1441-1440 H

Department of Mathematics

KPI's
According to KSA 2030 Vision

i. Increasing faculty members from ٧١,٤% to 100%
i. Reducing students staff from ٣٩,٨ to 10
i. Reducing the Average Class Enrollment from 37 to 20
v. Reducing the Average teaching load per week from 14 to 10
v. Increasing the Ratio of faculty to their research publications in refereed international journal from 1: 0.4 to 1:5.
i. Increasing the Number of talks presented in international scientific conferences from 0 to 5/week.
i. Increasing the Number of seminars from 0 to 10/ week.
i. Increasing the Number of training sessions from 0 to 10/ semester.
x. Increasing the Percentage of student's satisfaction to academic advising services from 37% to 100%.
x. Number of community education programs provided from 0 to 3/semester

Departmental Booklet

University College in Umluj

1441-1440 H

Contents

Preface

The Department ofMathematics welcomesthe studentsandprovidesthem withthis bookletwhich contains a brief summary, Vision, Mission and Goals.In additionto listthe learning outcomesandopportunities of field of work. Bookletalso offers adetailed explanation of thestudy planandthe contents of thecourses. Finally,contactinformation andscientificactivities ofthe departmentandorganizational structure.I hope thatthis bookletanswers alltheir questionsand be a usefulguide for them.

Head Department

Introduction:

The Department of Mathematics is the first scientific department that was established in the University College of Umluj, where it was established at the first term of the academic year 1430-1431^{H}, with the establishment of the college. The department grants bachelor's degree in mathematics Sciences. Since its establishment the College has taken several steps in order to develop their scientific and sophistication level of laboratory and research facilities.

Program Mission Statement

Offering an outstanding learning in order to have qualified graduates that are equipped with knowledge, abilities and skills to fulfill the community's need and development projects with distinguished administrative learning environment that supports creative research.

Department Vision:

A distinguished Department in education, research contributing to the community service.

Goals and Objectives:

(1) To equip students with scientific qualifications required by the various public and private sectors that require Mathematical skills.

(2) To prepare students for teaching posts in educational institutions.

(3) To prepare students for graduate studies leading to Master and PhD degrees.

(4) To foster in its students rational thinking and to enhance their information Technology skills in the domain of mathematics.

Employments opportunities:

1. High school teachers .
2. Mathematicians in government ministries and institutions, and private sectors that require mathematical skills such as: Ministry of Finance, Saudi Arabian Monetary Agency, General Organization for Social Insurance, Central Department of Statistics and Information, Public Pension Agency, Banks, Research Centers, etc.

3. Meritorious students pursue higher studies and ultimately join as faculty in colleges, technical colleges and universities in the Kingdom of Saudi Arabia.

Learning Outcomes:

Summary description of the knowledge to be acquired

- Fundamentals of different branches of pure and applied mathematics.
- General sciences (Physics, Chemistry and Statistics).
- Computer skills.
- Social and ethical values.
- English Language as a second language.

b. Cognitive skills to be developed and level of performance expected

- Reasonable and creative thinking, relating introductions to results and problem solving.

c. Description of the level of interpersonal skills and capacity to carry responsibility to be developed

- Ability to work individually or within a team.
- Learn the initiative spirit and bear responsibility for different situations.

d. Description of the communication, IT and numerical skills to be developed

- Extract high benefits from the use of the worldwide web,
- Using mathematical software such as Matlap and Mathematica and getting advantages of the World Wide Web.

Student's Administrationand Support

- Meeting new students.
- Provide counselling to students.
- A weekly office schedule is displayed on each faculty member's office and a total of 10 hours are specified for the students to provide them extra assistance and help in solving their academic problems.
- A follow-up committee exist in the department to look after the needs of the teaching staff and faculty members.
- Displaying the department handbook on the website of the department.

Academic Programs:

The department provides courses forundergraduatemajoring inmathematicssciencewherethestudentmuststudy132creditshourstoobtain a bachelor's degree in mathematicsas follows:

Requirements		Credits hours
University requirements		12
Faculty requirements	Compulsory	47
	Optional	None
Department requirements	Compulsory	64
	Optional	9
Total		132

Study Plan Courses & Levels

1st Level — **Preparatory Year**

	Courses Title	Course Code	Contact Hours			Credit	Prerequisites
			Theoretical	practical	Training		
1	MATH I	MATH 100	3			3	
2	General Physics	PHYS 101	3			3	
3	English I	ELS 001	1			3	
4	General Biology	BIO 101	3			5	
5	Learning, Thinking, and Research Skills	LTS 001	4			3	
Total			28			17	

2nd Level — **Preparatory Year**

	Courses Title	Course Code	Contact Hours			Credit	Prerequisites
			Theoretical	practical	Training		
1	General Chemistry	CHEM 101	3			3	
2	MATH II	MATH 101	3			3	MATH 100
3	English II	ELS 002	15			5	ELS 001
4	Computer Skills and Its application	CSC 001	4			3	
5	Communication Skills	COMM 001	2			2	
Total			٢٧			16	

3rd Level — **Second Year**

	Courses Title	Course Code	Contact Hours			Credit	Prerequisites
			Theoretical	practical	Training		
1	Fundamentals of inte Calculus	MATH 200	4	1		4	MATH 101
2	Basics of Mathematic	MATH251	3	1		3	MATH 101
3	Analytical Geometry	MATH261	3	-		3	MATH 101
4	Programming Langua	CS 112	4	2		4	CSC 001
5	Language Skills	ARB 101	2	-		2	----------
6	Islamic Culture (1)	ISLS101	2	-		2	
Total			18			18	

4th Level — **Second Year**

Courses Title	Course	Contact Hours			Credit	Prerequisites
		Theoretical	practical	Training		

		Code					
1	**Advanced Calculus**	MATH 203	4	1		4	MATH 200
2	**Differential Equations 1**	MATH 204	3	2		3	MATH 200
3	**Linear Algebra**	MATH 241	3	-		3	MATH 251
4	**General Statistics**	STAT 201	4	-		4	MATH 200
5	**Writing Skills**	ARB ٢01	2	-		2	ARB 101
٦	**Islamic Culture (2)**	ISLS 201	2	-		2	ISLS101
Total			**18**			**18**	

5th Level **Third Year**

	Courses Title	Course Code	Contact Hours			Credit	Prerequisites
			Theoretical	practical	Training		
1	Differential Equations 2	MATH 305	3			3	MATH 204
2	Real Analysis 1	MATH 311	3			3	MATH 251,
3	Probability theory (1)	STAT 311	3			3	STAT 201
4	Abstract Algebra 1	MATH 342	3			3	MATH 251
٥	Islamic Culture (3)	ISLS 301	2	-		2	ISLS 201
Total			١٤			١٤	

6th Level **Third Year**

	Courses Title	Course Code	Contact Hours			Credit	Prerequisites
			Theoretical	practical	Training		
1	Partial Differential Equations	MATH 406	3			٣	MATH 305
2	Abstract Algebra 2	MATH 343	٣			٣	MATH 342
3	Introduction to NumericalAnalysis	MATH 334	٣			٣	STAT 201
4	Introduction to Operations Research	STAT 340	٢			٢	MATH 203
5	Optional Mathematics	MATH xxx	3			٣	
6	Islamic Culture (4)	ISLS 401	2	-		2	ISLS 301
Total			١٦			١٦	

7th Level **Fourth Year**

	Courses Title	Course Code	Contact Hours			Credit	Prerequisites
			Theoretical	practical	Training		
1	**Mathematics and Packages Programs**	MATH 333	٣			٣	STAT 201 MATH 200
2	**Integral Equations**	MATH 408	٣			٣	MATH 305, MATH 311
3	**Complex Analysis (1)**	MATH 413	٣			٣	MATH 311
4	**General Topology**	MATH 464	٣			٣	MATH 251
5	**History of Mathematics among the Arabs and Muslims**	MATH 481	٣			٣	MATH 200
6	**Optional Mathematics**	MATH xxx	3			٣	STAT 201
Total			١٨			١٨	

8th Level **Fourth Year**

	Courses Title	Course Code	Contact Hours			Credit	Prerequisites
			Theoretical	practical	Training		
1	**Discrete Mathematics**	MATH 462	3			3	MATH 251
2	**Differential Geometry**	MATH 463	3			3	MATH 305 MATH 204
3	**Functional Analysis**	MATH 415	3			3	MATH 311
4	**Optional Mathematics**	MATH xxx	3			3	
5	** **Research Project**	MATH 491	3			3	Passing level 6

Total	١٥			١٥	

Credit point system:

- Study system is on the basis of levels.
- The program consists of 8 levels (4 years).
- One level lasts for one semester.
- Total credit hours are 132 hour.
- One credit hour equivalent to one hour lecture or two tutorial/lab hours per week.

Course Contents

Course Title:	Calculus Basics
Course Code:	Math200
Credit Hours:	4
Prerequisite:	Calculus lMath-101
Learning Objectives:	
- To let the student know the definiteandindefinite integralsoffunctionsof a single variable. - To let the student identify the fundamental theorem of calculus, mean value theorems and L'Hopital's rule for undetermined limits. Provide the definiteandindefinite integralsoffunctionsof a single variable. - To let the student acquire different techniques of integration- alternating series, absolute and conditional convergence, power series. Taylor &Maclaurin series	

Course Title:	Basic Mathematics
Course Code:	Math 251
Credit Hours:	3
Prerequisite:	Calculus l Math-101
Learning Objectives:	
- Let the student present Basic concepts of mathematical logic. - Let the student study of mathematical induction. - Let the student acquire and development of skills on theory of sets.	

Course Title:	Analytic Geometry
Course Code:	Math 261
Credit Hours:	3
Prerequisite:	Calculus l Math-101
Learning Objectives:	
Present the importance of the analytical geometry in Physics and Engineering Science, study the equations of the conic sections and its polar form with some applications in orbital Mechanics and introduce new coordinate systems, cylindrical and spherical coordinates.	

Course Title:	Advanced Calculus
Course Code:	Math 203
Credit Hours:	3
Prerequisite:	Fundamentals of integral calculus (Math 200)

Learning Objectives:

1- Let the student present the importance and applications of the advanced differential and integration in Physics, Chemistry and Engineering Science
2- Let the student study the Double Integrals. Area, Volume and Surface Area. Double Integrals in Polar Coordinates. Triple Integrals.
3- Let the student acquire the concept of line Integrals. Green's Theorem. Curl and Divergence. Surface Integrals. The Divergence Theorem. Stoke's Theorem.

Course Title:	Differential Equations 1
Course Code:	Math 204
Credit Hours:	3
Prerequisite:	Fundamentals of integral calculus (Math 200)

Learning Objectives:

1. Summary of the main learning outcomes for students enrolled in the course.

- To know Student the importance of the differential equations in Physics, Chemistry and Engineering Science.
- To allow Student acquires knowledge by learning new theories, concepts, and methods of solution in differential equations.
- To study Student the linear differential equations of the first order with some applications.
- To learn Student studies the differential equations of higher order and methods of solution.
- To acquire Student cognitive skills through thinking and problem solving.
- To become Student responsible for their own learning through solutions of assignments and time management.

Course Title:	Linear Algebra
Course Code:	Math 241
Credit Hours:	3
Prerequisite:	Basics of Mathematics Math 251

Learning Objectives:

-Let the student know the basic topics of linear algebra such as matrices, vector spaces.
-Let the student acquire solution linear equations in variables
-Let the student learn how to find Eigen values and eigenvectors

Course Title:	**General Statistics**
Course Code:	Stat 201
Credit Hours:	4

Learning Objectives:
Student knows the importance of Statistics in all Sciences. Student acquires knowledge by learning new theories, concepts and methods of collection and Presentation Of Statistical Data by different ways, calculate some Measures of Central Tendency, measures of dispersion, Correlation and Regression. Student studies The main Principles of Probability, random variables and some Statistical Distributions. Student becomes responsible for their own learning through solutions of assignments and time management

Course Title:	Differential Equations(2**)**
Course Code:	Math 305
Credit Hours:	3
Prerequisite:	**Differential Equations 1 Math 204**
Learning Objectives:	
1- Let the student present the importance and applications of the differential equations in Physics, Chemistry and Engineering Science 2- Let the student study the methods for solving ODE, series solution, solutions by Laplace transform. 3- Let the student acquire the concept of nonlinear differential equations.	

Course Title:	Real Analysis1
Course Code:	Math 311
Credit Hours:	3
Prerequisite:	Fundamentals of integral calculus (Math 200), Basics of Mathematics Math 251
Learning Objectives:	
To develop andgeneralize techniques studied in Calculus 1 in IR and to master theoretical subtleties such as uniform convergence and uniform continuity… **At the completion of this course, the successful student will have demonstrated these abilities:** • **The ability to understand both abstract and concrete mathematical reasoning.** • **The ability to differentiate between sound mathematical reasoning, flawed reasoning, and non-rigorous reasoning.** • **The ability to use the basic tools and methods of proof seen in analysis, in particular set theory and epsilon-delta and epsilon-n arguments.** • **The ability to formulate and prove theorems that arise from the definitions and concepts of the course content, and the ability to apply those theorems to specific examples.** • **The ability to write up, and occasionally present orally, one's mathematical proofs and arguments in a clear and compelling manner.**	

Course Title:	Probability Theory ن
Course Code:	Stat. 311
Credit Hours:	3 hrs
Prerequisite:	General Statistics (Stat 201)

Learning Objectives:
-The course aims to enable students to apply the fundamentals of probability theory. -The course Provide students with the required knowledge of random variables (Discrete and continuous), bivariate and multivariate random variables in addition to the applications of moment generating function and its use - The course aims to teach students the meaning of the continuous probability distributions and their applications as well as derivations of their means and variances

Course Title:	**Abstract Algebra 1**
Course Code:	**Math 342**
Credit Hours:	**3**
Prerequisite:	Basic of mathematics – Math 251
Learning Objectives:	
1- Let the student present the basic definitions in abstract algebra, Let the student study the algebraic structures with one binary operation (groups). 2- Let the student acquire the ability of the student to abstract and logic thinking, and Let the student development the ability of the student to dealing with the abstract proofs. 3- Let the student study the proofs in abstract algebra and methods of solution, and they acquires cognitive skills through thinking and problem solving.	

Course Title:	Partial differential equations
Course Code:	Math 406
Credit Hours:	3
Prerequisite:	Differential equations : *MATH305*
Learning Objectives:	
- Student knows that partial differential equations may be derived by the elimination of arbitrary constants and functions, and methods for finding the complete and general solutions of linear partial differential equations of order one, also the complete and singular solutions for non-linear PDEs. - Student studies some applications in physics , for example, D'Alemberts formula for a string. - Student learns how can expand a function by using the Fourier series to use it to find the solutions of some kinds of PDEs by using the method of separation of variables. - Training student to acquire the ability to analyze and think logically to find solutions to the problems and natural phenomena.	

Course Title:	Abstract Algebra(2)
Course Code:	Math 343
Credit Hours:	3
Prerequisite:	Abstract Algebra (1): Math 342
Learning Objectives:	

- Let the student teach the basic definitions in abstract algebra, and to study the algebraic structures with two binary operation(rings and fields).
- Let the student development the ability of the student to abstract and logic thinking, and to development the ability of the student to dealing with the abstract proofs
- Let the student study the proofs in abstract algebra and methods of solution, and they acquires cognitive skills through thinking and problem solving.

Course Title:	Introduction to numerical analysis
Course Code:	MATH 334
Credit Hours:	3
Prerequisite:	STAT 201; MATH 203
Learning Objectives:	
- Let the students know how to differentiate and integrate numerically. - Let the students study the method of iterations for solving nonlinear equations of one variable. -Let the students illustrate numerical methods by using the numerical analysis software and computer facilities.	

Course Title:	Introduction to Operation Research
Course Code:	Math 340
Credit Hours:	2
Prerequisite:	Advanced Calculus : Math 203
Learning Objectives:	
- Let the student know the importance of the operation research in practical life problems. - Let the student acquire knowledge by learning, algorithms, and methods of solution in mathematical programming. - Let the student learn the methods of solving linear programming and transportation model.	

Course Title:	Mathematics and Packages Programs
Course Code:	Math 333
Credit Hours:	3
Prerequisite:	Fundamentals of integral calculus (Math 200) and General statistics(Stat 201)
Learning Objectives:	
1. Summary of the main learning outcomes for students enrolled in the course. - Learnthe link betweenthe computerandmathematics. - The studentknowsthe importance ofusingcomputer softwareinthe variousbranches of mathematics, statistics, physics, chemistry, engineering and science. - The student learn how construct a program from a build in functions to solve different problems.	

Course Title:	Integral Equations
Course Code:	MATH 408

Credit Hours:	3
Prerequisite:	Differential equations : *MATH305*, Real Analysis 1 (Math311)
Learning Objectives:	
The course aims to provide the students with the a new concept of equations differ from the well-known differential equations, the integral equations.	

Course Title:	Complex Analysis 1
Course Code:	MATH 413
Credit Hours:	3
Prerequisite:	Real Analysis1 Math 311
Learning Objectives:	
1-Let the student's present importance of the complex variables theory. 2- Let the students analyze the Properties of the functions in complex variables 3- Let the students illustrate some applications of the complex Theory	

Course Title:	General Topology
Course Code:	MATH 464
Credit Hours:	3
Prerequisite:	Basic of mathematics – Math 251, Real Analysis1 Math 311
Learning Objectives:	
- To let the student deal with abstract mathematical concepts - To let the student develop the skills of writing clear and precise proofs. - To let the student study topological spaces and metric spaces - To let the student study the definitions of continuous, connectedness, compactness.	

Course Title:	History of mathematics among the Arabs and Muslims
Course Code:	MATH 481
Credit Hours:	3
Prerequisite:	
Learning Objectives:	
-To allow the student understandthe historical development of mathematics -To allow the student emphasize the role of Arabs and Muslims in development of mathematics. And their role in the transfer and translation of ancient scientific heritage, and whether scientists West. -To provide the student with Knowledge of systems numbers Babylonian and ancient Egyptian, Greek and Hindi. -To allow the student learn some calculations on these systems and the conversion from one system to another. -To allow the student identify the geniuses of the nations that have contributed to the development of mathematics	

Course Title:	Discreet Mathematics

Course Code:	MATH 462
Credit Hours:	3
Prerequisite:	Basics of Mathematics Math 251
Learning Objectives:	
- To provide the student with knowledge of logical thinking - To provide the student with the basic concepts discrete mathematics - To teach student how to apply software on these topics	

Course Title:	Differential Geometry
Course Code:	Math 463
Credit Hours:	3
Prerequisite:	Math 204, Math 305
Learning Objectives:	
Students who are successful in this course will improve in the following general education areas: - differential geometry (with an emphasis on curvature), - Surfaces in E^3 - Geodesics: Christoffel symbols. We will spend about half of our time on the theories of curves and surfaces in E^3.	

Course Title:	Functional Analysis
Course Code:	MATH 462
Credit Hours:	3
Prerequisite:	Linear Algebra 1: *MATH241*, Real Analysis 1 (Math311)
Learning Objectives:	
- To allow the student study the theoretical spaces. - To allow the student acquire some properties of sequences that are defined on the theoretical spaces.	

Course Title:	Linear Algebra 2
Course Code:	Math 342
Credit Hours:	3
Prerequisite:	Linear Algebra 1 (MATH 241).
Learning Objectives:	
- To let the student know how to convert linear equations to matrix and vice versa. - To let the student learn how to find the specific and distinctive values and vectors of matrices. - To let the student identify the different types of matrices there characteristics.	

Course Title:	Complex Analysis 2
Course Code:	MATH 414

Credit Hours:	3
Prerequisite:	Complex Analysis 1, Math 413
Learning Objectives:	
1- Let the students study some other complex functions. 2- Let students explain Cauchy ‘s integral formulas. 3- Let the students acquire the concept of series and residues.	

Course Title:	Numerical Analysis and Applications
Course Code:	MATH 434
Credit Hours:	3
Prerequisite:	Introduction to Numerical Analysis (Math 334)
Learning Objectives:	
-To allow student know how to use iterative methods to solve systems of linear equations. -To allow student know how to use numerical methods to solve ordinary differential equations first and second order. -To let the student understand the direct and approximate methods to solve the Eigen-value problems	

Course Title:	Euclidean and non-Euclidean Geometry
Course Code:	MATH 465
Credit Hours:	3
Prerequisite:	Math 261
Learning Objectives:	
1-Let the student understand the mathematical structure of Euclidean and Non-Euclidean Geometry. 2-Let the student know all the elements and the Axioms of Euclidean Geometry. 3-Let the student understand the congruence for sides and angles in a triangle 4-Let the student understand and prove some theories and results of geometry 5- Let the student solve the general problems and see their applications in geometry	

Course Title:	Special Functions
Course Code:	Math 427
Credit Hours:	3
Prerequisite:	Math 413 & Math 311
Learning Objectives:	
1- Let the students acquire the concept of some special functions.	
2- Let students explain the relation between Gamma and Beta functions.	

3- Let the students study the usage of Chebyshev polynomial and hypergeometric functions in solving differential equations.

Course Title:	Financial Mathematics
Course Code:	Math 332
Credit Hours:	3
Prerequisite:	Completion of the Math-200 course.
Learning Objectives:	
1- Let the student present the importance and applications of the financial mathematical. 2- Let the student study the methods for evaluating the simple and compound interests. 3- Let the student acquire the concepts of rate of return and insurance.	

Course Title:	Real Analysis 2
Course Code:	Math 312
Credit Hours:	3
Prerequisite:	Calculus 1 – Real analysis 1
Learning Objectives:	
To develop and generalize techniques studied in Real Analysis 1 (Math 311) and Calculus 1 (Math 101) in IR to IRp and to master theoretical subtleties such as uniform convergence and uniform continuity…	

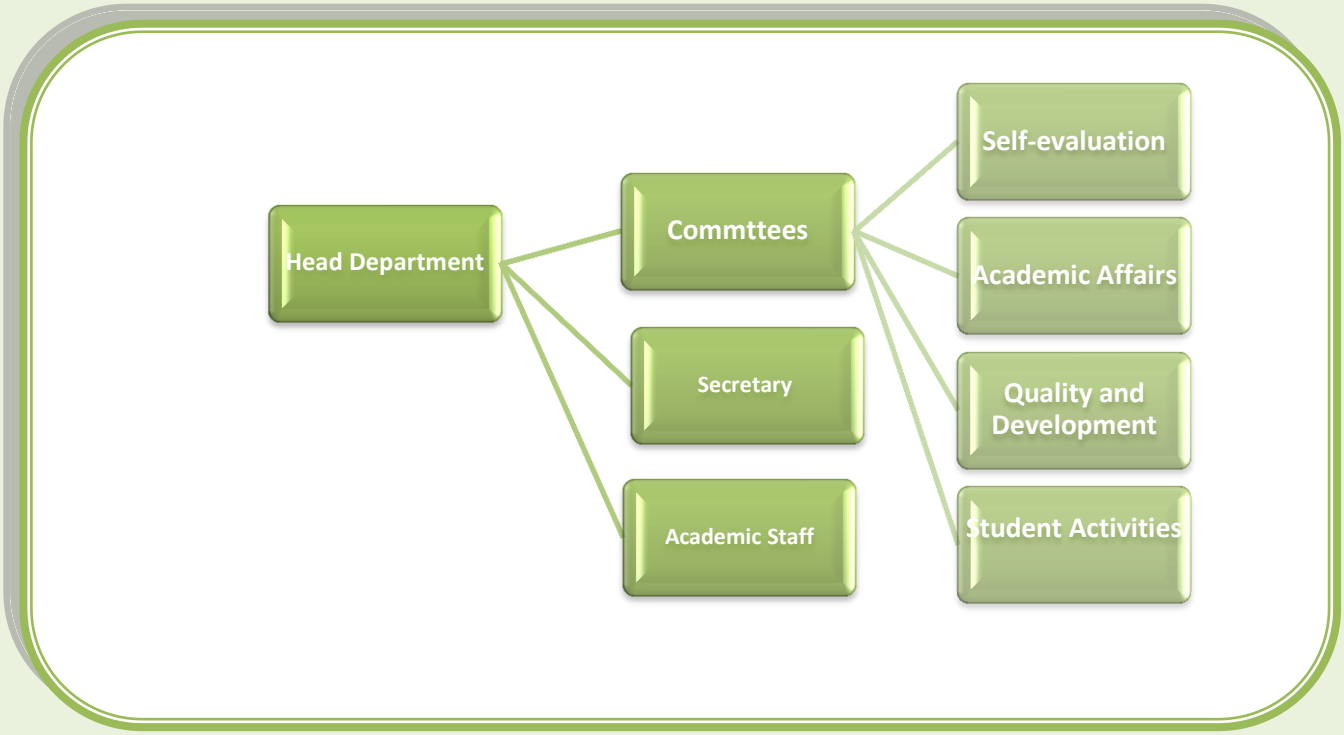
Course Title:	**Applied Mathematics**
Course Code:	**Math 332**
Credit Hours:	**3 hours**
Prerequisite:	**Math 200**
Learning Objectives:	
• Representation of Some different topics from applied mathematics. • Show the notion offunctions. • Recognize scalar and vector function. • Studying the calculus of vectors and its applications. • Studying the calculus of tensors and its applications • Studying analysis of stress and strain. • Outline connection between stress and strain.	

Activities:

- Supporting education classes
- Lectures in research method and report writing

- Research activities for the academic staff members in the field of education, scientific and social researches.
- Participations of the staff member in the college's activities such as workshops, training programs and cultural lectures.
- Department of Mathematicsaspiresnow to get the Academic Accreditation.

Department Organizational Structure



Staff Members:

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