in mathematics**

45.	Teaching and Learning Strategies
Strategy	**Giving lectures and using methodological books** **Solving issues related to the scientific subject** **Writing scientific reports and analyzing data** **Using e-learning in teaching according to available capabilities**

46. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	**Definition of student With the principles of complex numbers, their algebraic**	complex number definition, properties Geometric representation	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**

		properties, and geometric representation			
2	4	The student defines the field of complex numbers as a metric space	field of complex number as metric field .	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
3	4	**Definition of student** **Some terminology about a group of complex numbers**	Root of complex number	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
4	4	**Defining the student what is the concept of regions in the complex plane and regions**	Regions in The Complex Plane	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
5	4	**Introducing the student to the concept of complex functions**	Function of a complex Variable	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
6	4	**Definition of student** **Continuous complex functions**	Limits, Continuity	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
7	4	**Definition of student** **Differentiable complex functions**	Derivatives,	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
8	4	**Introducing the student to the concept of analytical functions**	Analytic Function	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
9	4	**Introduce the student to some applications of the Cauchy-Riemann theorem**	Cauchy- Riemann Equations	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
10	4	**Introducing the student to the concept of harmonic**	Harmonic Functions	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to**

		functions and their properties			monthly and final exams.
11	4	**Introducing the student to the concept of prime functions and their properties**	Exponential Function	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
12	4	**Introducing the student to the concept** Trigonometric Function **and their properties**	Trigonometric Function	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
13	4	**Introducing the student to the concept of Logarithmic Function** and **Hyperbolic Functions and their properties**	Logarithmic Function**,** Hyperbolic Functions	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
14	4	**Introducing the student to the concept of sequences and series**	**Convergence of Sequence, Convergence of Series, Pour Series, Convergence Pour Series, Taylor Series, Laure Series**	**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**
15	4	**A week of preparation before the final exam**		**Blackboard, data show, and introductory videos**	**Daily exams and homework, in addition to monthly and final exams.**

47. 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

48. Learning and Teaching Resources

Required textbooks (curricular books, any)	Complex Variable and Applications By : Churchill
Main references (sources)	Complex Analysis by : Ahlfyors M.
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	**https://www.syriamath.net/library**

Course Description Form of (Operations Research)

39.	Course Name: Operations Research

40.	Course Code: 405MAOR

41.	Semester / Year: Semester

42.	Description Preparation Date: 2/5/2024

43. Available Attendance Forms: Attendance - Online

44. Number of Credit Hours (Total) / Number of Units (Total) 45hours/ 3units

45.	Course administrator's name (mention all, if more than one name)
	Name: Assist. Prof. Dr. Adawiya Ali Mahmood Email: Dr.Adawiya@uodiyala.edu.iq

46.	Course Objectives
Course Objectives	The students know principles of operations research. The students learn thinking in Mathematics. The students know the importance of Mathematics.

47.	Teaching and Learning Strategies
Strategy	Giving lectures and using books. Solving problems. Using electronic learning in teaching.

48. Course Structure

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

1	3	The students know operation research The students learn mathematical model	Introduction in operations research	White board and data show	Oral and edited examinations
2,3	6		Building mathematical model	= =	= =
4,5	6	The students learn linear programming methods	linear programming methods	= =	= =
6,7,8	9	The students learn simplex method ,Big M method	Simplex method, M	= =	= =
9,10,11	9	The students learn dual problem	Dual problem	= =	= =

49. 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

50. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Operations Research Author Hamdy Taha Linear programming Author Hillier
Main references (sources)	Introduction of operations research Author Hamdy Taha Linear and non linear programming Author Hillier
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	1. https://notendur.hi.is 2. https://eco.nahrainuniv.edu.iq