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 Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

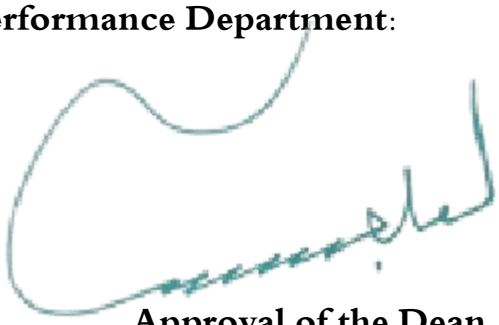
Date:

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

Prof. Dr. Majid M. Jassim

1. Program Vision

The College of Education for Pure Sciences seeks to be one of the leading higher education institutions at University of Basrah in the field of modern education and scientific research through its scientific, research and administrative activities. It also works to provide an integrated path for its students and professors to make them active and creative in serving society in the fields of mathematics and its life applications.

2. Program Mission

Working to prepare and graduate leading scientific and leadership competencies in mathematics and its applications and to develop the balance of knowledge in the field of scientific research to serve the local, regional and international community, as well as training and refining the minds of students scientifically and cognitively, and emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

1. Embodying the vision, mission and goals of the University of Basra, and applying the best educational practices with a focus on ensuring and enhancing quality and performance.
2. Preparing specialized cadres capable of serving the community and preparing for the preparation of future specializations.
3. Spreading the culture of human diversity in society, transferring mathematical knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.
4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and corresponding departments in different colleges to achieve best practices in the fields of education and learning.
5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics. Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation

NO

5. Other external influences

NO

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	60	30		
College Requirements	YES			
Department Requirements	YES			
Summer Training	NO			
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
First 2023-2024		Computers	Practical	

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	1- Understand the nature of the computer.

	2- Know the types of computers and their accessories. 3- Knows the benefits of the computer and its accessories. 4-Understands how to benefit from the computer in different fields of life. 5- Distinguish the relationship between the computer and the user. 6-The ability to analyze and apply what you learn practically to the calculator.
Skills	
Learning Outcomes 2	1- Skill in dealing with computer systems (Word, Excel, MATLAB). 2- Developing mental skills to diagnose problems and find solutions. 3- Knowledge of computer basics. 4-Expanding the student's concepts about the basics of the Internet, Microsoft, and Matlab
Ethics	
Learning Outcomes 4	Developing students' abilities to share ideas

9. Teaching and Learning Strategies

-Explaining the scientific material by presenting basic theories and concepts.

2- Giving exercises that contribute to increasing the student's understanding of the scientific material given during the lecture

3- Striving to link the previous topics with the given lecture

10. Evaluation methods

a) Method of in-person lectures in the laboratory.

b) Using the means of demonstration and digital display devices for the topics that require it.

c) Practical duties within the laboratory.

11. Faculty

Faculty Members						
Academic Rank	**Specialization**		**Special Requirements/Skills (if applicable)**		**Number of the teaching staff**	
	General	**Special**			**Staff**	**Lecturer**
Assistant Lecturer	Mathematics	Applied Mathematics			staff	
Teacher	Mathematics	Computational Mathematics			staff	

Professional Development
Mentoring new faculty members
Briefly describe 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

13. The most important sources of information about the program

1- Computer Basics and Office Applications (PartOne), Dr. Ziad Mohammed Aboud , Dr. Ghassan Hamid Abdul Majeed, Dr. Amir Hussein

Murad, Eng. Bilal Kamal Ahmed, University House for Printing, Publishing and Translation, Baghdad- Iraq,. 2014

2- Yusr Al-Mustafa Science Series "Basics of Computer and Internet Office, Dr. Ziad Mohamed Abboud, Dr. Dar Al-Doctor for Publishing and Distribution

Baghdad.

3- A step-by-step MATLAB course.

4- MATLAB for Engineers.

5- Teaching the use of words 2016, Ahmed Bassem Mahdi,2020.

6- Excel 2016 Course in Book, Nidal Al-Shami, Creative Commons,2017.

7- Websites specialized in teaching and explaining the material of roses Excel, and Matlab.

14. Program Development Plan
1- The curriculum should include a lot of practical applications. 2- Dependence of the curriculum on modern global sources that correspond to progress in computer science. 3- Increase the number of practical hours and reduce the number of students in the laboratory.

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
First 2023-2024		Computers	Basic												

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

Course Description Form

1. Course Name:
Computers
2. Course Code:
3. Semester / Year:
Annual
4. Description Preparation Date:
3/8/2024
5. Available Attendance Forms:
In-person only
6. Number of Credit Hours (Total) / Number of Units (Total)
2 hours per week 60 hours per academic year
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Lecturer: Angham Ahmed Jabbar Email:angham.jabar@uobasrah.edu.iq Lecturer: Mohammed Waleed Abdul Redha Email: mohammed.abdul-ridha@uobasrah.edu.iq

8. Course Objectives	
1- The student's ability to know the genesis of the computer and understand its componer 2- The student learns about the personal computer 3- Ward Program Basics Statement 4- Excel Basics Statement 5- Statement of the basics of the MATLAB program 6- Teaching the student the importance of the computer at present and in the future progress of the pace of development in this field and how to keep pace with it 7- Explain how the computer deals with programming languages and how it organi variables and programming commands and organizes them in memory devices.	• .... • .... • ....

9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
Weekly 1-3	6	Use of Windows	**Introduction** **- Installation Requirements** **Windows 10** **Ingredients:** **Office** **Tasks:** **- Icons** **|||UNTRANSLATED_CONTENT_START|||- خلفية سطح|||UNTRANSLATED_CONTENT_END|||** **Office** |||UNTRANSLATED_CONTENT_START|||- لوحة التحكم|||UNTRANSLATED_CONTENT_END|||	6 hours in lab	Daily Questions, Discussion, and Examination
Weekly 9-4	12	Maker and SoftOffice Microsoft Word	**Introduction** **- Running a program Microsoft.** **- Software Interface** **- File Tab** **- Insert tab** **- Homepage tab** **- Design Tab** **- Page Layout Tab**	12 hours the lab	Questions, discussion, and daily exam
Weekly 15-10	12	Microsoft office excel	**INTRODUCTION 3** **- Running a program Microsoft Excel** **- Software Interface** **- File Tab** **- Insert tab** **- Homepage tab** **- Tab Formulas** **Data Tab**	12 hours in the lab	Questions, discussion, and daily exam
Weekly 16-30	30	MATLAB	**Introduction** Program run **- Introduction to MATLAB** **- Matlab Desktop** **- Matlab Window Components** **- MATLAB Codes** **-Accounting Sentence** **- Office Pairings**	30 hours o practical attendance the laborat	Questions, discussion and daily exam

			- Matrices and operations on matrices - Find the partial matrix. - Consequences of dealing with the matrix. |||UNTRANSLATED_CONTENT_START|||- حجم المصفوفة.|||UNTRANSLATED_CONTENT_END||| - Multidimensional matrices. |||UNTRANSLATED_CONTENT_START|||- مصفوفة الخلايا.|||UNTRANSLATED_CONTENT_END||| |||UNTRANSLATED_CONTENT_START|||- السلاسل الزمنية.|||UNTRANSLATED_CONTENT_END||| - Input and output sentences. 3rd conditional Gerunds - Rotation and repetition sentences. |||UNTRANSLATED_CONTENT_START|||- الرسوم البيانية|||UNTRANSLATED_CONTENT_END|||		

11. Course Evaluation

Distribution is as follows: 25 marks for monthly and daily exams for the first semester. 25 marks for month daily exams for the second semester. 50 marks for final exams

12. Learning and Teaching Resources

Required textbooks (methodology if any)	Computer Basics and Office Applications (Part Dr. Ziad Mohammed Aboud, Dr. Ghassan Hamid Abdul Majeed, Dr. Amir Hussain Murad, Eng. Bil Kamal Ahmed, University House for Printing, Publishing and Translation, Baghdad- Iraq, |||UNTRANSLATED_CONTENT_START|||2014|||UNTRANSLATED_CONTENT_END|||
Main references (sources)	Yusr Al-Mustafa Science Series "Fundamentals of Co Internet Office, Dr. Ziad Mohammed Abboud Dar Al Dr Pu Distribution Baghdad 2010.
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Electronic References, Websites	Websites specialized in teaching and explai material of roses Excel, and Matlab.

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Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

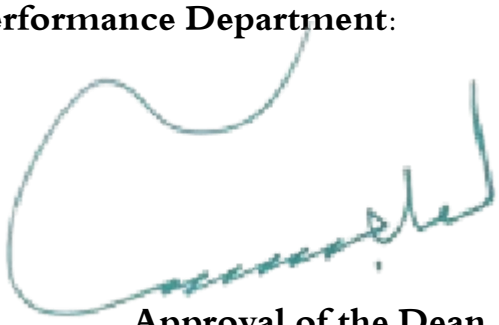
Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature: 

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5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics. Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation

NO

5. Other external influences

NO

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	150	150		
College Requirements	YES			
Department Requirements	YES			
Summer Training	NO			
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
First 2023-2024		Calculus	theoretical	practical

8. Expected learning outcomes of the program

Knowledge

Learning Outcomes 1	Informing students about the importance of studying calculus and the extent to which the subject can be applied in engineering and physics
Skills	
Learning Outcomes 2	Expanding the student's understanding of the subject and thinking about using it in other fields
Ethics	
Learning Outcomes 4	Developing students' abilities to share ideas

9. Teaching and Learning Strategies

-Explaining the scientific material by presenting basic theories and concepts.

2- Giving exercises that contribute to increasing the student's understanding of the scientific material given during the lecture

3- Striving to link the previous topics with the given lecture

10. Evaluation methods

Reports on each topic studied. In addition to monthly and daily exams and the end-of-year exam.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Teacher	Mathematics	Complex Analysis			staff	

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

13. The most important sources of information about the program

George B. Thomas (2009). Calculus. Twelfth Edition.

Adams, Robert A. (1999). Calculus: A complete course. Addison-Wesley. ISBN 978-0-201-39607-2.

Apostol, Tom M. (1967). Calculus, Volume 1, One-Variable Calculus with an Introduction to Linear Algebra. Wiley. ISBN 978-0-471-00005-1.

Apostol, Tom M. (1969). Calculus, Volume 2, Multi-Variable Calculus and Linear Algebra with Applications. Wiley. ISBN 978-0-471-00007-5.

محمد مطاوع خشان وايمن حلمي خشان. مقدمة في حساب التفاضل والتكامل.

14. Program Development Plan

The subject is taught among students in the mathematics and engineering departments. Working on scientific courses in engineering colleges to determine the extent to which this subject is used in applied fields

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
First 2023-2024		Calculus	Basic												

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

Course Description Form

1. Course Name:
Calculus
2. Course Code:
3. Semester / Year:
Annual
4. Description Preparation Date:
05/ 03/ 2024
5. Available Attendance Forms:
Attending only
6. Number of Credit Hours (Total) / Number of Units (Total)
5 h week, 150 h full year
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Sarem Hazim Hadi Email: sarim.hadi@yobasrah.edu.iq
8. Course Objectives

1- Providing students with the skill of applying differentiation integration, such as finding the domain of a function and corresponding domain, how to graph and subtract functions, types functions, the purpose of the function and its continuity, the deriva of functions and their integrals. 2- Expanding the student's skill by solving home exercises 3 - Clarifying the basic concepts in calculus.	• ..... • ..... • .....

9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

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

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 vacation 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 vacation	5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h	1- A general overview of the course and vocabulary in general 2- Study the definition of the function, its domain, and its corresponding domain 3- Drawing functions, their withdrawal, and installing functions 4- Types of functions and finding the inverse of functions 5- Trigonometric and inverse trigonometric functions 6- Study the purpose and continuity of functions 7- Introducing the student to the law of the derivative of functions and the derivative using the definition 8- Derivative of trigonometric, inverse trigonometric and hyperbolic functions 9- Explaining the applications of the derivative, such as (increasing	1- Functions 2- The goal is continuity 3- Derivative 4- Derivative applications 5- Integration and its applications 6- Finding the specified spaces	Explaining scientif material by understanding theories and presenting mathematical examples	Scientific reports and daily and monthly examinations.

		and decreasing, the critical point, local maximum and minimum points, concavity and convexity, as well as inflection points, L'Hopital's rule, and the mean value theorem) 10- Integration and integration methods 11- Integration of trigonometric and inverse trigonometric functions 12- Integration of special functions 13- Some integration methods such as (partial integration and other methods) 14- Definite integration and finding spaces			

11. Course Evaluation

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12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Calculus
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Electronic References, Websites	https://www.google.com/ https://www.youtube.net/

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File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

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Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

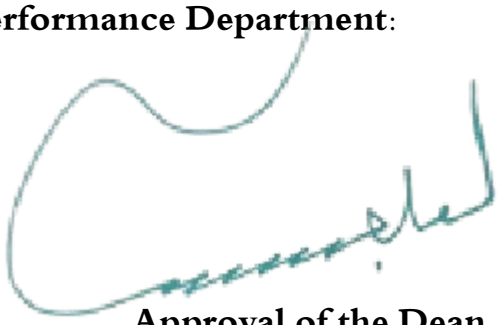
Date:

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Date:

Signature: 

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2. Preparing specialized cadres capable of serving the community and preparing for the preparation of future specializations.
3. Spreading the culture of human diversity in society, transferring mathematical knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.
4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and corresponding departments in different colleges to achieve best practices in the fields of education and learning.
5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics. Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation
NO

5. Other external influences
NO

6. Program Structure				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	**120**	**120**		
College Requirements	**YES**			
Department Requirements	**YES**			
Summer Training	**NO**			
Other				

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

7. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
First 2023-2024		**Foundations of mathematics**	**theoretical**	**practical**

8. Expected learning outcomes of the program
Knowledge

Learning Outcomes 1	1 - The student will be introduced to the concept of mathematical logic. 2 - The student will be introduced to sets and set algebra. 3 - The student will be introduced to the concept of relationships and their types. 4 - The student will be introduced to the concept of the equivalence relationship and the formation of equivalence classes. 5 - The student will be introduced to the concept of the division set. 6 - The student will be introduced to the concept of application and its types of applications. 7 - The student will be introduced to the origin of numbers.
Skills	
Learning Outcomes 2	Expanding the student's understanding of the topic by answering questions such as "Prove" and "Is that?", in addition to linking different concepts.
Ethics	
Learning Outcomes 4	Developing students' abilities to share ideas

9. Teaching and Learning Strategies

1- Present the scientific material by presenting and explaining the definitions and theories related to the topic.

2- Explore the student's understanding of the scientific material by assigning them to complete a number of exercises related to the topic.

3- Remind students of previous topics before introducing the lecture topic to establish connections between topics.

10. Evaluation methods

Solve exercises on each topic studied, in addition to monthly and daily exams and an end-of-year exam.

11. Faculty

Faculty Members						
Academic Rank	**Specialization**		**Special Requirements/Skills (if applicable)**		**Number of the teaching staff**	
	General	**Special**			**Staff**	**Lecturer**
Teacher	Mathematics	Applied mathematics			staff	

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**

13. **The most important sources of information about the program**
أسس الرياضيات (الجزء الأول+ الجزء الثاني) تأليف: د. هادي جابر- د. رياض شاكر نعوم- د. نادر جورج

14. Program Development Plan
Striving to conduct scientific courses to change students' established ideas about the difficulty of the subject of fundamental mathematics by presenting real-life examples and linking them to the subject.

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
First 2023-2024		Foundations of mathematics	Basic												

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

Course Description Form

1. Course Name:
Foundations of mathematics
2. Course Code:
3. Semester / Year:
Annual
4. Description Preparation Date:
05/ 03/ 2024
5. Available Attendance Forms:
Attending only
6. Number of Credit Hours (Total) / Number of Units (Total)
4 h week, 120 h full year
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Yasir Ahmed Abdul-Ameer Email: yasir.ahmed@uobasrah.edu.iq
8. Course Objectives

1 – The student will be introduced to the concept of mathematical logic. 2 – The student will be introduced to sets and set algebra. 3 – The student will be introduced to the concept of relationships and t types. 4 – The student will be introduced to the concept of the equivale relationship and the formation of equivalence classes. 5 – The student will be introduced to the concept of the division set. 6 – The student will be introduced to the concept of application and its ty of applications. 7 – The student will be introduced to the origin of numbers.	• ..... • ..... • .....

9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 vacation 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 vacation	4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h	1- The student learns the concept of mathematical logic and set algebra. 2- The student learns the concept of relationships, Cartesian multiplication of sets, and types of relationships. 3- The student learns the equivalence relationship and the formation of equivalence classes. 4- The student learns the difference between the partial and whole order relationship. 5- The student learns how to form a division set and its applications. 6- The student learns the definition of an application and its distinction from a relationship. 7- The student learns the types of applications and their definitions. 8- The student learns the composition of an application and its inverse. 9- The student learns how to compose natural numbers and algebraize natural numbers.	1- Basic Concepts 2- Relations 3- Equivalence Relation 4- Types of Relations 5- Division Set 6- Application 7- Types of Applications 8- Composition of Applications 9- Origin of Natural Numbers	Explaining scientific mater by understandi definitions, proving theorer and presenting mathematical examples.	Solve daily and monthly exercises and exams.

11. Course Evaluation

Distribution is as follows: 25 marks for monthly and daily exams for the first semester. 25 marks for monthly and daily exams for the second semester. 50 marks for final exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	أسس الرياضيات (الجزء الأول+ الجزء الثاني) تأليف: د. هادي جابر- د. رياض شاكر نعوم- د. نادر جورج
Main references (sources)	
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://t.me/s/math1_a?before=64 https://moodle.uomosul.edu.iq/course/info.php?id=215

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:

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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 Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

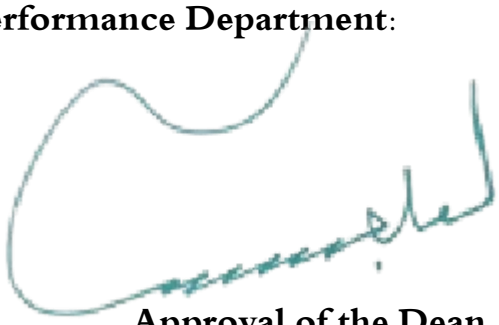
Date:

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

Prof. Dr. Majid M. Jassim

1. Program Vision

The College of Education for Pure Sciences seeks to prepare graduates in the field of mathematics teaching to work in the schools of the Ministry of Education.

2. Program Mission

Working to prepare and graduate leading scientific and leadership competencies in the field of mathematical sciences and to develop the balance of knowledge in the field of scientific research in the field of mathematics to serve the local, regional and international community, as well as training and refining the minds of students scientifically and cognitively, and emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

1- Acquiring the necessary mathematical knowledge for the prescribed subjects and understanding the meanings behind each mathematical concept

2 - Developing an understanding of the nature of the subject of mathematical analysis as an integrated system of basic mathematical concepts, which will provide an important basis for understanding other mathematical disciplines.

3- Clarifying the applications of the topics covered by the course

4- Students can obtain good and advanced skills in the field of applied mathematics

5- The student gains theoretical experience in the topics covered in the course

4. Program Accreditation

NON

5. **Other external influences**
NON

6. **Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	90	90		ESSENTIAL COURSE
College Requirements	**YES**			
Department Requirements	**YES**			
Summer Training	**NON**			
Other				

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

7. **Program Description**				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
2023-2024 LEVEL 2		**ADVANCED CALCULUS**	**theoretical**	

8. **Expected learning outcomes of the program**
Knowledge
A1- The student should be familiar with the concept of Cartesian, polar, cylindrical and spherical coordinates and how to convert from one to the other.

A2- The student will be familiar with applications in polar coordinates.

A3- The student will be familiar with the definition of sequences, series and convergence tests.

A4- The student will be familiar with the definition of domain and codomain of a multivariable functions.

A5- The student will be familiar with the concept of double and triple integrals and their applications.

A6- The student will learn about vectors and vector functions.

Skills

B1 - Training the student to solve the exercises with understanding and ease.

B2 - Enabling the student to apply it to other topics.

B3 - Enabling the student to link it to reality.

Ethics

C1- Developing students' abilities to share ideas.

9. Teaching and Learning Strategies

1- Theoretical lecture.

2- Use the display screen.

3- Guiding the student to websites.

4- Guiding the student to the sources on which the lectures were organized.

10. Evaluation methods

1- Daily exams.

2- Questions and discussions during the lecture.

3- Quarterly written exams.

4- Final written exams.

5- Homework assignments.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
LECTURER	MATHEMATICS	CALCULUS			STAFF	

Professional Development

Mentoring new faculty members

Orienting new faculty members.

Professional development of faculty members

12. Acceptance Criterion

13. The most important sources of information about the program

1. CALCULUS AND ANALYTIC GEOMETRY

   G. B. Thomas and R. L. Finney

2. CALCULUS

   H. Anton, I. Bivens and S. Davis

3. ADVANCED CALCULUS

   M. R. Spiegel

4. Program Development Plan
1- Taking advantage of modern technologies in presenting the course. 2- Updating the course resources. 3- The course is reviewed periodically by the department's scientific committee to ensure it keeps pace with modern 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
2024-2025 LEVWL 2		ADVANCED CALCULUS	ESSENTIAL	*	*	*	*	*	*	*		*			

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

Course Description Form

1. Course Name: ADVANCED CALCULUS

2. Course Code:

3. Semester / Year: YEARLY

4. Description Preparation Date: 1/9/2024

5. Available Attendance Forms: PRESENCE

6. Number of Credit Hours (Total) / 150 HOURS

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

Name: DR. KHALID ABDULALAH UTUB
Email: khalid.utub@uobasrah.edu.iq

8. Course Objectives

Course Objectives	1- Acquiring the necessary mathematical knowledge for the prescribed subjects and understanding the meanings behind each mathematical concept. 2 - Developing an understanding of the nature of the subject of calculus as an integrated system of basic mathematical concepts, which will provide an important basis for understanding other mathematical disciplines. 3- Clarifying the applications of the topics covered by the course. 4- Students can obtain good and advanced skills in the field of applied mathematics. 5- The student gains application experience in the topics covered in the course.

9. Teaching and Learning Strategies

Strategy	1- Theoretical lecture. 2- Use the display screen. 3- Guiding the student to websites. 4- Guiding the student to the sources on which the lectures were organized.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
4	20	The student learns the basic concepts of conic sections and rotation of axes.	Conic sections. Rotation of axes	Lecture+ discussion	Exam and daily questions
4	20	The student learns the basic concepts of polar coordinates and their relationship to Cartesian coordinates.	Polar coordinates	Lecture+ discussion	Exam and daily questions
4	20	The student learns the basic concepts about vectors, their properties and applications.	Vectors	Lecture+ discussion	Exam and daily questions
6	30	The student learns the basic concepts of partial derivative and its applications.	Partial derivative	Lecture+ discussion	Exam and daily questions
5	25	The student learns the basic concepts of definite double and triple integrals and their applications.	Repeated integrals	Lecture+ discussion	Exam and daily questions
4	20	The student learns the basic concepts of series.	Numerical series	Lecture+ discussion	Exam and daily questions
3	15	The student learns applications of series.	Applications	Lecture+ discussion	Exam and daily questions

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 a	NON
Main references (sources)	1. CALCULUS AND ANALYTIC GEOMETRY G. B. Thomas and R. L. Finney 2. CALCULUS H. Anton, I. Bivens and S. Davis 3. ADVANCED CALCULUS M. R. Spiegel
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	*1-* https://www.desmos.com/calculator/dxkknajdqb *2-* https://www.integral-calculator.com/ *3-* https://www.symbolab.com/solver/calculus-calculator

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Academic Program and Course Description Guide

2024

Introduction:

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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 Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

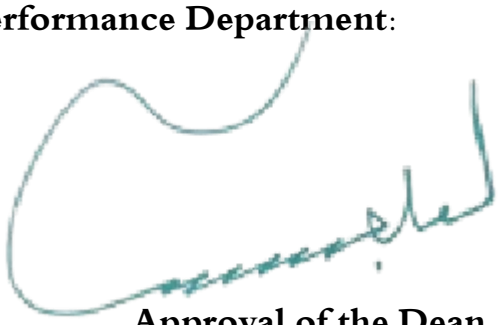
Date:

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

Prof. Dr. Majid M. Jassim

1. Program Vision

The College of Education for Pure Sciences seeks to be one of the leading higher education institutions at University of Basrah in the field of modern education and scientific research through its scientific, research and administrative activities. It also works to provide an integrated path for its students and professors to make them active and creative in serving society in the fields of mathematics and its life applications.

2. Program Mission

Working to prepare and graduate leading scientific and leadership competencies in mathematics and its applications and to develop the balance of knowledge in the field of scientific research to serve the local, regional and international community, as well as training and refining the minds of students scientifically and cognitively, and emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

1. Embodying the vision, mission and goals of the University of Basra, and applying the best educational practices with a focus on ensuring and enhancing quality and performance.
2. Preparing specialized cadres capable of serving the community and preparing for the preparation of future specializations.
3. Spreading the culture of human diversity in society, transferring mathematical knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.
4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and corresponding departments in different colleges to achieve best practices in the fields of education and learning.
5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics. Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation

NO

5. Other external influences

NO

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	60	60		
College Requirements	YES			
Department Requirements	YES			
Summer Training	NO			
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
First 2023-2024		Advance Computer	2 theoretical	8 practical

8. Expected learning outcomes of the program

Knowledge

Learning Outcomes 1	Informing students about the importance of studying advance computer and the extent to which the subject can be applied in mathematics and engineering
Skills	
Learning Outcomes 2	Expanding the student's understanding of the subject and thinking about using it in other fields
Ethics	
Learning Outcomes 4	Developing students' abilities to share ideas

9. Teaching and Learning Strategies

-Explaining the scientific material by presenting basic theories and concepts.

2- Giving exercises that contribute to increasing the student's understanding of the scientific material given during the lecture

3- Striving to link the previous topics with the given lecture

10. Evaluation methods

Reports on each topic studied. In addition to monthly and daily exams and the end-of-year exam.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Teacher	Mathematics	Numerical Analysis			staff	

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

13. The most important sources of information about the program

MATLAB: A Practical introduction to programming and problem solving, Stormy Attaway 2009

14. Program Development Plan

The subject is taught among students in the mathematics and engineering departments. Working on scientific courses in engineering colleges to determine the extent to which this subject is used in applied fields

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
First 2023-2024		Advance Computer	Basic												

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

Course Description Form

1. Course Name:
Advance Computer
2. Course Code:
3. Semester / Year:
Annual
4. Description Preparation Date:
05/ 03/ 2024
5. Available Attendance Forms:
Attending only
6. Number of Credit Hours (Total) / Number of Units (Total)
60 h full year
7. Course administrator's name (mention all, if more than one name)
Name: Huda Jabbar Saeed Email: huda.jabbar@uobasrah.edu.iq
8. Course Objectives

1- The student learns how to use the MATLAB program so that he can sc equations and mathematical problems in a way that qualifies him for higher leve the future. 2- Expanding the student's skill by solving home exercises 3 - Clarifying the basic concepts in MATLAB.	• ..... • ..... • .....

9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
7	14	Understanding course vocabulary	Starting with MATLAB	Explaining scientif material by understanding	Scientific reports and daily and

4	8	Understanding course vocabulary	Vectors and Matrices	theories and presenting mathematical examples	monthly examinations.
12	24	Understanding course vocabulary	Programming in MATLAB		
7	14	Understanding course vocabulary	Symbolic Mathematics and Calculus		

11. Course Evaluation

Distribution is as follows: 25 marks for monthly and daily exams for the first semester. 25 marks for monthly and daily exams for the second semester. 50 marks for final exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Department library
Main references (sources)	College library
Recommended books and references (scientific journals, reports…)	MATLAB: A Practical introduction to programming and problem solving, Stormy Attaway 2009 Scientific search engines and scientific channels
Electronic References, Websites	https://www.google.com/ https://www.youtube.net/

Ministry of Higher Education and Scientific Research
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Academic Program and Course Description Guide

2024

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Academic Program Description Form

University Name: **University of Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

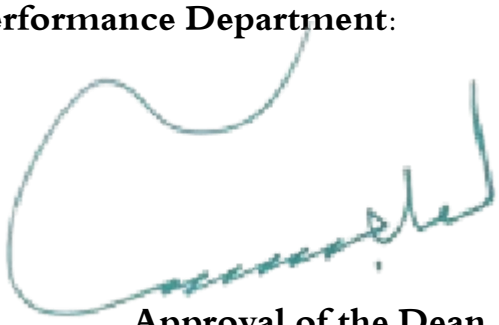
Date:

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

Prof. Dr. Majid M. Jassim

1. Program Vision

The College of Education for Pure Sciences seeks to be one of the leading higher education institutions at University of Basrah in the field of modern education and scientific research through its scientific, research and administrative activities. It also works to provide an integrated path for its students and professors to make them active and creative in serving society in the fields of mathematics and its life applications.

2. Program Mission

Working to prepare and graduate leading scientific and leadership competencies in mathematics and its applications and to develop the balance of knowledge in the field of scientific research to serve the local, regional and international community, as well as training and refining the minds of students scientifically and cognitively, and emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

1. Embodying the vision, mission and goals of the University of Basra, and applying the best educational practices with a focus on ensuring and enhancing quality and performance.
2. Preparing specialized cadres capable of serving the community and preparing for the preparation of future specializations.
3. Spreading the culture of human diversity in society, transferring mathematical knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.
4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and corresponding departments in different colleges to achieve best practices in the fields of education and learning.
5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics. Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation
NO

5. Other external influences
NO

6. Program Structure				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	**120**	**120**		
College Requirements	**YES**			
Department Requirements	**YES**			
Summer Training	**NO**			
Other				

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

7. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
Second 2024-2025		**Ordinary Differential Equations**	**theoretical**	**practical**

8. Expected learning outcomes of the program
Knowledge
1- The student will be introduced to the concept of ordinary and partial differential equations.
2- The student will be introduced to the concept of degree and order of a differential equation.

3- The student will be introduced to the concept of linear and nonlinear ordinary differential equations. 4- The student will be introduced to the concept of homogeneous and nonhomogeneous ordinary differential equations. 5- The student will be introduced to the concept of solving ordinary differential equations and methods for finding them. 6- The student will be introduced to the concept of the differential operator, its properties, and its use in solving ordinary differential equations. 7- The student will be introduced to the concept of the Laplace transform and its inverse and their use in solving ordinary differential equations. 8- The student will be introduced to the concept of singular and ordinary points of ordinary differential equations and the use of the power series method in solving them. 9- The student will become familiar with the concept of matrices and their use in solving ordinary differential equations.
Skills
1- The student can perform logical mathematical proof. 2- The student can distinguish between different types of differential equations. 3- The student can distinguish between different types of ordinary differential equations and choose the appropriate method to solve them. 4- The student can answer questions such as "why" and "how?", in addition to linking different concepts.
Ethics
1. Preliminary assessment through daily exams. 2. Formative assessment through semester exams. 3. Final assessment through final exams.

9. Teaching and Learning Strategies

1- Explaining the scientific material by presenting the basic concepts.

2- Providing exercises that contribute to increasing students' understanding of the scientific material presented during the lecture.

3- Exploring by linking previous topics to the lecture (currently)

10. Evaluation methods

1. Preliminary assessment through daily exams.

2. Formative assessment through semester exams.

3. Final assessment through final exams.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof.	Mathematics	Computational Mathematics			staff	

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

View related resources on the Internet.

12. Acceptance Criterion

13. The most important sources of information about the program

Textbook:

أ.م. خالد احمد السامرائي و أ.م. يحيى عبد سعيد " طرق حل المعادلات التفاضلية " وزارة التعليم العالي والبحث العلمي، جامعة بغداد، 1979.

Supporting books:

1. Albert L. Rabenstein "Introduction to Ordinary Differential Equations", Academic Press, INC., 1972.

2. R. K. Nagle, E.B. Satt and A.D. Snider "Fundamentals of differential Equations& Boundary Value Problems", Addison Wesley, Longman, 2000.

14. Program Development Plan

1.Preparing scientific publications that address some scientific concepts.

2. **Writing reports at the end of each semester.**

3. **Reviewing other mathematics subjects from previous academic levels, especially ordinary differential equations.**

4. **Accessing relevant resources on the Internet.**

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
Second 2024-2025		Ordinary Differential Equations	Basic												

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

Course Description Form

1. Course Name:

Ordinary Differential Equations

2. Course Code:

3. Semester / Year:

Annual

4. Description Preparation Date:

05/ 03/ 2025

5. Available Attendance Forms:

Attending only

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

4 h week, 120 h full year

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

Name: Dr. Hameeda Oda Mezban
Email: hameeda.mezban@uobasrah.edu.iq

8. Course Objectives

1. To provide students with the skill of applying ordinary differential equations, such as defining a differen equation, its order and degree, and methods for solving first-order and first-degree differential equations.

2. Methods for solving first-order and higher-order differential equations.

3. Methods for solving higher-order differential equations.

4. To expand students' skills by solving homework exercises.

5. To clarify the basic concepts in ordinary differential equations.

9. Teaching and Learning Strategies

Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	The student learns the concept of the ordinary	Basic concepts	Lecture	Introductory

		differential equation, the order of the equation, the degree of the equation, the general solution, the unique solution, and the special solution.			
2	4	The student learns how to distinguish between ordinary and partial differential equations, linear and nonlinear, homogeneous and nonhomogeneous.	Basic concepts	Lecture	Introductory
3	4	The student learns how to form a differential equation from the general solution.	Basic concepts	Lecture	Introductory
4	4	The student learns to solve by separation of variables, homogeneous equation, differential equations with linear coefficients, and complete differential equations.	Methods for solving first-order and first-degree differential equations	Lecture	The constructor
5	4	The student learns the concept of the integration factor and its use in solving incomplete differential equations.	Methods for solving first-order and first-degree differential equations	Lecture	The constructor
6	4	First order linear equation, Bernoulli's equation	First-order linear differential equations	Lecture	The constructor
7	4	Solving second-order differential equations transformable to first-order equations	Solving second-order differential equations transformable	Lecture	The constructor

			to first-order equations		
8	4	Solving first-order differential equations but of higher degrees	Solving first-order differential equations but of higher degrees	Lecture	The constructor
9	4	Simultaneous differential equations	Simultaneous differential equations	Lecture	The constructor
10	4	The student learns the concept of general linear differential equations of order n with constant coefficients, the concept of the Wronskian determinant and independence of solutions, and the concept of the differential operator.	Solving general linear differential equations of order n with constant coefficients	Lecture	Introductory
11	4	Solving linear differential equations by reducing them to the first order	Solving general linear differential equations of order n with constant coefficients	Lecture	The constructor
12	4	Solving homogeneous linear differential equations with constant coefficients	Solving general linear differential equations of order n with constant coefficients	Lecture	The constructor
13	4	Finding the particular solution of a non-homogeneous linear differential equation using: The method of indeterminate coefficients, the operator method, and the method of varying constants	Solving general linear differential equations of order n with constant coefficients	Lecture	The constructor
14	4	Finding the particular solution of a non-homogeneous	Solving general linear differential equations of	Lecture	The constructor

		linear differential equation using: The method of indeterminate coefficients, the operator method, and the method of varying constants	order n with constant coefficients		
15	4	The student learns about Euler's equation and how to solve it.	Euler Equation	Lecture	The constructor
Midterm exams (two weeks) Two-week break					
16	4	The student learns the concept of the Laplace transform and the inverse Laplace transform.	Laplace transform	Lecture	Introductory
17	4	Properties and theorems of the Laplace transform	Laplace transform	Lecture	The constructor
18	4	Solving linear differential equations with the Laplace transform	Laplace transform	Lecture	The constructor
19	4	Solving initial value problems with the Laplace transform	Laplace transform	Lecture	The constructor
20	4	Solving systems of ordinary differential equations using the Laplace transform	Laplace transform	Lecture	The constructor
21	4	The student learns the concept of special functions.	special functions	Lecture	Introductory
22	4	The student learns the concept of special functions.	special functions	Lecture	The constructor
23	4	The student learns the concept of normal points and singular points of the differential equation.	The series	Lecture	Introductory
24	4	Solving differential equations using series	The series	Lecture	The constructor
25	4	Solving differential equations using series	The series	Lecture	The constructor

26	4	Solving differential equations using series	The series	Lecture	The constructor
27	4	Frobenius method for solving differential equations	The series	Lecture	The constructor
28	4	Frobenius method for solving differential equations	The series	Lecture	The constructor
29	4	Solving differential equations using matrices.	The matrices	Lecture	The constructor
30	4	Solving differential equations using matrices.	The matrices	Lecture	The constructor

11.

Distribution is as follows: 25 marks for monthly and daily exams for the first semester. 25 marks for monthly and daily exams for the second semester. 50 marks for final exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	أ.م. خالد احمد السامرائي و أ.م. يحيى عبد سعيد " طرق حل المعادلات التفاضلية " وزارة التعليم العالي والبحث العلمي، جامعة بغداد، 1979.
Main references (sources)	Albert L. Rabenstein "Introduction to Ordinary Differential Equations", Academic Press, INC., 1972.
Recommended books and references (scientific journals, reports…)	**R. K. Nagle, E.B. Satt and A.D. Snider "Fundamentals of differential Equations& Boundary Value Problems", Addison Wesley, Longman, 2000** **محركات البحث العلمي والقنوات العلمية**
Electronic References, Websites	https://www.google.com/ https://www.youtube.net/

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

Academic Program Description Form

University Name: **University of Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

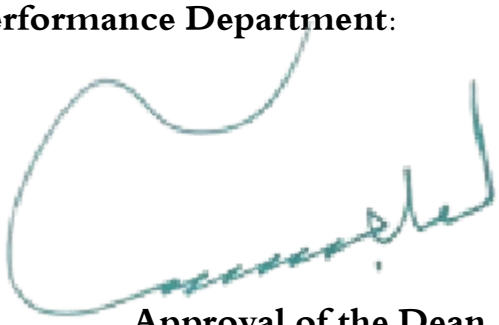
Date:

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

Prof. Dr. Majid M. Jassim

Approval of the Dean

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3. Spreading the culture of human diversity in society, transferring mathematical knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.
4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and corresponding departments in different colleges to achieve best practices in the fields of education and learning.
5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics.
Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation

NO

5. Other external influences

NO

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	100	100		
College Requirements	YES			
Department Requirements	YES			
Summer Training	NO			
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
Second 2024-2025		Engineering and Systems Axioms	theoretical	practical

8. Expected learning outcomes of the program

Knowledge

Learning Outcomes 1	Informing students about the importance of studying calculus and the extent to which the subject can be applied in engineering and physics
Skills	
Learning Outcomes 2	Expanding the student's understanding of the subject and thinking about using it in other fields
Ethics	
Learning Outcomes 4	Developing students' abilities to share ideas

9. Teaching and Learning Strategies

-Explaining the scientific material by presenting basic theories and concepts.

2- Giving exercises that contribute to increasing the student's understanding of the scientific material given during the lecture

3- Striving to link the previous topics with the given lecture

10. Evaluation methods

Reports on each topic studied. In addition to monthly and daily exams and the end-of-year exam.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Teacher	Mathematics	APPROXIMATION THEORY			staff	

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

13. The most important sources of information about the program

1-المفاهيم الاساسية في الهندسة

2- Fundatinns of Euelidiean and non-Euclidiean Geometry by Ellery B-Golos .

14. Program Development Plan

The subject is taught among students in the mathematics and engineering departments. Working on scientific courses in engineering colleges to determine the extent to which this subject is used in applied fields

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
Second 2024-2025		Engineering and Systems Axioms	Basic												

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

Course Description Form

1. Course Name:
Engineering and Systems Axioms
2. Course Code:
3. Semester / Year:
Annual
4. Description Preparation Date:
14/ 03/ 2025
5. Available Attendance Forms:
Attending only
6. Number of Credit Hours (Total) / Number of Units (Total)
3 h week, 100 h full year
7. Course administrator's name (mention all, if more than one name)
Name: Saffa Abdu Alshheed Email: saffa. hameed@uobasrah.edu.iq
8. Course Objectives

1- Familiarizing students with the foundations of enginee and axioms systems. 2- Understand the components of each intuitive system 3 - Know the importance of engineering in the educatic process.	• ..... • ..... • .....

9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1 2 3 4	5h 5h 5h 5h	1- General access to the course and vocabulary in general 2- Study of the	1- System of Axioms	Explain the scientific material by understandin the theories a putting forwa	Scientific reports and daily and monthly examinations.

5 6 7 8 9 10 11 12 13 14 15 vacati 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 vacati	5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h 5h	definition of the axiomatic system 3- The basics of building the intuitive system 4- Types of intuitive systems and their relationship (Fano system and UNK system) 5- Recognize the characteristics of every axiomatic system definition 6- Study of non-Euclidean geometry and knowledge of its properties. 7- Introducing the student to Hathlouli geometry and knowing the theorems of this geometry 8- Introducing the student to imperfect geometry and knowing the theorems for this geometry	2- Types System of Axioms 3- characteristics of every axiomatic system 4-Non-Euclidean geometry 5- Hathlouli geometry 6- Imperfect geometry	mathematical examples	

11. Course Evaluation

Distribution is as follows: 25 marks for monthly and daily exams for the first semester. 25 marks for monthly and daily exams for the second semester. 50 marks for final exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Lectures prepared by the subject teach
Main references (sources)	مفاهيم الاساسية في الهندسة
Recommended books and references (scientific journals, reports…)	Scientific search engines and scientific channels

Electronic References, Websites	https://www.google.com/ https://www.youtube.net/

Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
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Accreditation Department

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2024

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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 Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

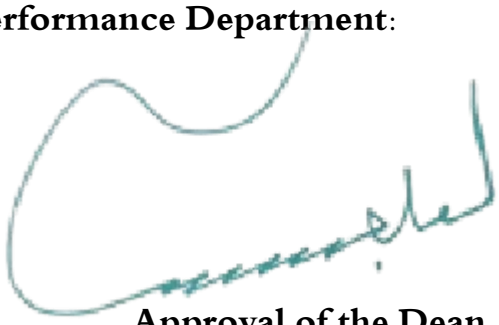
Date:

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

Prof. Dr. Majid M. Jassim

1. Program Vision

The College of Education for Pure Sciences seeks to be one of the leading higher education institutions at the University of Basra in the field of modern education and scientific research through its scientific, research and administrative activities. It also works to provide an integrated path for its students and professors to make them active and creative in serving society.

2. Program Mission

The Department of Mathematics was established in 1975-1976. The department aims to prepare graduate students as teachers in secondary schools, vocational schools, and Iraqi institutes. The department awards a Bachelor of Science degree in mathematics, whereby the graduate is qualified to teach mathematics. Graduates of the department are also qualified for postgraduate studies and conducting research. In addition, some of the department's teachers contribute effectively to scientific and educational seminars inside and outside the country.

3. Program Objectives

1) The course aims to provide students with knowledge of the basic theoretical aspect on which it depends and through which they can understand the applied aspect.

2) Integrating the theoretical aspect of the course with other vocabulary.

3) The curriculum and its contents achieve the skills required to develop the student's scientific thinking and self-learning.

4) Inform the student about the meaning of the ring, its properties, uses and applications in daily life, and the use of its theories

In society and in developing new knowledge.

4. **Program Accreditation**
Nothing

5. **Other external influences**
Nothing

6. **Program Structure**				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	**100**	**100**		**Basic course**
College Requirements	**yes**			
Department Requirements	**yes**			
Summer Training	Nothing			
Other				

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

7. **Program Description**				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
2023-2024 third	**304**	**Ring theory**	**theoretical**	

8. Expected learning outcomes of the program

Knowledge	
1) The student remembers the information and laws given in the course. 2) That the student understands the course topics and related mathematical problems. 3) The student should be able to apply what he has learned to solve mathematical problems. 4) That the student is able to analyze the text of the question and arrange the information to benefit from it in the solution and obtain correct results. 5) The student composes problems related to the course topics and then arrives at their correct solution. 6) The student must have ideas about the course material and know how to devise appropriate laws to solve it	Learning Outcomes Statement 1
Skills	
1) The student must demonstrate the required mathematical laws related to the course vocabulary. 2) The student should use the appropriate laws to solve each problem. 3) The student must be proficient in linking topics that can be linked within the course vocabulary. 4) The student should distinguish between the uses of theorems and laws during the solution.	Learning Outcomes Statement 2
Ethics	
1) The student should show interest in the explanation the teacher provides of the subject. 2) The student must have sufficient conviction about the importance of the material he is receiving 3) That the student is able to organize the data he has to solve mathematical problems 4) The student should be able to discuss and justify solutions to mathematical problems and suggest some other possible solutions to the problem	

9. Teaching and Learning Strategies

1.Education using electronic means

2. Teaching using electronic competitions, as they work to stimulate the spirit of enthusiasm among students

3. Learning by making the student a teacher to enhance his self-confidence

4. Learning through brainstorming among student

10. Evaluation methods

1.The method of discussion and dialogue between the student and the teacher

2. Observation method

3. Daily, monthly and quarterly exams

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Assistant Prof.	mathematics	Approximation throry			Staff	

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

Developing the concept of models by adding an appendix related to and in-depth with this concept, which is abundant with examples

12. Acceptance Criterion

Firstly, the requirements for admission to the college:

-1 Approval of admission conditions for students in accordance with the regulations of the Ministry of Higher Education and Scientific Research (central admission)

2- To successfully pass any special test or personal interview deemed appropriate by the college or university council.

3 - He must be medically fit for the specialty applied for.

Secondly, the conditions for admission to the scientific department:

-1 Choose the student's desire from more than one desire arranged according to preference.

-2 High school acceptance rate.

-3 GPA of the course in the department in which the student wishes to study.

-4 Absorptive capacity of the scientific department.

13. The most important sources of information about the program

1- The needs of secondary and middle schools for mathematics specialization.

2- Local trends.

3- Industrial and economic trends.

4- Studies and questionnaires.

5- Specialized seminars and workshops with beneficiaries

14. Program Development Plan

1- Adding other concepts related to algebraic structures.

2- Researching the possibility of applying the concepts of fields and rings in scientific disciplines other than 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
2023-2024 third		Algebra (ring)		√	√	√	√	√	√	√	√	√	√	√	√

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

Course Description Form

1. Course Name:	
Ring theory	
2. Course Code:	
3. Semester / Year:	
annual	
4. Description Preparation Date:	
14/2/2024	
5. Available Attendance Forms:	
Attendance only	
6. Number of Credit Hours (Total) / Number of Units (Total)	
100 hour annualy	
7. Course administrator's name (mention all, if more than one name)	
1) Dr. Ali J. Mohammad 2) Tahani Abdulmajeed	
8. Course Objectives	
1- Explain to the student the importance of rings and fields in algebraic structure. **2- The student gains a healthy understanding and understanding the course chapters through the lectures provided by the instructo** **3- Explaining new concepts to the student, such as fields and idea** **4- The student gains theoretical experience in the importance fields, rings, and ideals in algebra.**	• ..... • ..... • .....
9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept plannin 2- Brainstorming education strategy. 3- Education Strategy Notes Series
10. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
3 weeks	12 hours	Find out the meaning of the ring Its properties and work.	Definition of the ring And its properties	Lecture and discussion style	Weekly, monthly, daily, written exams, and the end-of-year exam.
2 weeks	8 hours	Know which ring it is Part of his ring And its properties	subring		
3 weeks	12 hours	Ideal meaning and its properties	Ideals		
3 weeks	12 hours	How to form a ring Fractional and its advantages	Fractional rings		
6 weeks	24 hours	Meaning of isomorphism And its importance	The isomorphism		
4 weeks	16 hours	How to get Special types of Ideals	Special types of Ideals and Polynomials rings		
7 weeks	28 hours	Special types of Ideals and episodes Polynomial	Extension of field		
2 weeks	8 hours	Other types of Partial models	Models, partial models, and their algebra		

11. Course Evaluation

Distribution is as follows: 25 marks for monthly and daily exams for the first semester. 25 marks for monthly and daily exams for the second semester. 50 marks for final exams

12.

Required textbooks (methodology, if any)	Modern abstract algebra

Main references (sources)	1- كتاب نظرية الحلقات. تأليف د. عادل غسان، د. باسل عطا. 2- كتاب الجبر. تأليف د. هادي جابر، د. نادر جورج
Recommended supporting books and references (scientific journals, reports….)	Internet sites
Electronic references, websites	

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.

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In this regard, we can only emphasize the importance of writing 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 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

Academic Program Description Form

University Name: **University of Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

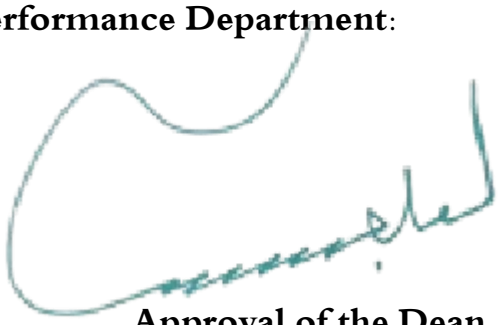
Date:

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

Prof. Dr. Majid M. Jassim

Director of the Quality Assurance and University Performance Department:

Date:

Signature:

Approval of the Dean

1. Program Vision

The College of Education for Pure Sciences seeks to be one of the leading higher education institutions at the University of Basrah in the field of modern education and scientific research through its scientific, research and administrative activities. It also works to provide an integrated path for its students and professors to make them active and creative in serving society in the fields of mathematics and its life applications.

2. Program Mission

Working to prepare and graduate leading scientific and leadership competencies in mathematics and its applications and to develop the balance of knowledge in the field of scientific research to serve the local, regional and international community, as well as training and refining the minds of students scientifically and cognitively and emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

1. Embodying the vision, mission and goals of the University of Basra, and applying the best educational practices with a focus on ensuring and enhancing quality and performance.
2. Preparing specialized cadres capable of serving the community and preparing for the preparation of future specializations.
3. Spreading the culture of human diversity in society, transferring mathematical knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.

4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and corresponding departments in different colleges to achieve best practices in the fields of education and learning.
5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics. Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation

NO

5. Other external influences

NO

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	402	120		
College Requirements	YES			
Department Requirements	YES			
Summer Training	NO			
Other				

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

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
First 2024-2025		Mathematical statistics	theoretical	practical

8. Expected learning outcomes of the program

Knowledge	
Learning Outcomes 1	Informing students about the importance of studying calculus and the extent to which the subject can be applied in engineering and physics
Skills	
Learning Outcomes 2	Expanding the student's understanding of the subject and thinking about using it in other fields
Ethics	
Learning Outcomes 4	Developing students' abilities to share ideas

9. Teaching and Learning Strategies

-Explaining scientific material by presenting basic theories and concepts.

2- Giving exercises that contribute to increasing the student's understanding of the scientific material given during the lecture

3- Striving to link the previous topics with the given lecture

10. Evaluation methods

Reports on each topic studied. In addition to monthly and daily exams and the end-of-year exam.

11. Faculty

Faculty Members						
Academic Rank	**Specialization**		**Special Requirements/Skills (if applicable)**		**Number of the teaching staff**	
	General	**Special**			**Staff**	**Lecturer**
Teacher	Mathematics				staff	**Lecturer**

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

13. The most important sources of information about the program

Introduction to Mathematical Statistics by Robert V. Hogg

14. Program Development Plan

The subject is taught among students in the mathematics and engineering departments. Working on scientific courses in engineering colleges to determine the extent to which this subject is used in applied fields

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
First 2024-2025		Mathematical statistics	Basic												

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

Course Description Form

1. Course Name:
Mathematical statistics
2. Course Code:
Mathematical statistics / 402 R
3. Semester / Year:
4 rd. Year
4. Description Preparation Date:
05/ 03/ 2025
5. Available Attendance Forms:
Attending only
6. Number of Credit Hours (Total) / Number of Units (Total)
4 h week, 120 h full year
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Jasim Mohammed Ali Email: jasim.ali@uobasrah.edu.iq

8. Course Objectives	Skills
1- Providing students with the skill of applying differentiation and integrat such as finding the domain of a function and its corresponding domain, h to graph and subtract functions, types of functions, the purpose of function and its continuity, the derivative of functions and their integrals. 2- Expanding the student's skill by solving home exercises 3 - Clarifying the basic concepts in calculus.	**B1**. Students can perform the solution of the probability and count method questions. **B2**. Students can prove any property about probability events. **B3**. Students can distinction between the probability distributions and show the properties of the probability distributions **B4**. Students can perform the proof of the Markov chain properties and distinction between the stochastic processes with its properties and classification these processes according to its states.

9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series 1. The diction. 2. Lecture. 3. Exploration.

10. Course Structure

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

Primaries	Lecture	Distributions of Functions of Random Variables	Discrete Probability Distribution and its Related	16	4-1
Primaries	Lecture	Transformations of Variables	The cumulative distribution, Moment and Moment Generating Function.	8	6-5
Primaries	Lecture	Point Estimation	Method of Moment, Method of Maximum Likelihood	16	10-7
Primaries	Lecture	Properties of Point Estimation	Unbiased , Consistency, Sufficiency, Completeness, Uniqueness, Efficiency	12	13-11
Primaries	Lecture	The Rao-Black Well Theorem, Exponential Family	The Rao- Cramer Inequality, Cramer-Rao lower bound.	12	16-14
Formative	Lecture	Exponential Family	Exponential Family, Mean and variance of $K(X)$	4	17
Primaries	Lecture	Moment & Moment Generating Function of Jointly Random Variables	Moment and Moment Generating Function of Jointly Random.	8	19-18

Formative	**Lecture**	**Interval Estimation**	**Confidence Intervals for Mean.**	**4**	**20**
Formative	**Lecture**	**Intervals For Ratio Between Two Variances**	**Confidence Intervals for Probability, Confidence Intervals for Differences Of Probabilities.**	**8**	**22-21**
Primaries	**Lecture**	**Test Of Hypotheses**	**Type of Test of Hypothesis, Critical Region, Best of Critical Region, Statistical Test,**	**8**	**24-23**
Formative	**Lecture**	**Neyman-Pearson Theorem**	**Uniformly Most Power Full Fest, Likelihood Ratio Test, Sequential Test**	**8**	**25**

11. Course Evaluation

Distribution is as follows: 25 marks for monthly and daily exams for the first semester. 25 marks for monthly and daily exams for the second semester. 50 marks for final exams

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Mathematical statistics
Main references (sources) Introduction to Mathematical Statistics	Vocabulary Article The book systematic (methodical) Assistant book
Recommended books and references (scientific journals, reports…) Introduction to Mathematical Statistics By Robert V. Hogg 4,	Introduction to Mathematical Statistics By Robert V. Hogg 4,5,6,7 and 8 Edition محركات البحث العلمي والقنوات العلمية
Electronic References, Websites	https://www.google.com/ https://www.youtube.net/

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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 Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

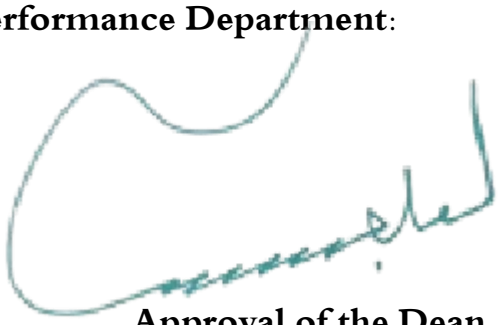
Date:

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

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2. Program Mission

Working to prepare and graduate leading scientific and leadership competencies in mathematics and its applications and to develop the balance of knowledge in the field of scientific research to serve the local, regional and international community, as well as training and refining the minds of students scientifically and cognitively, and emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

1. Embodying the vision, mission and goals of the University of Basra, and applying the best educational practices with a focus on ensuring and enhancing quality and performance.
2. Preparing specialized cadres capable of serving the community and preparing for the preparation of future specializations.
3. Spreading the culture of human diversity in society, transferring mathematical knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.
4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and corresponding departments in different colleges to achieve best practices in the fields of education and learning.
5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics. Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation
NO

5. Other external influences
NO

6. Program Structure				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	**150**	**150**		
College Requirements	**YES**			
Department Requirements	**YES**			
Summer Training	**NO**			
Other				

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

7. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
First 2023-2024		**Approximation theory**	**theoretical**	**practical**

8. Expected learning outcomes of the program
Knowledge

Learning Outcomes 1	Informing students about the importance of studying calculus and the extent to which the subject can be applied in engineering and physics
Skills	
Learning Outcomes 2	Expanding the student's understanding of the subject and thinking about using it in other fields
Ethics	
Learning Outcomes 4	Developing students' abilities to share ideas

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-Explaining the scientific material by presenting basic theories and concepts.

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3- Striving to link the previous topics with the given lecture

10. Evaluation methods

Reports on each topic studied. In addition to monthly and daily exams and the end-of-year exam.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Asst. Prof. Asst. teacher	Mathematics	Approximation theory			staff	

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

13. The most important sources of information about the program

• P. P. Korovkin: Linear Operators and Approximation Theory, Hindustan Publishing Corp (India) Delhi, 1960, Translated from Russian Edition 1959.

• G.G. Lorintz: Bernstein Polynomials, Univ. of Texas, Austin, Texas, 1986.

• V. Gupta, T. M. Rassias, P. N. Agrawal and A. M. Acu: Recent Advances in Constructive Approximation Theory, Springer International Publishing AG, part of Springer Nature 2018

14. Program Development Plan

The subject is taught among students in the mathematics and engineering departments. Working on scientific courses in engineering colleges to determine the extent to which this subject is used in applied fields

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
First 2024-2025		Approximation theory	optional												

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

Course Description Form

1. Course Name:
Approximation theory
2. Course Code:
3. Semester / Year:
Annual
4. Description Preparation Date:
09/ 03/ 2025
5. Available Attendance Forms:
Attending only
6. Number of Credit Hours (Total) / Number of Units (Total)
4 h week, 120 h full year
7. Course administrator's name (mention all, if more than one name)
Name: Asst. prof Dr. Ali J. Mohammad and Asst. teacher Iman A. Abdul Samad Email: alijasmoh@gmail.com and iman.math.msc@gmail.com
8. Course Objectives

1- Providing students with the skill of applying Approximation theory , s as how to approach difficult function with simpler functions with posi linear operators such as Bernstein operator, Szasz operator , Baska operator and Beta operator and study the amount of error resulting from approximation as well as study a number of definition and theorems rela to the approximation , such as the korovkin theorem 2- Expanding the student's skill by solving home exercises 3 - Clarifying the basic concepts in calculus.	• ..... • ..... • .....

9. Teaching and Learning Strategies

Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

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

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 vacation 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 vacation	4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h 4h	1- Overview of the course and vocabulary in general 2- Study some definitions such as Vector space,sub space,norm ,normed vector space and Taylor polynomial 3- Solve some example and exercises and give homework 4- Study of the Bernstein sequence and it's weight function properties. 5- Prove of convergence of Bernstein sequence using korovikn theorem. 6- Study of the Szasz sequence and it's weight function properties. 7- Prove of convergence of Szasz sequence	1- 2- Bernstein sequence 3- Szasz sequence 4- Baskakov sequence 5- Beta sequence 6- The mom function	Explaining scienti material by understanding theories and presenting mathematical examples	Scientific reports and daily and monthly examinations

		using korovikn theorem. 8- Study of the Baskakov sequence and it's weight function properties. 9- Prove of convergence of Baskakov sequence using korovikn theorem. 10- Study of the Beta sequence and it's weight function properties. 11- Prove of convergence of Beta sequence using korovikn theorem. 12- Study the moment function of Bernstein sequence and Szasz sequence 13- Study the moment function of Baskakov sequence and Beta sequence 14- Study Bernstien sequences in	7- The notati O and o		

		close interval [a,b] 15- Study The Notations O and o.			

11. Course Evaluation

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Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://www.google.com/ https://www.youtube.net/

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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 Basrah**.

Faculty/Institute: **College of education for pure sciences**

Scientific Department: **Department of Mathematics**.

Academic or Professional Program Name: **Mathematics**.

Final Certificate Name: **Sciences in Mathematics**

Academic System: …Annual system

Description Preparation Date: **5/10/2023**

File Completion Date: **5/3/2024**

Signature: 

Head of Department Name: Dr. Haitham Abdulsada Al-hajjaj

Date:

Signature: 

Scientific Associate Name: **Prof. Dr. AbdulSattar J. Alsaif**

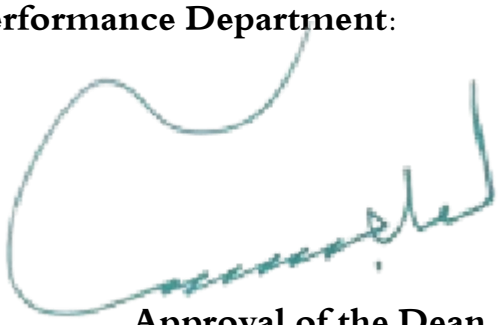
Date:

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

Prof. Dr. Majid M. Jassim

1. Program Vision

The College of Education for Pure Sciences seeks to be one of the leading higher education institutions at University of Basrah in the field of modern education and scientific research through its scientific, research and administrative activities. It also works to provide an integrated path for its students and professors to make them active and creative in serving society in the fields of mathematics and its life applications.

2. Program Mission

Working to prepare and graduate leading scientific and leadership competencies in mathematics and its applications and to develop the balance of knowledge in the field of scientific research to serve the local, regional and international community, as well as training and refining the minds of students scientifically and cognitively, and emphasizing social and cultural values and responding to the requirements of the local market.

3. Program Objectives

1. Embodying the vision, mission and goals of the University of Basra, and applying the best educational practices with a focus on ensuring and enhancing quality and performance.
2. Preparing specialized cadres capable of serving the community and preparing for the preparation of future specializations.
3. Spreading the culture of human diversity in society, transferring mathematical knowledge and skills, writing academic research, and creative scientific achievement through student- and teaching-focused activities.
4. The college seeks to conclude scientific and cultural cooperation agreements with corresponding colleges and corresponding departments in different colleges to achieve best practices in the fields of education and learning.
5. Focusing on the educational and moral aspects of all its members and spreading the spirit of dedication, tolerance, commitment and work to serve the nation.
6. Paying attention to intellectual and cultural construction through openness to the experiences of other countries in the fields of mathematics applications and interest in studying modern mathematics. Focusing on the educational and moral aspect of the student and instilling a spirit of dedication, tolerance and commitment.

4. Program Accreditation
NO

5. Other external influences
NO

6. Program Structure				
Program Structure	**Number of Courses**	**Credit hours**	**Percentage**	**Reviews***
Institution Requirements	**120**	**120**		**Elective course**
College Requirements	**YES**			
Department Requirements	**YES**			
Summer Training	**NO**			
Other				

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

7. Program Description				
Year/Level	**Course Code**	**Course Name**	**Credit Hours**	
2024-2025/Fourth		**Applied Mathematics**	**theoretical**	

8. Expected learning outcomes of the program
Knowledge

Learning Outcomes 1	Explaining the importance of applied mathematics and its relationship to other sciences and its use in other applied fields that relate to reality and society
Skills	
Learning Outcomes 2	Developing students' awareness of the subject and crystallizing their ideas in realistic application fields
Ethics	
Learning Outcomes 4	Developing students' ability to share ideas

9. Teaching and Learning Strategies

1. Clarifying the scientific concepts and foundations of the subject matter by presenting the basic theories and ideas.
2. Training students to solve problems that play a significant role in developing and improving students' understanding of the given scientific material.
3. Research the points of connection between the scientific topics presented in each lecture and those presented before it to demonstrate the extent of their usefulness.
4. Engaging students in the subject by linking mathematics to the labor market in addressing many problems in society.

10. Evaluation methods

Conducting monthly and daily tests and centralized exams, as well as providing studies on every topic presented or studied.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Professor	Mathematics	Applied Mathematics			staff	

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

13. The most important sources of information about the program

1- Mark A. P. "Partial differential. equations. and boundary-value problems with applications" 2011
2- Glenn F., Peter F., and Arthur J."Modelling with Differential and Difference Equations" Cambridge University Press, 2006
3-Erich Z." Partial differential equations and applied mathematics" 1989
4-Nakhle H." Partial diff. equations. with Fourier series and boundary value problems " 2000
5-Evans G., Blackledge J. and Yardley P." Analytic method for partial diff. equations. " 2001
6-Duffy D. G." Transform methods for solving partial differential equations"2004.
7-D. N. Burghes and M. S. Borrie "Modelling with differential equations" 1982

14. Program Development Plan

The subject is taught to students in the mathematics and engineering departments.

Scientific courses are being conducted in engineering colleges to determine the extent to which this subject is used in applied fields.

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
2024-2025/Fourth		Applied Mathematics	Elective		x					x				x	

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

Course Description Form

1. Course Name:
Applied Mathematics
2. Course Code:
3. Semester / Year:
Annual
4. Description Preparation Date:
05/ 03/ 2025
5. Available Attendance Forms:
Attending only
6. Number of Credit Hours (Total) / Number of Units (Total)
4 h week, 120 h full year
7. Course administrator's name (mention all, if more than one name)
Name: prof. Dr. Abdul-Sattar Jaber Ali Al-Saif Email: abdulsattar.ali@uobasrah.edu.iq
8. Course Objectives

Applied mathematics involves formulating problems that lead to differential equati (ordinary or partial), classifying and characterizing equations and problems of different ty and examining exact and approximate methods for solving these problems. explains h differential equations play important roles in life, cropping out also, how it's useful in universe, and its benefits in society (industrial, economics,…), through this course, students can obtain good and high skills in this field.	• ….. • ….. • …..

9. Teaching and Learning Strategies	
Strategy	1- Educational strategy, collaborative concept planning. 2- Brainstorming education strategy. 3- Education Strategy Notes Series

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Learn some concepts and definitions and a brief review of the equs. concepts	introduction (math. preliminaries)	theoretical lecture	Scientific reports + Preliminary and formative assessments
2	4		Concepts and definitions		
3	4				
4	4	Review equs. classification & learn how to find its transformations.	Review for differential equs.	theoretical lecture	
5	4		Classifications of 2nd -order P.D.Es		
6	4	Learn the concept of a mathematical model with a single equation.	Canonical forms		
7	4		Modeling (introduction)with Single differential equation	theoretical lecture	
8	4	Boundary value problems and their applications and solution methods.	Boundary value problems	theoretical lecture	
9	4		separation of variables method		
10	4		Laplace transformations method		
11	4	Learn the concept of a mathematical model for a system of equations.	Fourier transformations method	theoretical lecture	
12	4		Modeling (introduction) with System differential equations	theoretical lecture	
13	4		Existing and unique DEs	theoretical lecture	
14	4	Learn the concepts of the properties and behavior of solving equations.	Stability of differential equations		
15	4				
vacati					
16	4	Gain teaching experience and skills through training in secondary schools.	Physical applications		
17	4		training at school		
18	4		training at school	Training	
19	4	Learn about the relevance of mathematics and its usefulness in various applied fields.	training at school		
20	4		training at school		
21	4		training at school		
22	4		training at school		
23	4	Learn about numerical methods for solving boundary value problems and studying their properties (convergence, etc.).	ving physical problems& systems	theoretical lecture	
24	4		Chemistry applications		
25	4		ing Chemistry problems& system	theoretical lecture	
26	4		Biological applications		
27	4		ing Biological problems& system	theoretical lecture	
28	4		Other applications	theoretical lecture	
29	4		merical solution for single Model		
30			nerical solution for coupled Mode		
vacati			Exam	Writen	final

11. Course Evaluation

Distribution is as follows: 25 marks for monthly and daily exams for the first semester. 25 marks for monthly and daily exams for the second semester. 50 marks for final exams

12. Learning and Teaching Resources

Required textbooks (curric books, if any)	Applied Mathematics

Main references (sources)	1- Mark A. P. "Partial diff. equs. and boundary-value problems with applications" 2011 2- Glenn F., Peter F., and Arthur J."Modelling with Differential and Difference Equati Cambridge University Press, 2006
Recommended books and references (scientific journals, reports…)	1-Mark A. P. "Partial differential. equations. and boundary-value problems with applications" 2011 2-Glenn F., Peter F., and Arthur J."Modelling with Differential and Difference Equations" Cambridge University Press, 2006 3-Erich Z." Partial differential equations and applied mathematics" 1989 4-Nakhle H." Partial diff. equations. with Fourier series and boundary value problems " 2000 5-Evans G., Blackledge J. and Yardley P." Analytic method for partial diff. equations. " 2001 6-Duffy D. G." Transform methods for solving partial differential equations"2004. 7-D. N. Burghes and M. S. Borrie "Modelling with differential equations" 1982
Electronic Referenc Websites	https://www.google.com/ https://www.youtube.net/