



# Course Specifications

<b>Course Title:</b>	<b>CALCULUS 1</b>
<b>Course Code:</b>	<b>Math 101 T (Taught in English)</b>
<b>Program:</b>	<b>College of sciences program which including scientific track.</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours: <b>3Credits (2Theoretical+2 Tutorial)</b>
2. Course type a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>1st level/ 1st year</b>
4. Pre-requisites for this course: <b>None</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Functions (the concept of relationships and functions - inverse functions - the composition function), limits (The concept of the limit of a function - theorems on limits), continuity (definition of a continuous function - theorems on continuity), derivatives (definition of derivative - derivatives theorem - derivative of algebraic and trigonometric functions and inverse trigonometric functions, implicit and successive derivation - applications on derivatives For the function – graph of functions) - Roll theory and the mean- value theorem. Integration (definition of integration - definite and indefinite integration - some integration methods). Use program packages such as Mathematica, MATLAB or Maple in some scheduled topics if possible.

### 2. Course Main Objective

- Understanding the numerical and algebraic mathematical basics.
- Acquiring the skills of numerical and algebraic mathematics.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1.0	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics.	K1
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	K2
1.4	Use mathematical definitions and formulas in thinking and logical processes	K4
2.0	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3.0	<b>Competence:</b>	
3.1	None	

## C. Course Content

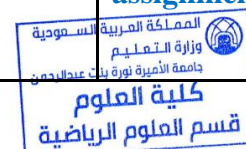
No	List of Topics	Contact Hours
1	Function- -inverse functions-composition functions	8
2	Limits	8
3	Continuity	4
4	The Derivative: derivative definition- theorems on derivatives- derivatives of algebraic, trigonometric and inverse functions	12
5	Implicit and higher derivatives	4
6	Roll's theorem, Mean-value theorem	12
7	Some formulas of integration.	12
Total		60



## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.1	Describe knowledge of mathematics and statistics.	Interactive lectures, discussions and conversations, cooperative learning, Guided discovers, e-learning, Brainstorm, Problems solving.	Quizzes Mid-term exams and final exam Homework assignments
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	Interactive lectures, discussions and conversations, cooperative learning, Guided discovers, e-learning, Brainstorm, Problems solving.	Quizzes Mid-term exams and final exam Homework assignments
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lectures, discussions and conversations, cooperative learning, Guided discovers, e-learning, Brainstorm, Problems solving.	Quizzes Mid-term exams and final exam Homework assignments
2.0	<b>Skills:</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures, discussions and conversations, cooperative learning, Guided discovers, e-learning,	Quizzes Mid-term exams and final exam Homework assignments



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Brainstorm, Problems solving.	
3.0	Competence:		
None			

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Short exams	5 <sup>th</sup> , 11 <sup>th</sup>	15%
2	First and second Midterm exam	8 <sup>th</sup> , 12 <sup>th</sup>	35%
3	Homework Assignment and class participations	weekly	10%
4	Final examination	After week 15	40%

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	H. Anton, I. Bivens, and S. Davis, Calculus: Late Transcendental Single and multivariable, 8th Edition, John Wiley and Sons (2005)
Essential References Materials	Earl W. Swokowski Calculus with analytic geometry, Pws-KENT Publishing Company 1988.  Smith, R. T. and Minton, Calculus Early Transcendental Function, Mc Graw Hill. Third Edition. إبراهيم سرميني، سلمان السلطان. (١٤٢٥). تطبيقات في حساب التفاضل والتكامل. - الطبعة الثانية .
Electronic Materials	Determined by the Professor of the course at the time
Other Learning Materials	Insert any other educational materials such as mathematical software such as: (Matlab, Mathematica and Maple)

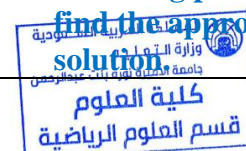


## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	Computers and data show.
<p><b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	Determined later depending on the new circumstances

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students	Survey
Verifying of achievement of course learning outcomes	Program quality and accreditation unit	Learning outcomes matrix General students level
Verifying standards of student achievement.	Independent member teaching staff	<p>1- Check marking by an independent member teaching staff of samples of student work.</p> <p>2- Exchanging periodically to mark exams or a sample of assignments with faculty members</p>
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members inside the institution, students, program and collage quality	<p>1- Periodic review of courses by faculty members to discuss recurring problems to find the appropriate solution</p>



		2- Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019





<b>Course Title:</b>	<b>CALCULUS 2</b>
<b>Course Code:</b>	<b>Math 102 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours: <b>4 Credit hours (3 Theoretical+2 Tutorial)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>The 2<sup>nd</sup> Level / 1<sup>st</sup> year</b>
4. Pre-requisites for this course: <b>Calculus (1), Math 101T</b>
5. Co-requisites for this course: <b>None</b>

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Integration ( The indefinite integral-Integration by substitution for indefinite integral- The definition of area as a limit- Definition of definite integration and Riemann sum- The fundamental theory of integration and the theory of mean value of integration.- Evaluating definite integrals by substitution-Definition of exponential and logarithmic functions- Derivative and integrals involving logarithmic functions- Derivative and integrals involving logarithmic functions - Derivative and integrals involving exponential functions- Derivative and integrals involving inverse trigonometric functions-Definition of hyperbolic and inverse hyperbolic functions and their integrals and derivatives- An overview of integration methods- Integration by parts and reduction formula- Trigonometric substitutions- Integration rational functions by partial fractions)- Indeterminate forms ( L'Hopital rule.- applications on improper integrals)-Integration applications (Area and volumes of surfaces of revolution and length of curve for given functions)- Numerical integration (Trapezoidal rule - Simpson rule). Use program packages such as Mathematica, Matlab or Maple in some scheduled topics.

### 2. Course Main Objective

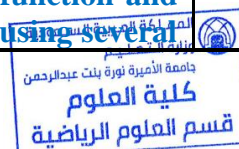
- The ability to solve problems by using numerical and algebraic mathematical skills and high thinking skills in solving biomathematical and social problems
- Develop mathematical and logical reasoning skills in dialogue with full analyzing of results.
- Acquiring the skills of communication, using mathematical programs, developing computer to stimulate mathematical thinking and solving mathematical issues.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	The use of mathematical concepts and laws in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3.0	<b>Competence</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	C.1

## C. Course Content

No	List of Topics	Contact Hours
1	Definition of the definite and indefinite integrals of the function and calculating the integrals and Riemann sum of functions using several	10



	theorems- fundamental theorem of calculus for integrals (I, II) and the mean value theorem for integrals.	
2	Definition of exponential and logarithmic functions and their derivatives-logarithmic differentiation Integrals of several functions such as (polynomials, trigonometric, exponential, logarithmic functions, hyperbolic functions, and inverse trigonometric, inverse hyperbolic functions).	15
3	Integration by substitution, integration by parts, partial fraction decomposition, Trigonometric substitutions.	20
4	Indeterminate values for applying L'Hopital rule to find limits, and apply it for improper integrals.	10
5	Area - volume of revolutions -and the arc length of several functions.	15
6	The numerical integrals such that Trapezoidal, midpoint and Simpsons rules.	5
<b>Total</b>		<b>75</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lectures, discussions and conversations, brainstorm, problems solving.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures, discussions and conversations, brainstorm, problems solving.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	Discussions in classes	Follow up the homework assignments and exams



## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Short exams	The 6 <sup>th</sup> and 11 <sup>th</sup> week	20%
2	First and second Midterm exam	The 8 <sup>th</sup> and 13 <sup>th</sup> weekly	35%
3	Homework Assignment	After the 15 <sup>th</sup> week	5%
4	Final examination		40%

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	H. Anton, I. Bivens, and S. Davis, Calculus: Late Transcendental Single and multivariable, 10th Edition, John Wiley and Sons (2013)
Essential References Materials	Earl W. Swokowski Calculus with analytic geometry, Pws-KENT Publishing Company 1988. Smith, R. T. and Minton, Calculus Early Transcendental Function, Mc Graw Hill. Third Edition. إبراهيم سرميني، سلمان السلطان. (١٤٢٥). تطبيقات في حساب التفاضل والتكامل. - الطبعة الثانية .
Electronic Materials	Determined by the Professor of the course at the time



<b>Other Learning Materials</b>	<b>Mathematical software such as: Matlab, Mathematica and Maple</b>
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## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>Computers devices and data show.</b>
<b>Other Resources</b>	<b>Will be determined later in the light of the new.</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
<b>Course and teaching effectiveness</b>	<b>The Students</b>	<b>Survey</b>
<b>Verification of the learning outcomes of the course</b>	<b>Program quality Accreditation unit</b>	<b>Learning outcomes Matrix The General level of the students</b>
<b>Verification of the student achievement criteria</b>	<b>Independent faculty members from within the University</b>	<ol style="list-style-type: none"> <li>1. Checking the marking of a sample of students' work</li> <li>2. Exchange periodically to marked exams with faculty members.</li> </ol>
<b>Planning procedures for periodic review of</b>	<b>Faculty members from inside the university Students</b>	<b>1 - Periodic review of the courses by faculty members to discuss recurring</b>



Evaluation Areas/Issues	Evaluators	Evaluation Methods
the effectiveness of the course and planning for its development	Quality management in the department or the college	problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019





<b>Course Title:</b>	<b>Foundations of Mathematics</b>
<b>Course Code:</b>	<b>Math 131 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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<b>G. Course Quality Evaluation .....</b>	<b>7</b>
<b>H. Specification Approval Data .....</b>	<b>8</b>



## A. Course Identification

1. Credit hours:	4 Credit hours (contact hours: 3 Theoretical + 2 Exercises)		
2. Course type			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
3. Level/year at which this course is offered:	2 <sup>nd</sup> Level/ 1 <sup>st</sup> year		
4. Pre-requisites for this course (if any):	None		
5. Co-requisites for this course (if any):	None		

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

1. Course Description
Principles of mathematical logic and methods of proof, groups and relationships, applications, binary operations, groups, loops and fields.
2. Course Main Objective
1. Ability to formulate Mathematical Sentences.
2. Understand the principles of the Mathematical Logic.
3. Understand proofing methods and ability to choose and evaluate the best method to use when applying.
4. Assimilation some advanced concepts in Algebra.



### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs.	S.2
2.4	Illustrate an ability to communicate effectively with a range of audiences.	S.4

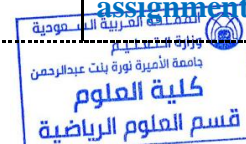
### C. Course Content

No	List of Topics	Contact Hours
1	Elementary mathematical logic and Methods of proof	20
2	Sets and Relations	15
3	Mappings and Binary operations	15
4	Groups, Rings and Fields	15
5	Revision	10
<b>Total</b>		<b>75</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	Interactive lecture, discussion and conversation, brainstorm, presentations	Written exams, oral exams, class assignments, homework assignments, class discussions,
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lecture, discussion and conversation, brainstorm, presentation	Written exams, oral exams, class assignments, homework assignments, class discussions
2.0	<b>Skills</b>		
2.2	Apply appropriate tools and processes, using advanced	Interactive lecture, discussion and conversation,	Written exams, oral exams, class assignments,



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	mathematics and computer programs.	brainstorm, Presentations.	homework assignments, class discussions
2.4	Illustrate an ability to communicate effectively with a range of audiences.	Presentations conversation, brainstorm, Practical training.	class assignments class discussions,

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Two Quizzes	(4 <sup>th</sup> and 9 <sup>th</sup> ) week	%10
2	Two Midterm exams	(7 <sup>th</sup> and 12 <sup>th</sup> ) week	%40
3	Homework Assignment	Weekly	%10
4	Final examination	After week 15	%40

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	معروف سمحان و فدوى أبو مريفة أسس الرياضيات. مطبوعات الخريجي. الطبعة الثانية (٢٠٠٦م).
Essential References Materials	سلمان السلطان. مقدمة في البنو الجبرية. مطبوعات جامعة الملك سعود الطبعة الخامسة Ian Stewart and David Tall, Foundations of Mathematics , Oxford University Press 1977
Electronic Materials	Will be determined later according to the course instructor
Other Learning Materials	Include any other learning materials such as software, programming and CDs: Mathematica, Mable, or MATLAB software



## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	<p>Computers devices and data show.</p>
<p><b>Other Resources</b></p>	<p>Will be determined later in the light of the new.</p>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.

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Evaluation Areas/Issues	Evaluators	Evaluation Methods
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

#### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Analytical Geometry</b>
<b>Course Code:</b>	<b>Math 171 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman</b>



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## A. Course Identification

1. Credit hours: <b>4 Credit hours (3 Theoretical + 2 Exercises)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>The 2<sup>nd</sup> Level / First year</b>
4. Pre-requisites for this course (if any): <b>None</b>
5. Co-requisites for this course (if any): <b>None</b>

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	<b>75</b>	<b>100%</b>
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	<b>45</b>
2	Laboratory/Studio	
3	Tutorial	<b>30</b>
4	Others (specify)	
	Total	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	<b>15</b>
2	Assignments	<b>5</b>
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	Total	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

The general equation of the second-degree curves with two variables - the general picture of the cone-cutting equations (ellipse - circle - hyperbolic - parabola - straight pairs) - determine the type of curve using the characteristic equation. - Coordinates in the triple space: polar coordinates - Cartesian coordinates in the space - cylindrical coordinates - spherical coordinates. - vectors in plane and space - algebraic operations on vectors - standard and directional multiplication - triple multiplication - Level in the space: the different images of the level equation in the space - the systemic equation of the level - the positions of two levels - after a point from the level - the angle between two levels.

- The rectangle in the space: the different images of the equation of a straight in the space - the equation of the rectum arising from the intersection of two levels - the relative position of two rectangles in the space - the angle between the two straight and the orthogonal condition - the position of the straight and level - the angle between the straight and level and orthogonal condition.

- The ball in the triple space: the general equation of the equation of the ball in terms of the center and the radius - different cases to show the equation

Quadrature surfaces in the triangular space: ellipse, second-degree cone, single-section hyperbolic scale, two-section hyperbolic scale, ellipse, hyperbolic parabolic scale, cylinders.

### 2. Course Main Objective

1. Highlight the importance of analytical geometry in the representation of geometric shapes in plane and triple space
2. Sensing problems and providing solutions to them by practicing higher-order thinking skills, analyzing, interpreting and discussing results and information.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.2	Determine the Outline of Mathematics and Statistics: Principles, theories and mathematical models	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	Skills :	
2.2	Apply appropriate tools and processes, using advanced mathematics	S.2

## C. Course Content

No	List of Topics	Contact Hours
1	The general equation of the second degree curves with two variables - the general picture of the cone-cutting equations (ellipse - circle - hyperbolic - parabola - straight pairs) - determine the type of curve using the characteristic of the equation.	10



2	Coordinates in triple space: polar coordinates and some curves in polar coordinates - Cartesian coordinates in the space (distance between two points - directional angles and directional cosine pockets - angle between two lines - find the point dividing the distance between two points by a certain percentage) - cylindrical coordinates - spherical coordinates	12.5
3	Vectors in plane and space - Algebraic operations on vectors - Standard and directional multiplication - Triple multiplication	5
4	Level in the space: the different images of the level equation in the space - the systemic equation of the level - the positions of two levels - .a point after the level - the angle between two levels	15
5	Rectal in space: Different images of a straight equation in a space - a rectal equation arising from the intersection of two planes - the relative position of two rectangles in the space - the angle between two lines and their orthogonal condition - the straight and level position - the angle between a straight, level and orthogonal condition	15
6	For a ball in the triple space: the general equation for the equation of the ball in terms of center and radius - the different states of the equation statement $Ax^2 + Ay^2 + Az^2 + Gx + Hy + Iz + J = 0$	5
7	Quadrature surfaces in the triangular space: ellipse, second-degree cone, single-section hyperbolic scale, two-section hyperbolic scale, ellipse, hyperbolic parabolic scale, cylinders.	12.5
<b>Total</b>		<b>75</b>

#### D. Teaching and Assessment

##### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Determine the Outline of Mathematics and Statistics: Principles, theories and mathematical models	Interactive lectures Brainstorming Discussion dialogue Presentations Problem solving	Written and oral tests (quizzes, midterms, final) – class work – homework
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Brainstorming Discussion Dialogue Problem solving Presentations	Written and oral tests (quizzes, midterms, final) – class work – homework
2.0	<b>Skills</b>		



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.2	Apply appropriate tools and processes, using advanced mathematics	Interactive lectures Brainstorming Discussion dialogue Presentations, Problem solving	Written and oral tests (quizzes, midterms, final) – class work – homework

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Short quizzes in the end of each chapter	The 3 <sup>rd</sup> , 6 <sup>th</sup> , 9 <sup>th</sup> , 12 <sup>th</sup> week	10 %
2	Midterm exam	13 <sup>th</sup>	35%
3	Search or any activity in the class for students divided groups	Term is divided for student groups	5 %
4	Homework and exercises	Every week	10 %
5	Final exam	After the 15 <sup>th</sup> week	40 %

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	الهندسة التحليلية للجامعات والمعاهد العليا د. علي محمد عوين و د. أحمد صادق القرمانى
Essential References Materials	المساعد فى الهندسه التحليلية مستوية ومجسمه. د.أروى الشيبانى ود.سارة العريفى. H,Anton , Calculus :Late transcendental , 9 <sup>th</sup> ed, John Wiley, 2005. Analytic Geometry – Maria M. Roberts and Julia T. Colpitts.
Electronic Materials	Determine by the Lecturer of the course



## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	<p>Computers and data show.</p>
<p><b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	<p>Will be determined later according to the new circumstances</p>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what



Evaluation Areas/Issues	Evaluators	Evaluation Methods
		is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

#### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Calculus (3)</b>
<b>Course Code:</b>	<b>Math 203 T</b>
<b>Program:</b>	<b>Bachelors of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical Science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours:	4 Credit hours (contact hours: 3 Theoretical + 2 Exercises)			
2. Course type				
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>	Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>		
3. Level/year at which this course is offered:	3 <sup>rd</sup> Level -2 <sup>nd</sup> year			
4. Pre-requisites for this course (if any):	Math 102T, Math 171 T			
5. Co-requisites for this course (if any):	None			

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Functions in several variables: endings and connectivity - partial derivation, implicit derivation, minimum and maximum values, Lagrange multiplications - integrals of functions in two variables and three variables - applications to find surface areas and volumes Power series, Taylor and McCluren series.

Use of software packages such as Mathematica, MATLAB or Maple in some course topics.



## 2. Course Main Objective

- Understand the concept of the function in one variable and in several variables and find their derivatives, their maximum values and integrations.
- Understanding the convergence of sequences and series also, training in methods of testing and the relationship between functions and power series.
- Acquiring skills in the use of some software such as Mathematica, MATLAB or Maple.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models.	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability..	S.3
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	C.1

## C. Course Content

No	List of Topics	Contact Hours
1	Function of several variables, domain, limits, continuity,	10
2	partial derivatives, implicit derivatives, extreme values of functions, Lagrange Multipliers.	15
3	Integrations of functions of several variables, double integral in xy-coordinates, and polar coordinates, triple integrals in rectangular, cylindrical and spherical coordinates. Jacobian in 2-variables	20
4	An application, find area and volume by double and triple integrals	5
5	Sequences, Monotone sequences, convergent and divergent sequences, series, divergence and convergence tests for series,	15
6	Taylor, McLaurin and Power Series, Radius of convergence and convergence of power series, present a function by a power series, practical ways to find Taylor series of functions at given point.	10
<b>Total</b>		75

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models.	Interactive lectures Discussions and conversations Brainstorm	Written exams (quizzes, midterm, final)



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Presentations.	class assignments, homework assignments, class discussions.
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Discussions and conversations Brainstorm Presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures Discussions and conversations Brainstorm Presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish certain goals.	Interactive lectures Discussions and conversations Brainstorm Presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Two short quizzes	The 5 <sup>th</sup> and 7 <sup>th</sup> week	15%
2	First and second Midterm exam	The 10 <sup>th</sup> and 14 <sup>th</sup> week	40%
3	Homework Assignment	weekly	5%
4	Final examination	After week 15	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (half of teaching load of the staff member), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members.



through her site on the web.

- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	H. Anton, I. Bivens, and S. Davis, Calculus:Late Transcendental Single and multivariable, 8th Edition, John Wiley and Sons (2005)
<b>Essential References Materials</b>	1- Earl W. Swokowski Calculus with analytic geometry, Pws-KENT Publishing Company 1988. 2- Smith, R. T. and Minton, Calculus Early Transcendental Function, Mc Graw Hill. Third Edition -إبراهيم سرميني، سلمان السلطان. (1425). تطبيقات في حساب التفاضل والتكامل . الطبعة الثانية
<b>Electronic Materials</b>	Will be determined according to course instructor
<b>Other Learning Materials</b>	Mathematical software such as: Mathematica and MATLAB.

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers devices and data show.
<b>Other Resources</b>	Will be determined later in the light of the new.



## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Calculus (4)</b>
<b>Course Code:</b>	<b>Math 204 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical Science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>

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## A. Course Identification

1. Credit hours:	4 Credit hours (3Theortical+ 2 Practical)		
2. Course type			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
3. Level/year at which this course is offered:	4 <sup>th</sup> Level / 2 <sup>nd</sup> year		
4. Pre-requisites for this course (if any):	Calculus (3) Math 203T		
5. Co-requisites for this course (if any):	None		

## 6. Mode of Instruction

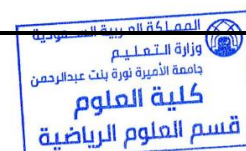
No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

1. Course Description
<ul style="list-style-type: none"> <li>The student will study vector-valued functions, and do all its calculation.</li> <li>Students will generalize the vector valued function to vector field with some applications about work and area.</li> <li>In this course the student will study Green theory- Stoke theory- divergence theory- Tensors</li> <li>The student will analyze a problem through a mathematical methods and learn to use some mathematical programs</li> </ul>



## 2. Course Main Objective

1. Understand the concept of vector valued functions.
2. Knowledge and conclusion of the generalization of directional functions through the study of fields and use in different applications such as work, area.
3. Study some special theories such as Green and Stokes theory and an introduction to the extensions.
4. Realizing the problems and giving solutions to practice higher thinking skills, and analyze, with using some computer software such as Maple, Mathematica or MATLAB.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.3	State theorems of mathematics with their proofs	K.3
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
2.5	Demonstrates an ability to use current mathematical: techniques, software, skills, and tools necessary for analyzing real life problems.	S.5

## C. Course Content

No	List of Topics	Contact Hours
1	Vector function,	7.5
2	Vector-valued functions calculus.	7.5
3	Movement in space– velocity, speed and acceleration.	5
4	Vector field calculus: gradient, divergent and curl	10
5	Line integral, Surface integral, Green's theorem, Stock's theorem and Divergent theorem	20
6	Tensors :N-dimension vector field , Coordinate Transformations, contra variant and covariant vectors.	5
7	Contra variant, covariant and mixed tensors, tensors with rank more than 2 and basic operations on tensors.	5
8	Christoffel symbols and rules of its transformation.	5
9	Covariant derivatives	5
10	Gradient ,divergent and curl for tensors	5
Total		75

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.3	State theorems of mathematics with their proofs	Interactive lectures Discussions and conversations Brainstorm Presentations.	Exams: Quizzes, midterm and Final exam Homework Class discussions
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Discussions and conversations Brainstorm Presentations.	Exams: Quizzes, midterm and Final exam Homework Class discussions
<b>2.0</b>	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures Discussions and conversations Brainstorm Presentations.	Exams: Quizzes, midterm and Final exam Class discussions
2.5	Demonstrates an ability to use current mathematical: techniques, software, skills, and tools necessary for analyzing real life problems.	Interactive lectures, Presentations Activities Practical training	Exams: Quizzes, midterm and Final exam Homework Class discussions

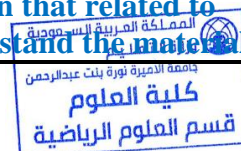
### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Short exams	8 <sup>th</sup> and 12 <sup>th</sup>	15%
2	Midterms 2 times	7 <sup>th</sup> and 11 <sup>th</sup>	40%
3	Homework Assignment	weekly	5%
4	Final examination	After week 15	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material



and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	H. Anton, I. Bivens, and S. Davis, Calculus: Late Transcendental Single and multivariable, 8th Edition, John Wiley and Sons (2005)
<b>Essential References Materials</b>	1- A Student Guide to Vectors and Tensors ,Daniel Fleisch , Cambridge University Press,2012 2- Vector and Tensor Analysis (Monographs and Text books in Pure and Applied Mathemahco ,vol.172) , Eutiquio C.Young, Marced Dekker , Inc.,1992 3- Tensor Calculus: A Concise Course, Barry Spain ,Dover Publications,2003
<b>Electronic Materials</b>	As the teacher decide
<b>Other Learning Materials</b>	Will be determined later according to course instructor

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers devices and data show.
<b>Other Resources</b>	Will be determined later in the light of the new.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Introduction in the Differential equation</b>
<b>Course Code:</b>	<b>Math 222 T</b>
<b>Program:</b>	<b>Bachelors of Science in Mathematical Science</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>

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## A. Course Identification

1. Credit hours: <b>4 Credit Hours.</b> (Contact hours: 3 Theoretical+ 2 tutorial)
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>Level Four, Second year.</b>
4. Pre-requisites for this course (if any): <b>Calculus (2) (Math102 T)</b>
5. Co-requisites for this course (if any): <b>None</b>

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

**Introduction in the Differential equations: Definitions and Terms, Initial value problems, Autonomous First order ODE(s), Differential equations from first order: Separable, Differential equations from first order: linear equations, Exact equations, solutions by substitution, Preliminary Theory-Linear equations: initial and boundary value problems, homogenous and non-homogenous equations, Reduction of order, Homogeneous linear equations with constant coefficients, The methods of undetermined coefficients: Variation of parameters, Cauchy-Euler equations, Solving systems of ODE(s) by elimination, Definition of Laplace transform, Inverse transform and transforms of derivatives.**





## 2. Course Main Objective

- Recognize the important of the Differential equation in basic science such as physics, chemistry and engineering sciences.
- Training student on methods and strategies of solve Differential equation

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills:</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish curtain goals	C.1

## C. Course Content

No	List of Topics	Contact Hours
1	Introduction in the Differential equations: Definitions and Terms, Initial value problems	7.5
2	Autonomous First order ODE(s)	2.5
3	Differential equations from first order: Separable, Differential equations from first order: linear equations.	7.5
4	Exact equations, solutions by substitution	7.5
5	Preliminary Theory-Linear equations: initial and boundary value problems, homogenous and non-homogenous equations. .	5
6	Reduction of order, Homogeneous linear equations with constant coefficients	7.5
7	The methods of undetermined coefficients: Variation of parameters,	10
8	Cauchy-Euler equations	5
9	Solving systems of ODE(s) by elimination.	5
10	Series solutions of ODE(s) about ordinary points.	5
11	Definition of Laplace transform	5
12	Inverse transform and transforms of derivatives.	7.5
Total		75

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
K.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lecture, brainstorm, discussing dialogue and presentation.	Tests ( quizzes, midterms, final) Classroom participations, Homework's.
2.0	<b>Skills:</b>		
S.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lecture, brainstorm, discussing dialogue and presentation.	Tests (quizzes, midterms, final) Classroom participations, Homework's and exercises
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish curtain goals	Cooperative learning, brainstorm, seminars and presentation	Classroom participations, Homework's and exercises.

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz	5th	5
2	Solving home works	weekly	10
3	First midterm	7th	15
	Short exam	10th	10
4	Second midterm	11th	20
5	Final Exam	After week 15	40

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Determining and commit office hours (6 hours per week) with attach lectures schedule and be announced to the students.
- communicating with and asking questions by e-mail to faculty members through her sit or on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course that include helping students to understand the material and



contribute to process of academic advising, and helping students face any problem related to the course either studying or academic problem

## F. Learning Resources and Facilities

### 1. Learning Resources

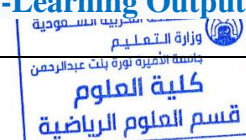
<b>Required Textbooks</b>	D.G.Zill, A first Course in Differential Equations, Cole Pub Co (2008)
<b>Essential References Materials</b>	4- Marcus, Differential Equations, An introduction, Wm.C. Brown Publishers, 1991 5- D. G. Zill, Differential Equations with Computer Lap Experiments, Brooks Cole, 2 edition, 1998. - إبراهيم ديب سرميني و آخرون. (١٤٢٥هـ). مقدمة في المعادلات التفاضلية. مطابع جامعة الملك سعود، - سالم أحمد سحاب، مقدمة في المعادلات التفاضلية، مركز النشر التعليمي، (١٤١٤هـ) - وليم بوليس وريتشارد دبيريما، مبادئ المعادلات التفاضلية، دار جون وايلي و أبناؤه، ١٩٨٣
<b>Electronic Materials</b>	Will be determined later according to the course instructor
<b>Other Learning Materials</b>	Program Software packages such as Maple, Mathematica, MatLab

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	* Classrooms specialized for the lectures , ready for traditional education and online education. This allows for interaction between the teacher and the students in which the number of students varies between (30-40) students. * The seats of the classroom are moveable equipped with wheelchairs so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart whiteboards, there should be a platform speaker with integrated sound system and wired and wireless microphones. * There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computer devices and a data projector.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be mentioned later when required

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix



		-General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees' program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Linear Algebra</b>
<b>Course Code:</b>	<b>Math 241 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical science</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>

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## A. Course Identification

1. Credit hours:	<b>4 Credit hours (contact hours: 3 Theoretical + 2 Exercises)</b>
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	<b>Starting from the 3<sup>rd</sup> Level / 2<sup>nd</sup> year</b>
4. Pre-requisites for this course (if any):	<b>Math 131 T</b>
5. Co-requisites for this course (if any):	<b>Calculus 1(MaSc 101).</b>

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

1. Course Description	<b>Matrices and determinant, Linear equations systems, Vector spaces, Inner product spaces, Linear transformations, Eigenvalues and eigenvectors</b>
2. Course Main Objective	<ul style="list-style-type: none"> <li>• Understand some algebraic basics and the ability to apply them.</li> <li>• Gaining skill of Communication and using mathematical software and computational skills to stimulate mathematical thinking, Understand and solve life matters</li> </ul>



### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
3	<b>Interpersonal Skills &amp; Responsibility:</b>	
3.1	Show an ability to function effectively within teams to accomplish certain goals	C.1

### C. Course Content

No	List of Topics	Contact Hours
1	Matrices and determinant	17.5
2	Linear equations systems	12.5
3	Vector spaces	15
4	Inner product spaces	10
5	Linear transformations	10
6	Eigenvalues and eigenvectors	10
Total		75

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	Interactive lecture Discussion and conversation, Brainstorm, presentations	Written exams, oral exams, class assignments, homework assignments, class discussions
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lecture Discussion and conversation, Brainstorm, presentations	Written exams, oral exams, class assignments, homework assignments, class discussions
2.0	<b>Skills</b>		
2.1	None		





Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish certain goals	Interactive lecture Discussion and conversation, Brainstorm, Presentations Practice	Written exams, oral exams, class assignments, homework assignments, class discussions

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Short exam	5 <sup>th</sup>	5
2	Solving home works	weekly	10
3	First midterm	8 <sup>th</sup>	15
4	Second midterm	12 <sup>th</sup>	20
5	Final Exam	17 <sup>th</sup>	50

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Steven J. Leon, Linear Algebra with application, Person Prentic Hall, Eighth Edition, (2010)
Essential References Materials	-Paul Thamos. Finite Dimensional Vector Space. Springer Verlag H. Anton C. Rorres. Elementary Linear Algebra. John Wiley- W. H. Nicholson. Elementary Linear Algebra. McGraw-Hill- 6- معروف سمحان ، علي السحيباني، فوزي الذكير الجبر الخطي و تطبيقاته. مكتبة العبيكان. الطبعة الثانية. (٢٠٠٦).
Electronic Materials	<a href="http://sakharov.net/foundation.html">http://sakharov.net/foundation.html</a>
Other Learning Materials	Ready Software packages such as programs like Mathematica and MatLab



## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	<p>Computers devices and data show.</p>
<p><b>Other Resources</b></p>	<p>Will be determined later in the light of the new.</p>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.

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Evaluation Areas/Issues	Evaluators	Evaluation Methods
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	General Statistics
<b>Course Code:</b>	Math 261 T
<b>Program:</b>	College of science programs (Bachelors of Mathematical Science, Bachelor of Physics, Bachelor of Chemistry, Bachelor of Biology)
<b>Department:</b>	Department of Mathematical science
<b>College:</b>	Science
<b>Institution:</b>	Princess Nourah bint Abdulrahman University

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## A. Course Identification

1. Credit hours:	3 (Contact hours: 2 Theoretical + 2 Tutorial)
2. Course type	
a.	University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Starting from Second level.
4. Pre-requisites for this course (if any):	Math 101T
5. Co-requisites for this course (if any):	None

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

1. Course Description Introduction (definition of Statistics and its importance), data organization and presentation of data, measures of central tendency, dispersion measures, correlation and regression, introduction of probabilities, binomial and normal distribution, use program packages such as SAS, SPSS, Minitab in some scheduled topics.
2. Course Main Objective <ul style="list-style-type: none"> <li>Recognize conceptual and fundamental basics of descriptive statistics.</li> <li>Understand basic concepts of probability and its applications.</li> <li>Understand and study advanced courses that require knowledge of basic concepts in statistics.</li> </ul>



### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics	K.1
1.2	Identify the outlines in mathematics and statistics: foundations, principles, theories and mathematical models.	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.1	Apply appropriate tools and processes using mathematics, statistics and computer programs.	S.2
3	<b>competence</b>	
	None	

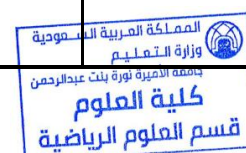
### C. Course Content

No	List of Topics	Contact Hours
1	Data tabulation using frequency distribution and the most important pictorial methods to represent it.	٨
2	Measures of central tendency.	٦
3	Measures of dispersion. (short exam (quiz))	٨
4	Coefficient of correlation.	٤
5	Probability axioms	٤
6	Conditional probability– independent events.	٤
7	Mid-term Exam	٤
8	Discrete random variable and its probability distribution, mathematical expectation and variance.	٤
9	Binomial distribution mean and variance (short exam (quiz))	٤
10	Continuous random variable and its probability distribution mathematical expectation and variance.	٤
11	Normal curve and the area under the density curve, standard normal table,.	٨
<b>Total</b>		60

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
K.1	Describe knowledge of mathematics and statistics	Interactive lectures, brainstorm, dialogue and discussions	Written exams and homework
K.2	Identify the outlines in mathematics and statistics: foundations, principles, theories and mathematical models.		



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
K.4	Use mathematical definitions and formulas in thinking and logical processes		
2.0	Skills		
S.2	Apply appropriate tools and processes using mathematics, statistics and computer programs.	Interactive lectures, dialogue and discussions	Written exams and homework
3.0	Competence		
	None		

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	5th	5
2	Midterm exam	8th	25
3	Quiz 2	10th	5
4	Midterm exam	13th	15
5	Homework Assignment, exercise and computer training	weekly	10
6	Final examination	After 15	40

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	د. عبدالله الشبيحة، د. عدنان بري. مقدمة في الاحصاء والاحتمالات. مكتبة الشقري، ٢٠٠٧ Walpole, R. E., Myers, R. H., and S. L. Myers (2007), Probability and Statistics for Engineers and Scientists, 8th ed., Prentice-Hall, Inc., Upper Saddle River, New Jersey
Essential References Materials	مقدمة في الإحصاء والاحتمالات لمحمد صبحي أبو صالح و عدنان عوض نيويورك: دار جون وايلي وأبنائه ١٩٨٣ Ross, S. (2004), Introduction to Probability and Statistics for Engineers and Scientists, 3rd ed., John Wiley & Sons, New York.
Electronic Materials	Determined by the Professor of the course at the time





<b>Other Learning Materials</b>	<b>Statistical package such as SPSS, SAS, MINITAB</b>
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## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be determining later according to the new circumstances.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	<ul style="list-style-type: none"> <li>-Learning Output Matrix</li> <li>-General level of female students</li> </ul>
Verifying standards of student achievement.	Independent member teaching staff	<ul style="list-style-type: none"> <li>-Checking the correction of a sample of students' work</li> <li>-Exchange periodically to correct tests with faculty member.</li> </ul>
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees program and college	<ul style="list-style-type: none"> <li>-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution.</li> </ul>



		-Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Mathematical Methods</b>
<b>Course Code:</b>	<b>MATH 311 T (Taught by English )</b>
<b>Program:</b>	<b>College of sciences program (Bachelors of Mathematical Sciences)</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours: <b>3 credits (contact hours: 2 Theoretical + 2 Practical)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: <b>Level 6 / Year 3</b>
4. Pre-requisites for this course (if any): <b>Math 222 T + Math 204T + Math 241T</b>
5. Co-requisites for this course (if any): <b>None</b>

### 6. Mode of Instruction (mark all that apply)

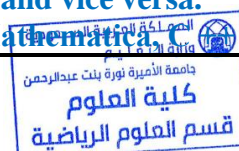
No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours</b>		
1	Study	15
2	Assignments	0
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b>  <b>Inner Product Space. Power series solutions of linear ordinary differential equations with variable coefficients. Conjugating operators. Sturm-Liouville Theory. Special Functions: (Legendre, Hermite, Gamma, Beta, Bessel). General theory of Fourier series and Fourier integration. Laplace transforms. Applications.</b></p>
<p><b>2. Course Main Objective</b></p> <ul style="list-style-type: none"> <li>• Providing students with basic mathematical knowledge and developing creative sense of students.</li> <li>• Introduce to the students the concept of integral equation, the classification of integral equations and how it convert them to differential equations and vice versa.</li> <li>• Acquiring skills to use computer software such as (Matlab, Mathematica, C, ...).</li> </ul>



- Sensing problems with providing solutions by practicing higher-order thinking skills, analyzing, interpreting and discussing results and information.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K4
<b>2</b>	<b>Skills :</b>	
2.1	Develop mathematical and models of real life problems in a way that demonstrates its appropriateness and justification.	S1
2.3	Appraise different methods and techniques of problem solving, assessing their effectiveness and applicability.	S3
<b>3</b>	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish certain goals.	C1

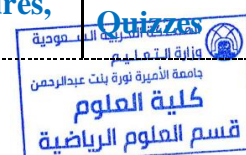
### C. Course Content

No	List of Topics	Contact Hours
1	Solve linear ordinary differential equations with variable coefficients using power series.	14
2	Inner product space and conjugating operators.	10
3	Sturm-Liouville Theory and special functions: Legendre, Hermite, Gamma, Beta, Bessel.	16
4	General theory of Fourier series, Fourier integration and Laplace transform.	14
5	Applications	6
Total		60

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lectures, Brainstorm discussions and conversations presentations	Quizzes Mid-term exams and final exam Homework assignments
<b>2.0</b>	<b>Skills</b>		
2.1	Develop mathematical and models of real life problems in a way that demonstrates its appropriateness and justification	Interactive lectures, Brainstorm discussions and conversations presentations	Quizzes Mid-term exams and final exam Homework assignments
2.3	Appraise different methods and techniques of problem solving,	Interactive lectures, Brainstorm	Quizzes



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	assessing their effectiveness and applicability.	discussions and conversations presentations	Mid-term exams and final exam Homework assignments
3.0	Competence		
3.1	Show an ability to function effectively within teams to accomplish certain goals	Interactive lectures, Brainstorm discussions and conversations presentations	Quizzes Mid-term exams and final exam Homework assignments

## 2. Assessment Tasks for Students

#	Assessment task	Week Due	Percentage of Total Assessment Score
1	Quizzes	7th and 10th weeks	10%
2	First Midterm exam	8th	20%
3	Second Midterm exam	13th	20%
4	Homework Assignment	weekly	10%
5	Final examination	After week 15	40%

## E. Student Academic Counseling and Support

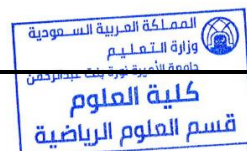
Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	P.P.G. Dyke, An introduction to Laplace Transforms and Flourier Series, Springer Verlag, 2000
Essential References Materials	-Joe D. Hoffman, Numerical Methods for Engineers and Scientists, Marcel Dekker Incorp, 2001. - Richard Lissaman and Elizabeth West MEI Numerical Methods ( MEI Structured Mathematics (A+AS Level) ), (27 Aug 2004) - J.Douglas Faires and Richard Burden Numerical Methods., ( 18 Jul 2000) A First Course in Differential Equations with Modeling - Applications, Dennis G. Zill, Ninth edition
Electronic Materials	Wikipedia, Math world, .... <a href="http://en.wikipedia.or">http://en.wikipedia.or</a>



	<a href="http://www.ams.org">http://www.ams.org</a> <a href="http://www.math.psu.edu">http://www.math.psu.edu</a> <a href="http://www.emis.de/ZMATH">http://www.emis.de/ZMATH</a> <a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a>
<b>Other Learning Materials</b>	Will be determined later according to course instructor

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Determined later depending on the new circumstances.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students	Survey
Verifying of achievement of course learning outcomes	Program quality and accreditation unit	Learning outcomes matrix General students level
Verifying standards of student achievement.	Independent member teaching staff	3- Check marking by an independent member teaching staff of samples of student work. 4- Exchanging periodically to mark exams or a sample of assignments with faculty members
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members inside the institution, students, program and collage quality	3- Periodic review of courses by faculty members to discuss recurring problems to





		<p>find the appropriate solution.</p> <p>4- Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.</p>
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Differential Equations</b>
<b>Course Code:</b>	<b>Math 323 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science.</b>
<b>Department:</b>	<b>Mathematical Science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>

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## A. Course Identification

1. Credit hours:	3 (2 Theoretical + 2 Exercise)
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered:	6 <sup>th</sup> level- 3 <sup>rd</sup> year
4. Pre-requisites for this course (if any):	Math 222 T, Math 204 T and Math 241 T
5. Co-requisites for this course (if any):	None

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Modeling with higher-order differential equations and problems of initial and boundary values of linear equations - Series solutions of linear equations. Solutions about ordinary points. Solutions about singular points, The Laplace transform. Inverse transforms and transforms of derivatives. Operational properties, Homogenous linear systems with constant coefficients using eigenvalues. Variation of parameter method and Matrix exponential.

Basic concepts of integral equations: definition of Classification of Linear Integral Equations: Fredholm Equations - Volterra Equations - Equations (Differential-Integral) - Equivalent Integral Equations.



Convert the Volterra equation to an ordinary differential equation, Solve the integral equation, Conversion of the initial value problems of the Volterra equation - conversion of the boundary value problems of the Friedholm equation, using computer programs such as (Matlab, Mathematica, C ++ ...) to solve these problems.

## 2. Course Main Objective

1. Introducing students to the integral equation and its classification and conversion to differential equation and vice versa.
2. Acquire proficiency in the use of computer programs such as (Matlab, Mathematica, C ++ ...)
3. Solve problems with solutions to them by practicing higher thinking skills, analyzing and interpreting results and information

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Using mathematical definition and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.1	Develop mathematical models of real-life problem in a way that demonstrates its appropriateness and justification	S.1
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability	S.3
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals	C.1

## C. Course Content

No	List of Topics	Contact Hours
1	Modeling with higher-order differential equations, initial value problems and Boundary value problems of linear equations	4
2	Series solutions of linear equations. Solutions about ordinary points. Solutions about singular points	4
3	Laplace transforms. Inverse Laplace transforms, and Laplace transforms of derivatives. Operational properties	6
4	Systems of linear equations -Systems of first order linear differential equations	8
5	Homogeneous linear systems with fixed coefficients: different real eigenvalues, repeated eigenvalues, complex eigenvalues	16
6	Variation of parameters , Matrix exponential	10
7	Basic concepts of integral equations: definition of integral equations - Classification of Linear Integral Equations: Fredholm Equations - Volterra Equations - Equations (Differential - Integral)- singular Integral Equations.	6
8	Solve the integrative equation- Convert the Volterra equation to an ordinary differential equation, , Conversion of the initial value	6



problems of the Volterra equation - conversion of the boundary value problems of the Friedholm equation	
<b>Total</b>	60

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Using mathematical definition and formulas in thinking and logical processes	Interactive lectures, discussions and conversations, Brainstorm, Presentations, practical training	Written exams, Oral exams, Class assignments, Homework assignments, class discussions
2.0	<b>Skills :</b>		
2.1	Develop mathematical models of real life problem in a way that demonstrates its appropriateness and justification	Interactive lectures, discussions and conversations, Brainstorm, Presentations, practical training	Written exams, Oral exams, Class assignments, Homework assignments, class discussions
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability	Interactive lectures, discussions and conversations, Brainstorm, Presentations, practical training	Written exams, Oral exams, Class assignments, Homework assignments, class discussions
3.0	<b>Competence:</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals	Interactive lectures, Brainstorm, practical training, discussions and conversations, Presentation.	Homework assignments, class discussions

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Short research	in Twice term	10%
2	Mid Term 1	7 <sup>th</sup> week	20%
3	Mid Term 2	11 <sup>th</sup> week	20%
4	Home works	All weeks	10%
5	Final Exam	16 <sup>th</sup> week	40%



## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	D. G. Zill, A first Course in Differential Equations, Cole Pub Co (2008). Abdul-majid Wazwaz, A First course in integral equations, world Scientific pub co.(1997).
Essential References Materials	Marcus, Differential Equations: An Introduction, Wm.C. Brown Publishers, 1991. - إبراهيم ديب سرميني وآخرون. (١٤٢٥ هـ). مقدمة في المعادلات التفاضلية. مطابع جامعة الملك سعود - سالم أحمد سحاب, مقدمة في المعادلات التفاضلية, مركز النشر العلمي, (١٤١٤ هـ). - وليم بوليس وريتشارد دبيريما, مبادئ المعادلات التفاضلية, دار جون وايلي وأبناؤه, ١٩٨٣ م
Electronic Materials	<a href="http://en.wikipedia.org">http://en.wikipedia.org</a> <a href="http://www.aws.org">http://www.aws.org</a> <a href="http://www.math.psu.edu">http://www.math.psu.edu</a> <a href="http://wwwemis.de/ZMATH">http://wwwemis.de/ZMATH</a> <a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a>
Other Learning Materials	Matlab, Mathematica, Maple

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should</p>



Item	Resources
	be a platform speaker with integrated sound system and wired and wireless microphones. * There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers devices and data show.
<b>Other Resources</b>	Will be determined later in the light of the new.

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019





<b>Course Title:</b>	Number Theory
<b>Course Code:</b>	Math 342 T (Taught in Arabic)
<b>Program:</b>	College of science program (Bachelors of Mathematical Science)
<b>Department:</b>	Department of Mathematical science
<b>College:</b>	College of Science
<b>Institution:</b>	Princess Nourah bint Abdulrahman University



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## A. Course Identification

1. Credit hours:	4 credits (contact hours: 3 Theoretical + 2 Exercises)
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Starting from Level Five \ Third year
4. Pre-requisites for this course (if any):	Foundations of mathematics Math 131 T
5. Co-requisites for this course (if any):	None

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

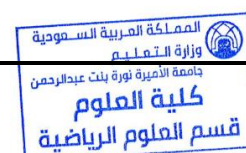
## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Mathematical induction and well-ordering principle - Divisibility rule - Euclidean algorithm. Prime numbers and its characteristics. Linear Diophantine equations. Congruence and its some basic characteristics - Linear congruence and solving it - Chinese remainder theorem and its applications. Non-Linear congruence and solving it. Fermat's Theorem - Fermat's way in analysis - Wilson's theorem and Euler's theorem. Some numerical functions and its characteristics. Pythagorean triple and introduce Fermat's hunch. . Continued fraction.



## 2. Course Main Objective

- knowing the history of integers and its origin.
- knowing the new relations of integers.
- Acquiring the skills of dealing with numbers.
- Making the students acquire the communication skills, using mathematics programs and computational skills to stimulate mathematical thinking, understand and do the mathematical exercise.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.3	State theorems of mathematics with their proofs.	K3
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem solving, assessing their effectiveness and applicability.	S3
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish certain goals.	C1

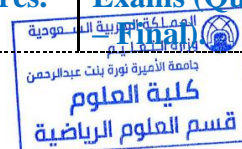
## C. Course Content

No	List of Topics	Contact Hours
1	Mathematical induction and well-ordering principle. Divisibility rule. Euclidean algorithm.	15
2	Prime numbers and its characteristics.	5
3	Diophantine equations.	5
4	Congruence and its some basic characteristics.	10
5	Linear congruence and solving it. Chinese remainder theorem and its applications.	10
6	Non-linear congruence and solving it.	5
7	Fermat's little. Fermat's way in analysis.	5
8	Wilson's theorem and Euler's theorem.	5
9	Some numerical functions and its characteristics.	5
10	Pythagorean triple and introduce Fermat's hunch.	5
11	Continued fraction.	5
Total		75

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.3	State theorems of mathematics with their proofs.	Interactive lectures. Brainstorming.	Exams (Quiz – Mid



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Discussions and conversations. Presentations.	Homework. Discussion in class and worksheets.
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures. Brainstorming. Discussions and conversations. Presentations.	Exams (Quiz – Mid – Final). Homework. Discussion in class and worksheets.
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem solving, assessing their effectiveness and applicability.	Brainstorm Problem solving. Group research.	Simulated. Performance tests. Students' projects. Research Papers.
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish certain goals.	Brainstorm. Group research.	Interviews. Observations. Evaluate colleagues and students.

## 2. Assessment Tasks for Students

#	Assessment task	Week Due	Percentage of Total Assessment Score
1	Quizzes (1)	5 <sup>th</sup>	5%
2	First Midterm exam	7 <sup>th</sup>	20%
3	Quizzes (2)	9 <sup>th</sup>	5%
4	Second Midterm exam	12 <sup>th</sup>	20%
5	Homework Assignment	weekly	5%
6	Class participation	weekly	5%
7	Final examination	After week 15	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	- فوزي الذكير ، معروف سمحان ..نظرية الأعداد وتطبيقاتها. ، جامعة الملك سعود ، الطبعة الثالثة . (١٤٢٩هـ)
<b>Essential References Materials</b>	<b>D. Burton (Elementary Number theory.) Allyan and Bacon. . (1980).</b>
<b>Electronic Materials</b>	<b>Determined by the professor of the course at the time.</b>
<b>Other Learning Materials</b>	<b>Insert any other educational materials such as mathematical software such as: (Matlab, Mathematica and Maple)</b>

### 2. Facilities Required

<b>Item</b>	<b>Resources</b>
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>Computers devices and data show.</b>
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<b>Determined later depending on the new circumstances.</b>

## G. Course Quality Evaluation

<b>Evaluation Areas/Issues</b>	<b>Evaluators</b>	<b>Evaluation Methods</b>
<b>Effectiveness of teaching and assessment.</b>	<b>Students</b>	<b>Survey</b>
<b>Verifying of achievement of course learning outcomes</b>	<b>Program quality and accreditation unit</b>	<b>Learning outcomes matrix General students level</b>

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Verifying standards of student achievement.	Independent member teaching staff	<p>5- Check marking by an independent member teaching staff of samples of student work.</p> <p>6- Exchanging periodically to mark exams or a sample of assignments with faculty members</p>
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members inside the institution, students, program and collage quality	<p>5- Periodic review of courses by faculty members to discuss recurring problems to find the appropriate solution.</p> <p>6- Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.</p>
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Numerical Analysis</b>
<b>Course Code:</b>	<b>Math 351 T (Taught in English)</b>
<b>Program:</b>	<b>College of science program (Bachelors of Mathematical Science)</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

<b>1. Credit hours:</b> 4 (contact hours: 3 Theoretical + 2 Exercises)
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> Level 5 / Year 3
<b>4. Pre-requisites for this course (if any):</b> Math 203 T, Math 241 T and Math CS242 T
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

#### Theoretical part:

Calculations, rounding errors, error growth and convergence. Numerical Methods for Solving Nonlinear Equations: Drainage, False Mode, Frequency Relay, Newton-Raphson and Cutter. Study of the error analysis of the repetitive methods and the rate of convergence. Boundary approximation and approximation: Taylor, Lagrange, division differences. Study the errors associated with these functions and analyze numerical results. Numerical differentiation: the conclusion of numerical methods of different approximations for calculus I and II using the polynomials Taylor and Lagrange. To study the errors associated with these methods, as well as to analyze the effect of the circular errors on the calculated values. Numerical integration: The conclusion of some methods such as: trapeze, Simpson and midpoint as well as compound formulas. Study and analyze the error of all formulas. Numerical solutions for systems of linear equations: Direct methods: Gaussian deletion, with emphasis. Error analysis of numerical solutions for direct methods. Frequency methods: Jacobi, Gauss-Siddal and SOR with the study of error analysis and convergence rates for these methods. Ordinary Differential Equations of First Order: Euler and Taylor Method, Conclusion of Some. Study the accompanying errors and their approximation. Rong-Kuta methods, and analysis of errors related to them

#### Practical part:

Using mathematical software to solve problems.

### 2. Course Main Objective

1. Gain skill in numerical methods for solutions of equations, by using numerical analysis programs and computer facilities.
2. Understand specific steps (algorithms) for accessing from the given data to numerical results or solutions that are almost the exact solutions.
3. Providing female students with communication skills, using mathematical programs, and computer skills to stimulate mathematical thinking and to understand and solve mathematical problems.
4. Describe and analyze methods for obtaining numerical solutions to problems that are difficult to solve by the usual algebraic methods.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes	K4
2	<b>Skills :</b>	
2.1	Develop mathematical and models of real life problems in a way that demonstrates its appropriateness and justification	S1
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs.	S2
2.5	Demonstrates an ability to use current mathematical: techniques, software, skills, and tools necessary for analyzing real life problems.	S5
3	<b>Competence:</b>	

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CLOs		Aligned PLOs
3.3	Implement a given technique on real life data using a computer if necessary	C3

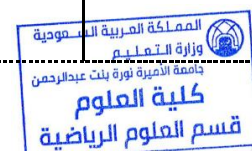
### C. Course Content

No	List of Topics	Contact Hours
	<b>Theoretical Parts</b>	
1	Calculations, rounding errors, error growth and convergence	3
2	Numerical Methods for Solving Nonlinear Equations: Drainage, False Mode, Frequency Relay, Newton-Raphson and Cutter. Study of the error analysis of the repetitive methods and the rate of convergence.	9
3	Boundary approximation and approximation: Taylor, Lagrange, division differences. Study the errors associated with these functions and analyze numerical results.	6
4	Numerical differentiation: the conclusion of numerical methods of different approximations for calculus I and II using the polynomials Taylor and Lagrange. To study the errors associated with these methods, as well as to analyze the effect of the circular errors on the calculated values	4.5
5	Numerical integration: The conclusion of some methods such as: trapeze, Simpson and midpoint as well as compound formulas. Study and analyze the error of all formulas.	4.5
6	Numerical solutions for systems of linear equations: Direct methods: Gaussian deletion, with emphasis. Error analysis of numerical solutions for direct methods	4.5
7	Frequency methods: Jacobi, Gauss-Siddal and SOR with the study of error analysis and convergence rates for these methods. Ordinary Differential Equations of First Order: Euler and Taylor Method, Conclusion of Some. Study the accompanying errors and their approximation. Rong-Kuta methods, and analysis of errors related to them.	13.5
	<b>Practical parts</b>	
8	Package program	26
<b>Total</b>		<b>71</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures, Brainstorm, discussions and conversations, Presentations	Exams (quiz, Mid, Final) Class assignments, Homework



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.0	<b>Skills</b>		
2.1	Develop mathematical and models of real life problems in a way that demonstrates its appropriateness and justification	Interactive lectures, Brainstorm, discussions and conversations, Presentations	Exams (quiz, Mid, Final) Class assignments, Homework
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs.	Interactive lectures, Brainstorm, discussions and conversations, Presentations	Exams (quiz, Mid, Final) Class assignments, Homework
2.5	Demonstrates an ability to use current mathematical: techniques, software, skills, and tools necessary for analyzing real life problems.	Interactive lectures, Brainstorm, discussions and conversations, Presentations Practical training	Practical exams Class assignments, Homework
3.0	<b>Competence</b>		
3.3	Implement a given technique on real life data using a computer if necessary	Interactive lectures, Brainstorm, discussions and conversations, Presentations Practical training	Reports and projects

## 2. Assessment Tasks for Students

#	Assessment task	Week Due	Percentage of Total Assessment Score
1	Quiz	5 <sup>th</sup> and 13 <sup>th</sup>	10
2	Midterm exam	10 <sup>th</sup>	10
3	Final Lab	14 <sup>th</sup>	10
4	Participation and Homework Assignment	weekly	10
5	Practical training	weekly	10
6	Final examination	After week 15	50

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	Richard L. Burden, J. Douglas Faires and Albert C. Reynolds, <b>NUMERICAL Analysis</b> , 7th edition, PWS-KENT Publishing Company, 2005
<b>Essential References Materials</b>	- Endre Süli and David F. Mayers, <b>An Introduction to Numerical Analysis</b> , 28 Aug 2003. - Eugene Isaacson and Herbert B. Keller, <b>Analysis of Numerical Methods (Dover books on advanced mathematics)</b> , Oct 1994
<b>Electronic Materials</b>	Will be determined later
<b>Other Learning Materials</b>	Mathematical software such as: MATLAB

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers devices and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students	Survey
Verifying of achievement of course learning outcomes	Program quality and accreditation unit	Learning outcomes matrix General students level
Verifying standards of student achievement.	Independent member teaching staff	7- Check marking by an independent member teaching



		<p>staff of samples of student work.</p> <p>8- Exchanging periodically to mark exams or a sample of assignments with faculty members</p>
<p>Planning procedures for periodic review of the effectiveness of the course and planning for its development</p>	<p>Faculty members inside the institution, students, program and collage quality</p>	<p>7- Periodic review of courses by faculty members to discuss recurring problems to find the appropriate solution.</p> <p>8- Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.</p>
<p>Evaluation of the course file</p>	<p>Program quality and accreditation unit</p>	<p>Check and review the course file content.</p>

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Probability Theory</b>
<b>Course Code:</b>	<b>Math 362 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours: <b>3 credit hours (contact hours: 3 Theoretical + 2 Training)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>Level 5/ Year 3</b>
4. Pre-requisites for this course (if any): <b>Math 203T+ Math 261T</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

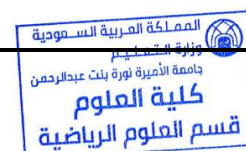
## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (training)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Review of probability, conditional probabilities, independence, random variables, probability mass and density functions, cumulative distribution function, characteristics of random variables for discrete and continuous distributions, some discrete and continuous probability distributions, bivariate discrete and continuous distributions, moments and moment generating functions for some discrete and continuous distributions, conditional expectation and variance, functions of random variables, sum of random variables.



## 2. Course Main Objective

- Studying random variables and their characteristics, and univariate probability distributions (discrete and continuous).
- Studying probability distributions for more than one random variables.
- Deriving the probability distributions of functions of random variables, and sum of random variables.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.3	State theorems of mathematics with their proofs	K.3
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
2.4	Illustrate an ability to communicate effectively with a range of audiences	S.4
3	<b>Competence</b>	
	None	

## C. Course Content

No	List of Topics	Contact Hours
1	Review of probability: random experiment, sample space, event operations, axioms of probability, conditional probabilities, and independent events.	5
2	Random variable and probability distributions: discrete and continuous random variables, discrete and continuous probability distributions, cumulative distribution function.	5
3	Characteristics of random variables: expected value of a random variable and function in random variable, properties of expected value and variance, moments, moment generating functions, probability generating function.	10
4	Discrete probability distributions: Bernoulli trial, Binomial distribution, Poisson distribution, Geometric distribution, Negative binomial distribution, The hypergeometric distribution.	10
5	Continuous probability distributions: Uniform (rectangular) distribution, Exponential distribution, Gamma distribution, Beta distribution, Normal distribution.	10
6	Bivariate random variables: Discrete and continuous bivariate distributions, marginal distributions, conditional probability distributions, independence of random variables, expected value and	15



	moments of bivariate distributions, Trinomial distribution, the bivariate normal distributions.	
7	Functions of random variables: discrete and continuous random variables, cumulative distribution method, moment generating function method, transformations method, the derivation of F and T distributions.	15
8	Sum of random variables: expected value, variance, moment generating function, sum of finite number of random variables.	5
<b>Total</b>		75

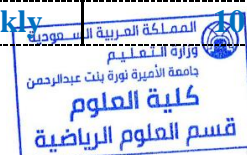
## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.3	State theorems of mathematics with their proofs	Interactive lectures, Brainstorming, Discussions, Presentations.	Exams (quizzes, midterms, finals), Participation, Homework Exercises
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures, Brainstorming, Discussions, Presentations.	Exams (quizzes, midterms, finals), Participation, Homework Exercises
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures, Brainstorming, Discussions, Presentations.	Exams (quizzes, midterms, finals), Participation, Homework Exercises
2.4	Illustrate an ability to communicate effectively with a range of audiences	Presentations, Interactive lectures, University events and activities, Practical training	Exams (quizzes, midterms, finals), Participation, Homework Exercises

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz	5 <sup>th</sup> and 10 <sup>th</sup>	5 for every exam
2	Midterm exam	8 <sup>th</sup> and 12 <sup>th</sup>	20 for every exam
3	Homework Assignment and Participation.	weekly	



#	Assessment task*	Week Due	Percentage of Total Assessment Score
4	Final examination	After week 15	40

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	نظرية الاحتمالات / د: جلال الصياد دار الحافظ للنشر والتوزيع, جدة. (١٩٩٠).
Essential References Materials	- مقدمة في النظرية الإحصائية لأحمد عوة، جامعة الملك سعود، ٢٠٠٠، الرياض. -Hogg. R. and A. Crag, Introduction to mathematical Statistics, (1978). - Hodges J., Lehmann E (1964/70), Basic concepts of probability and statistics.
Electronic Materials	Specified by the faculty member.
Other Learning Materials	-

## 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
Technology Resources (AV, data show, Smart Board, software, etc.)	Computers and data show.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be determined later according to the new circumstances

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	<ol style="list-style-type: none"> <li>1. Checking the marking of a sample of students' work</li> <li>2. Exchange periodically to marked exams with faculty members.</li> </ol>
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	<ol style="list-style-type: none"> <li>1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution.</li> <li>2 - Giving the opportunity for the students to express their views on what</li> </ol>

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Evaluation Areas/Issues	Evaluators	Evaluation Methods
		is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Introduction to Topology</b>
<b>Course Code:</b>	<b>Math372 T</b>
<b>Program:</b>	<b>Bachelor of Scientific colleges/Mathematical science</b>
<b>Department:</b>	<b>Mathematical science</b>
<b>College:</b>	<b>science colleges</b>
<b>Institution:</b>	<b>Princess Nourah University</b>



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## A. Course Identification

1. Credit hours:	4credits (3theoretical+2 tutorial)		
2. Course type			
a	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	Others <input type="checkbox"/>
3. Level/year at which this course is offered:	6 <sup>st</sup> level/ 3 <sup>st</sup> year		
4. Pre-requisites for this course:	Real Analysis (1), Math381T		
5. Co-requisites for this course:	None		

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<b>1. Course Description</b> Topological spaces: Definition and examples, Open and Closed sets. Closure of a set, Interior, boundary, exterior and derived sets. The subspace Topology, Bases and sub-bases. Product topology, Metric spaces: Definitions and Examples Discrete metric, Usual and square metric on $R^n$ , Metric topology, Metrizable, continuous functions in topological spaces, Homeomorphisms, Topological property, compactness, Compactness in $R^n$ , Limit point compactness, Sequentially compact spaces, Compactness in metric spaces. Use program packages such as Mathematica, MATLAB or Maple in some scheduled topics.		
<b>2. Course Main Objective</b> 1. Dealing with abstract mathematical concepts and detailed proofs for mathematical facts. 2. Provide the ability to express mathematical facts verbally and in writing.		
<b>3. Course Learning Outcomes</b>		
CLOs	Aligned PLOs	
1	<b>Knowledge:</b>	
1.4.	Use mathematical definitions and formulas in thinking and logical processes such as: using topology theorems	K4
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	S.2
2.4	Illustrate an ability to communicate effectively with a range of audiences	S.4
3	<b>Competence:</b>	
3.2	Demonstrates the need for and the ability to engage in continuing professional development	C.2
3.3	Implement a given technique on real life data using a computer if necessary	C.3

## C. Course Content

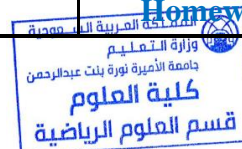
No	List of Topics	Contact Hours
1	Topological spaces: Definition and examples	10
2	Bases and sub-bases. Product topology.	10
3	Open and Closed sets. Closure of a set, Interior, boundary , exterior and derived sets. The subspace Topology.	10
4	Metric spaces: Definitions and Examples, Discrete metric, Usual and square metric on $R^n$ , Metric topology , Metrizable,	15
5	continuous functions in topological spaces, Homeomorphisms, Topological property	15
٦	compactness, Compactness in $R^n$ , Limit point compactness, Sequentially compact spaces, Compactness in metric spaces	15
<b>Total</b>		<b>75</b>

وزارة التعليم  
جامعة الأميرة نورة بنت عبد الرحمن  
كلية العلوم  
قسم العلوم الرياضية

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4.	Use mathematical definitions and formulas in thinking and logical processes such as: using topology theorems	Presentations Interactive lectures Practical Training Brainstorm	Exams: Quizzes Mid-term exams and final exam Homework class assignments
2.0	<b>Skills</b>		
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	Presentations Interactive lectures Practical Training Brainstorm	Exams: Quizzes Mid-term exams and final exam Homework class assignments
2.4	Illustrate an ability to communicate effectively with a range of audiences	Presentations Interactive lectures Practical Training Brainstorm	Exams: Quizzes Mid-term exams and final exam Homework class assignments
3.0	<b>Competence</b>		
3.2	Demonstrates the need for and the ability to engage in continuing professional development	Presentations Interactive lectures Practical Training Brainstorm	Exams: Quizzes Mid-term exams and final exam Homework class assignments
3.3	Implement a given technique on real life data using a computer if necessary	Presentations Interactive lectures Practical Training Brainstorm	Exams: Quizzes Mid-term exams and final exam Homework



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			class assignments

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quizzes	5,10	10%
2	Midterm exams	8, 12	40%
3	project	10	5%
4	tutorial	During the term	5%
5	Final exam	After 15	40%

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

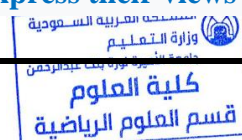
Required Textbooks	J. R. Munkres, Topology (2nd Edition), Prentice Hall, Inc, 2000.
Essential References Materials	1- R. Engelking, General Topology, Heldermann Verlag (1989). 2- s. Willard, General Topology, Dover Publications, (2004). - مقدمة في التبولوجيا، محمد عبد المنعم إسماعيل، عمادة شئون المكتبات، جامعة الملك سعود. - أسس التبولوجي العام، أحمد عبد المنصف علام، دار الزمان للنشر والتوزيع، الطبعة الثانية، ٢٠٠٠ م.
Electronic Materials	Determined by the Professor of the course at the time
Other Learning Materials	Mathematica -Maple - Matlab

## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	<p>Computers devices and data show.</p>
<p><b>Other Resources</b></p>	<p>Will be determined later in the light of the new.</p>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what



Evaluation Areas/Issues	Evaluators	Evaluation Methods
		is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Real Analysis (1)</b>
<b>Course Code:</b>	<b>Math 381 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>





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## A. Course Identification

1. Credit hours: <b>4 Credit hours (contact hours: 3 Theoretical + 2 Exercises)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>Fifth level/Third year</b>
4. Pre-requisites for this course (if any): <b>Calculus (3) (Math 203 T) + The foundations of Mathematics (Math 131 T)</b>
5. Co-requisites for this course: <b>None</b>

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

**The Real Numbers: The Algebraic and Order properties.**

**The Completeness Property. Applications of the Supremum Property. Intervals.**

**Sequences and Series: Sequences and their Limits. Limit Theorems. Monotone Sequences. Subsequences and the Bolzano-Weierstrass Theorem. The Cauchy Criterion.**

**Limits: Limits of Functions. Limit Theorems. Some Extensions of the Limit Concept.**

**Continuous Functions:**

**Continuous Functions. Combinations of Continuous Functions. Continuous Functions on intervals. Uniform Continuity. Monotone and Inverse Functions.**

**Differentiation: The Derivative. MVT. L'Hospital's Rules. Taylor's Theorem.**

**A Glimpse into Topology: Open and Closed Sets in  $\mathbb{R}$ . Compact Sets . Continuous Functions. Metric Spaces**

### 2. Course Main Objective

1. Understand the analytical foundations of terminology concepts, communication, and derivation.
2. Providing students with a number of mental skills, such as logical thinking, analysis, reasoning, and problem-solving and decision-making.
3. Providing female students with communication skills and using mathematical programs and computer skills to stimulate mathematical thinking and to understand and solve mathematical problems.
4. Understand basic Muslim definitions, definitions and theories.
5. The ability to formulate mathematical expressions and prove or deny them.
6. Develop the ability to understand the nature of mathematical proof and the idea of examples of negation.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.3	State theorems of mathematics with their proofs	<b>K.3</b>
1.4	The use of mathematical concepts and laws in thinking and logical processes	<b>K.4</b>
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	<b>S.3</b>
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	<b>C.1</b>

## C. Course Content

No	List of Topics	Contact Hours
1	Ch2: The Real Numbers: The Algebraic and Order properties. The Completeness Property. Applications of the Supremum Property. Intervals.	12.5



2	Ch 3: Sequences and Series: Sequences and their Limits. Limit Theorems. Monotone Sequences. Subsequences and the Bolzan Weierstrass Theorem. The Cauchy Criterion.	20	the Bolzan
3	Ch4: Limits: Limits of Functions. Limit Theorems. Some Extensions of the Limit Concept.	10	
4	Ch 5: Continuous Functions: Continuous Functions. Combinations of Continuous Functions. Continuous Functions on intervals. Uniform Continuity. Monotone and Inverse Functions.	10	
5	Ch 6: Differentiation: The Derivative. MVT. L'Hospital's Rules. Taylor's Theorem.	12.5	
6	Ch 11: A Glimpse into Topology: Open and Closed Sets in R. Compact Sets . Continuous Functions. Metric Spaces.	10	
<b>Total</b>		<b>75</b>	

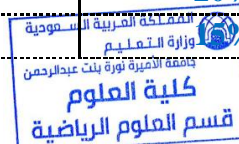
## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.3	State theorems of mathematics with their proofs	Interactive lectures, discussions and conversations, Brainstorm, presentation	Quizzes, Homework assignments, class discussions
1.4	The use of mathematical concepts and laws in thinking and logical processes	Interactive lectures, discussions and conversations, Brainstorm, presentation	Quizzes, Homework assignments, class discussions
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures, discussions and conversations, Brainstorm, presentation	Quizzes, Homework assignments, class discussions
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	Interactive lectures, discussions and conversations, Brainstorm, presentation	Quizzes, Homework assignments, class discussions

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz	Week 3 <sup>rd</sup> + 5 <sup>th</sup> +7 <sup>th</sup> +9 <sup>th</sup>	10%
2	Midterm exam 1	8 <sup>th</sup>	15%
3	Midterm exam 2	12 <sup>th</sup>	20%
4	Homework Assignment	weekly	0%



#	Assessment task*	Week Due	Percentage of Total Assessment Score
5	Final examination	After week 15	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Robert Bartl and Donald Sherbert, Introduction to Real Analysis, 3 <sup>rd</sup> ed., Wiley, 2000.
Essential References Materials	<ul style="list-style-type: none"> <li>• D. Gaughan, introduction to analysis 5<sup>th</sup> edition , Brooks/ Cole, 2009.</li> <li>• F. Morgan, Real Analysis, Oxford Univ. press, 2005.</li> <li>• مبادئ التحليل الحقيقي- الجزء الاول – محمد القويز وصالح السنوسي- الطبعة الثانية- المؤلفان - ٢٠٠٢</li> <li>• أساسيات التحليل الحقيقي – الجزء الاول- محمود أبو العز وفدوى أبو مريفة وفتحي عبد السلام- دار الحريجي للنشر والتوزيع – ٢٠٠٧</li> <li>• التحليل الحقيقي- رمضان جهيمة – الدار الدولية للنشر والتوزيع- القاهرة – ١٩٩٩ م</li> </ul>
Other Learning Materials	Mathematica – Maple – Matlab

### 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 25to 30 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p>



Item	Resources
	* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	To be determined by the professor of the course
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Real Analysis 2</b>
<b>Course Code:</b>	<b>Math 382 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical science</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours: <b>4 credits (3 Theoretical+2 Tutorial)</b>			
2. Course type			
a	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
3. Level/year at which this course is offered: <b>6<sup>th</sup> level / 3<sup>rd</sup> year</b>			
4. Pre-requisites for this course (if any): <b>Math 381T</b>			
5. Co-requisites for this course (if any): <b>None</b>			

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

1. Course Description: <b>Riemann integration, Riemann integrable functions, The Fundamental Theorem of Calculus, definition, approximation integration. The pointwise and uniform convergence of sequences of functions, interchange of limits, exponential, logarithmic and trigonometric functions.</b> <b>Infinite Series (Convergence tests, absolute convergence, function series)</b>
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Generalized Riemann integration (Definition, properties, Improper Integral, Lebesgue integrals, Infinite intervals, convergence theory), Using of software Mathematica, Maple, MATLAB

## 2. Course Main Objective:

1. Develop the ability to understand the nature of mathematical proof to prove or deny mathematical expressions.
2. Gaining skills of mental such as logical thinking, analysis and reasoning and taking decision.
3. Using the mathematical computer programs and ability to activate the mathematical thinking and solving the problems.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
<b>1</b>	<b>Knowledge</b>	
1.3	State theorems of mathematics with their proofs	K3
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K4
<b>2</b>	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S3
<b>3</b>	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish certain goals.	C1

## C. Course Content

No	List of Topics	Contact Hours
1	Definition of Riemann integrations, Riemann totals, Riemann integrable functions, and approximation integration.	12.5
2	The definition of pointwise and uniform convergence of sequences of functions and how to change the limits and apply the criteria of convergence. Exponential, logarithmic and trigonometric functions.	20
3	Infinite series, absolute convergence of infinite series. Absolute and nonabsolute convergence tests. series of functions.	22.5
4	Generalized Riemann integration (Definition, properties, Improper Integral , Lebesgue Integrations, Infinite intervals, convergence theory)	20
<b>Total</b>		<b>75</b>



## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		
1.3	State theorems of mathematics with their proofs	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quiz, Midterm, final exam and class discussions.
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quiz, Midterm, final exam and class discussions.
2.0	Cognitive Skills		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures Discussion and dialogue Presentations practices	Quiz, Midterm, final exam and class discussions.
3.0	Interpersonal Skills & Responsibility		
3.1	Show an ability to function effectively within teams to accomplish curricular goals.	Interactive lectures Discussion and dialogue Presentations practices	class discussions.

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz at the ending of each chapter	3 <sup>th</sup> , 6 <sup>th</sup> , 9 <sup>th</sup> and 12 <sup>th</sup> weeks	10%
2	First and second Midterm exam	7 <sup>th</sup> , 12 <sup>th</sup> weeks	40%
3	Homework	Distribute weeks to students	5%
4	Homework Assignment	weekly	5%
5	Final examination	After 15 <sup>th</sup> week	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.

Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to



the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	<b>Robert Bartle and Donald Sherbert, Introduction to Real Analysis, 3rd ed., Wiley, 2000.</b>
<b>Essential References Materials</b>	<ul style="list-style-type: none"> <li>- E. D. Gaughan .Introduction to analysis.5th edition.</li> <li>- F. Morgan . Real Analysis., Oxford Univ .Press ( 2005).</li> <li>• محمد القويص وصالح السنوسي .مبادئ التحليل الحقيقي. الجزء الثاني. الطبعة الثانية.</li> <li>• رمضان جهيمة . التحليل الحقيقي. الدار الدولية للنشر والتوزيع, القاهرة (١٩٩٩ م).</li> </ul>
<b>Electronic Materials</b>	<b>Determined by the Professor of the course</b>
<b>Other Learning Materials</b>	<b>Mathematical software such as: MATLAB, Mable , Mathematica.</b>

### 2. Facilities Required

<b>Item</b>	<b>Resources</b>
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>Computers devices and data show.</b>
<b>Other Resources</b>	<b>Will be determined later in the light of the new.(the sentence is incomplete)</b>



## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Mathematical Modeling</b>
<b>Course Code:</b>	<b>Math 412 T (Taught by English)</b>
<b>Program:</b>	<b>College of science program Bachelors of Mathematical science</b>
<b>Department:</b>	<b>Department of Mathematical science.</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours:	4 credits (contact hours: 3 Theoretical + 2 Practical)
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered:	Level 6/7- Year 4
4. Pre-requisites for this course (if any):	Math 351T + Math222T.
5. Co-requisites for this course (if any):	None

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

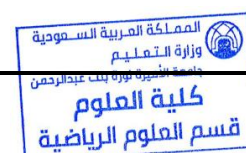
### 1. Course Description

#### Theoretical Part:

Introduction to mathematical Modeling. Defining, building, graphing and simplifying of mathematical model. Model Fitting to data points. Simulation modeling. Discrete modeling: Discrete optimization models. Modeling includes normal differential equations, optimization models use of mathematical modeling concepts in different applied fields such as physical, biological, economic and social models.

#### The Practical part:

Computer and Software applications for the solution of the models.





## 2. Course Main Objective

- Acquire the skill of constructing computational model
- The ability of graphing the mathematical model.
- Gain the skill for creation a simulate models.
- Ability of establishing mathematical models including Differential equations
- The ability to use mathematical modeling concepts in different applied fields such as physical, biological, economic and social models.
- Ability of using computer and math software.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b> None	
2	<b>Skills :</b>	
2.1	Develop mathematical and models of real life problems in a way that demonstrates its appropriateness and justification.	S1
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs.	S2
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S3
3	<b>Competence:</b>	
3.2	Demonstrates the need for and the ability to engage in continuing professional development.	C2
3.3	Implement a given technique on real life data using a computer if necessary.	C3

## C. Course Content

No	List of Topics	Contact Hours
<b>The theoretical part:</b>		
1	Introduction to mathematical modeling	4
2	Defining, building, graphing and simplifying of mathematical model. Model Fitting to data points	4
3	Simulation modeling Simulation model discrete modeling discrete optimization models	6
4	Modeling includes normal differential equations	6
5	The use of mathematical modeling concepts in different applied fields such as physical, biological, economic and social models	10
<b>The Practical part:</b>		
6	Knowing computer and software applications	4
7	Using computer applications for solving some problems	26
<b>Total</b>		<b>60</b>



## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
	<b>Not Applicable</b>		
2.0	<b>Skills</b>		
2.1	Develop mathematical and models of real life problems in a way that demonstrates its appropriateness and justification.	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quizzes Mid-term exams and final exam Homework assignments
2.2	Apply a real life problem through a mathematical tools and methods.	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quizzes Mid-term exams and final exam Homework assignments
2.3	Appraise different methods and techniques in problem solving and assess their effectiveness, and their applications	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quizzes Mid-term exams and final exam Homework assignments
3.0	<b>Competence</b>		
3.2	Demonstrates the need for and the ability to engage in continuing professional development.	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quizzes Mid-term exams and final exam Homework assignments
3.3	Implement a given technique on real life data using a computer if necessary.	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quizzes Mid-term exams and final exam Homework assignments

### 2. Assessment Tasks for Students

#	Assessment task	Week Due	Percentage of Total Assessment Score
1	Quizzes	4, 6, 8, 10	15%
2	Group exercise	weekly	10%
3	Software training	weekly	20%
4	Midterm exam	9	15%
5	Final examination	16, 17	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

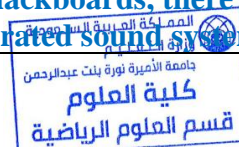
## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	<ul style="list-style-type: none"> <li>• Edward A, Bender, An introduction to Mathematical Modeling , Dover , 2000</li> <li>• F.R. Giordano and M.D Weir , A First course in Mathematical Modeling ,Books/Cole , 2008</li> </ul>
Essential References Materials	Dilwyn Edwards and Michael Hamson , Guide to Mathematical Modeling, ( 20 Jul 2007)
Electronic Materials	Determined by the professor of the course at the time.
Other Learning Materials	Math software : Fortran live physics(3D graphing calculator) C++ Maple Mathematica or Matlab

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>• Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>• The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and</li> </ul>



Item	Resources
	wired and wireless microphones. There will be a connection to the internet, and a modern air conditioning system and appropriate lighting. <ul style="list-style-type: none"> <li>• Safety Measures and emergency exits.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers , soft wares and data show
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	None

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students	Survey
Verifying of achievement of course learning outcomes	Program quality and accreditation unit	Learning outcomes matrix General students level
Verifying standards of student achievement.	Independent member teaching staff	9- Check marking by an independent member teaching staff of samples of student work. 10- Exchanging periodically to mark exams or a sample of assignments with faculty members
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members inside the institution, students, program and collage quality	9- Periodic review of courses by faculty members to discuss recurring problems to find the appropriate solution. 10- Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Financial Mathematics</b>
<b>Course Code:</b>	<b>Math 413T</b>
<b>Program:</b>	<b>Mathematical Science</b>
<b>Department:</b>	<b>Mathematical science</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdul Rahman University</b>



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## A. Course Identification

1. Credit hours: <b>3 Credit hours (2 Theoretical+2 Tutorial)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input type="checkbox"/> Others <input checked="" type="checkbox"/> b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: <b>Seventh or eighth-fourth year</b>
4. Pre-requisites for this course (if any): <b>Math 351T + Math261 T</b>
5. Co-requisites for this course (if any): <b>None</b>

### 6. Mode of Instruction (mark all that apply)

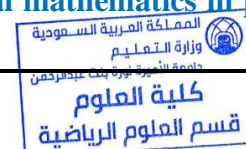
No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<b>1. Course Description</b> An overview of basic concepts in stock markets. Stochastic Stock Price Model. Use of derivatives to fuse strategies and market management risks. binomial option pricing model. Neutral evaluation risk, answer and pricing of incidental claims. Black Scholes analysis. Interest rate models. Using computer applications to solve some practical issues.
<b>2. Course Main Objective</b> <ul style="list-style-type: none"> <li>Understand the basic concepts such as financial management and the financial environment as an introduction to the field of financial mathematics in practical life</li> </ul>





- Study of intermittent time market models and general characteristics of options
- Provide students with the skill in using computer technology in statistical studies .

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1.0	<b>Knowledge:</b>	
1.2	Outline of Mathematics and Statistics, basics, principles, theories and mathematical models Through course topics.	K2
S	<b>Skills :</b>	
2.1	Develop mathematical models of real-life issues in a way that shows their suitability and clarity Through course topics.	S1
2.3	Evaluate different methods and techniques in problem solving and assess their effectiveness and their applications Through course topics.	S3
2.5	Use modern mathematic techniques Programs, skills and tools to analyze real life problems.	S.5
C	<b>Competence:</b>	
	None	

### C. Course Content

No	List of Topics	Contact Hours
1	<u>Introduction: A Simple Market Model</u> – Basic Notions and Assumptions	4
2	No-Arbitrage Principle One-Step Binomial Model	4
3	Risk and Return Forward Contracts	4
4	Call and Put Options Managing Risk with Options	4
5	<u>Risky Assets</u> Introduction Dynamics of Stock Prices Return Expected Return	4
6	Binomial Tree Model Risk-Neutral Probability Martingale Property	4
7	<u>Options General Properties</u> Definitions – Put-Call Parity	4
8	– Bounds on Option Prices European Options	4



	European and American Calls on Non Dividend Paying Stock American Options	
9	Variables Determining Option Prices European Options American Options	4
10	– Time Value of Options	4
11	<u>Option Pricing</u> Introduction – European Options in the Binomial Tree Model – One Step Two Steps	4
12	<u>General N-Step Model</u> <u>Cox–Ross–Rubinstein Formula</u>	4
13	<u>American Options in the Binomial Tree Model</u>	4
14	<u>Black–Scholes Formula</u>	4
15	Review the curriculum and answer the students' questions	4
<b>Total</b>		60

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Outline of Mathematics and Statistics, basics, principles, theories and mathematical models Through course topics.	Interactive lectures, discussions, dialogue Brainstorm, presentation	Tests (Quizzes, midterms, final) class participation
2.0	<b>Skills</b>		
2.1	Develop mathematical models of real-life issues in a way that shows their suitability and clarity Through course topics.	Interactive lectures, discussions, dialogue Brainstorm, presentation	Tests (Quizzes, midterms, final) class participation
2.3	Evaluate different methods and techniques in problem solving and assess their effectiveness and their applications Through course topics.	Interactive lectures, discussions, dialogue Brainstorm, presentation	Tests (Quizzes, midterms, final) class participation
2.5	Use modern mathematic techniques Programs, skills and tools to analyze real life problems.	Interactive lectures, discussions, dialogue Brainstorm, presentation	Tests (Quizzes, midterms, final) class participation
C	<b>Competence</b>		
	None		



## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	5 th	10
2	First Midterm	10 th	20
3	Quiz 2	13 th	15
4	Homework Assignment	weekly	15
5	Final examination	After 15 th	40%

## E. Student Academic Counseling and Support

- Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:
- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	1-Marek Capiński and Tomasz Zastawniak, Mathematics for Finance: An Introduction to Financial Engineering, Springer, 2003 2- J. Hull, Options, Futures and Other Derivatives, 7th Edition, Prentice-Hall, 2008. 3-P. Wilmott, S. Howison and J. Dewynne, The Mathematics of Financial Derivatives: A Student Introduction, Cambridge University Press, 1995
Essential References Materials	Include - in the list - basic reference materials) scientific journals, reports and others.
Electronic Materials	To be determined by the professor of the course
Other Learning Materials	MATLAB, Mathematica or Maple

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<p>1-Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>2-The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>3-There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be mentioned later when required

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees' program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.

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Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.
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## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Partial Differential Equations</b>
<b>Course Code:</b>	<b>Math 424 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical sciences</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>

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## A. Course Identification

1. Credit hours: <b>3Credit hours (3Theoretical)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: <b>The 7<sup>th</sup> or 8<sup>th</sup> Level - 4<sup>th</sup> Year</b>
4. Pre-requisites for this course (if any): <b>Math 222 T</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	45
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	Total	20

## B. Course Objectives and Learning Outcomes

<b>1. Course Description</b> <b>Equations of the first order, solution by Lagrange method, the Cauchy problem, second-order linear equations in two variables and three variables, Elliptic and hyperbolic and parabolic forms, the solution by separable variables, Green Functions, Laplace equation, Poisson's equation, boundary value problems by Dirichlet and Newman and mixed, Wave equation and heat equation, Physical interpretation, Initial conditions and modalities for the solution and using Maple or MATLAB or Mathematica programs in some subjects of the courses.</b>
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## 2. Course Main Objective

- 1- Providing the student with the concepts of partial differential equations and some physical applications.
- 2- Providing the student with some mental skills such as logical thinking, analysis, explanation, problem solving skills and decision-making.
- 3- Providing the student with the skill of choosing the appropriate way to solve public life issues by representing her with partial differential equations.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics	K.1
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	C.1

## C. Course Content

No	List of Topics	Contact Hours
1	Equations of the first order	4.5
2	Solution by Lagrange method	4.5
3	The Cauchy problem	3
4	Second-order linear equations in two variables and three variables	3
5	Elliptic and hyperbolic and parabolic forms	3
6	Mid-term exam 1	3
7	The solution by separable variables	3
8	Poisson's equation	3
9	boundary value problems by Dirichlet and Newman and mixed	3
10	Mid-term exam 2	3
11	Green Functions	3
12	Wave equation and heat equation	3
13	Physical interpretation	3
14	Initial conditions and modalities for the solution	3
<b>Total</b>		<b>45</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.1	Describe knowledge of mathematics and statistics	Interactive lectures Brainstorm	Quizzes Mid-term exams and final exam



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Discussions and conversations Problems solving	HomeWorks Class discussions.
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures Brainstorm Discussions and conversations Presentation	Quizzes Mid-term exams and final exam HomeWorks Class discussions.
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	Interactive lectures Brainstorm Discussions and conversations Presentation	Classification the students into groups, Oral exams for the groups, Class assignments, Homework assignments, class discussions.

## 2. Assessment Tasks for Students

	Assessment task	Week Due	Percentage of Total % Assessment Score
1	Short quiz	The 5 <sup>th</sup> & the 13 <sup>th</sup> week	20%
2	First and second Midterm exams	7 <sup>th</sup> & 11 <sup>th</sup>	30%
4	Homework Assignment	weekly	10%
5	Final examination	After week 15	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities Required

### 1. Learning Resources

<b>Required Textbooks</b>	<b>David Bleecker and George Csordas, Basic Partial Differential Equations, A publication of International Press, 2003.</b>
<b>Essential References Materials</b>	<p><b>1-W.A.Strauss, Partial Differential Equations: An Introduction, Wiley, 1992.</b></p> <p><b>2-Y.Pinchover and J.Rubinstein, An Introduction to Partial Differential Equations, Cambridge University Press, 2005</b></p> <p><b>3-S.I.Naimit, Elements of Partial Differential Equations, Dover Publication, 2006</b></p> <p>١ - ناجي صالح خلاف، شعبان رسلان سالم، <u>المعادلات التفاضلية الجزئية</u>، مطابع المدينة المنورة. (١٤٢٨هـ).</p>
<b>Electronic Materials</b>	<b>Determined by the Professor of the course at the time</b>

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
Technology Resources (AV, data show, Smart Board, software, etc.)	<b>Computers and data show.</b>
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	<b>Will be determined later according to the new circumstances</b>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Discrete Mathematics</b>
<b>Course Code:</b>	<b>Math 432 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical Science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman</b>



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## A. Course Identification

1. Credit hours: <b>3 (contact hours: 2 Theoretical + 2 Exercises)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: <b>Level 7 / Year 4</b>
4. Pre-requisites for this course (if any): <b>Math241T</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction (mark all that apply)

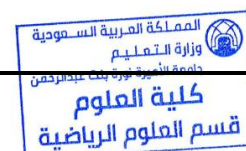
No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<b>1. Course Description</b> Introduction on graphs, Eulerian and Hamiltonian graphs, Planar graphs, Coloring in graphs, Minimum spanning trees, Directed Graphs, Matching, Ordered set, Dilworth Theorem, Combinations and permutation, Inclusion and exclusion, Recursive relations, Generating functions, Sorting problem. Use software packages in some parts of the course such as Maple.
<b>2. Course Main Objective</b> <ol style="list-style-type: none"> <li>Understanding the different notions of graph theory.</li> <li>Understanding the different ways of counting.</li> </ol>



3. Giving students the skill of communication and the use of mathematical programs and calculating skills to stimulate mathematical thinking and understanding and solving mathematical problems.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	C.1

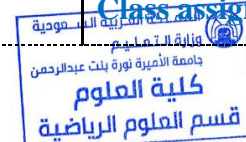
### C. Course Content

No	List of Topics	Contact Hours
1	Introduction on graphs	8
2	Eulerian and Hamiltonian graphs	8
3	Planar graphs	8
4	Trees	4
5	Directed Graphs	4
6	Matching	4
7	Inclusion and exclusion	4
8	Recursive relations	4
9	Generating functions	8
10	Sorting problem	8
<b>Total</b>		<b>60</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Discussions and conversations Brainstorm Presentations	Written exams, Oral exams, Class assignments Homework assignments, Class discussions.
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures Discussions and conversations Brainstorm	Written exams, Oral exams, Class assignments





Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Presentations	Homework assignments, Class discussions.
3.0	Competence		
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	Interactive lectures Presentations Activities Group assignments Scientific laboratories.	Written exams, Oral exams, Class assignments Homework assignments, Class discussions..

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	5 <sup>th</sup> week	10%
2	Midterm 1	9 <sup>th</sup> week	20%
3	Midterm 2	13 <sup>th</sup> week	20%
4	Participation	All of the semester	5%
5	Project and presentation	15 <sup>th</sup> week	5%
6	Final examination	16 <sup>th</sup> -17 <sup>th</sup>	40%

## E. Student Academic Counseling and Support

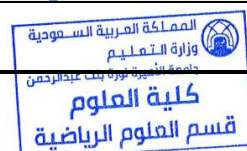
Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (half of teaching load for the staff member), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising.

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Miklos Bona , A Walk Through Combinatorics: An Introduction to Enumeration and Graph Theory (Second Edition) World Scientific Publishing Company 2006.
Essential References Materials	أحمد شراري و محمد الزهيري (مقدمة في نظرية التركيبات)، دار الخريجي ١٤٢٤ هـ الطبعة الأولى أحمد شراري و محمد الزهيري. مقدمة في الرسومات، تحت الإعداد Introduction to Combinatorics (Chapman and Hall Mathematics Series) by Alan Slomson, Publisher: Chapman and Hall 1997.
Electronic Materials	Will be determined later



<b>Other Learning Materials</b>	<b>Mathematical software such as: MATHEMATICA, MATLAB or MAPLE</b>
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## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers devices and data show.
<b>Other Resources</b>	Will be determined later in the light of the new.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of	Faculty members from inside the university Students	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution.

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كلية العلوم  
قسم العلوم الرياضية

Evaluation Areas/Issues	Evaluators	Evaluation Methods
the course and planning for its development	Quality management in the department or the college	2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	Group theory
<b>Course Code:</b>	Math 443 T
<b>Program:</b>	College of sciences program (Bachelors of Mathematical Science)
<b>Department:</b>	Department of Mathematical science
<b>College:</b>	College of Science
<b>Institution:</b>	Princess Nourah bint Abdulrahman University



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## A. Course Identification

1. Credit hours: <b>4 (contact hours: 3 Theoretical + 2 Exercises)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>Level 7 / Year 4</b>
4. Pre-requisites for this course (if any): <b>Math 131 T</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Groups and examples, subgroups and normal subgroups, Factor groups, Homomorphism's , automorphism, symmetric group, Selo theorem and its applications in the classification of finite groups, The use of software Programs in some parts of the subject such as MATLAB or Mable



## 2. Course Main Objective

- The student's ability to distinguish between types of groups
- The student's ability to distinguish between types of Homomorphism's
- Provide students skills for using mathematical programs and computer skills to stimulate mathematical thinking.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	Determine the Outline of Mathematics and Statistics:- Principles, principles, theories and mathematical models	K2
1.3	State theorems of mathematics with their proofs	K3
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability	S3
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish certain goals	C1

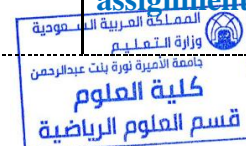
## C. Course Content

No	List of Topics	Contact Hours
1	The groups are defined, examples and basic properties, subgroups and Cyclic groups.	10
2	Symmetric group	5
3	Sets of coset and Lagrang theorem, subgroups , normal subgroups, Factor groups, and Simple groups	20
4	Homomorphism's, symmetries, Cayley theorem, Isomorphism theorems, and aut isomorphism	20
5	The influence of a group on a set, the Equivalence classes, Cauchy theorem, Selo's theorem and its applications in the classification of finite groups	15
6	Direct product ring	5
<b>Total</b>		<b>75</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Determine the Outline of Mathematics and Statistics: principles, theories and mathematical models	Interactive lectures Brainstorm discussions and conversations Presentations	Quizzes Mid-term exams and final exam Homework assignments



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	State theorems of mathematics with their proofs	Interactive lectures Brainstorm discussions and conversations Presentations	Quizzes Mid-term exams and final exam Homework assignments
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability	Interactive lectures Brainstorm discussions and conversations Presentations	Quizzes Mid-term exams and final exam Homework assignments
2.4	Illustrate an ability to communicate effectively with a range of audiences	Interactive lectures Brainstorm discussions and conversations Presentations	Quizzes Mid-term exams and final exam Homework assignments
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish certain goals	Interactive lectures Brainstorm discussions and conversations Presentations	Quizzes Mid-term exams and final exam Homework assignments

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
١	Quiz 1	5	10
٢	First Midterm	12	15
٣	Quiz 2	10	10
٤	Homework Assignment	weekly	5
٥	Second Midterm	13	20
٦	Final examination	After week 15	40

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students





face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities


### 1. Learning Resources

<b>Required Textbooks</b>	- معروف سمحان، فوزي الذكير. <u>نظرية الزمر</u> . دار الخريجي للطباعة والنشر، ٢٠٠٧
<b>Essential References Materials</b>	- محمد القاضي وعبد الله الجوعي. <u>مقدمة في نظرية الزمر</u> . مكتبة الرشد. الطبعة الأولى -أي هيرستين (مواضيع في الجبر) ترجمة فوزي الذكير وعلى السحيباني. جامعة الملك سعود (٢٠٠٠). <u>John B. Fraleigh , A First Course in Abstract Algebra, 7th Edition by Addison Wesley 2002</u>
<b>Electronic Materials</b>	Determined by the teacher of the course at the time.
<b>Other Learning Materials</b>	Mathematical software such as: MATLAB or Mable

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students. * The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones. * There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	To be determined later

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
<b>Effectiveness of teaching and assessment.</b>	Students	Survey 

<b>Verifying of achievement of course learning outcomes</b>	<b>Program quality and accreditation unit</b>	<b>Learning outcomes matrix General students level</b>
<b>Verifying standards of student achievement.</b>	<b>Independent member teaching staff</b>	<b>11- Check marking by an independent member teaching staff of samples of student work. 12- Exchanging periodically to mark exams or a sample of assignments with faculty members</b>
<b>Planning procedures for periodic review of the effectiveness of the course and planning for its development</b>	<b>Faculty members inside the institution, students, program and collage quality</b>	<b>11- Periodic review of courses by faculty members to discuss recurring problems to find the appropriate solution. 12- Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.</b>
<b>Evaluation of the course file</b>	<b>Program quality and accreditation unit</b>	<b>Check and review the course file content.</b>

### **H. Specification Approval Data**

<b>Council / Committee</b>	<b>The Mathematical Sciences Department</b>
<b>Reference No.</b>	<b>The 10<sup>th</sup> Council</b>
<b>Date</b>	<b>30/12/2019</b>



<b>Course Title:</b>	Rings and fields
<b>Course Code:</b>	Math 444 T
<b>Program:</b>	Bachelors of Mathematical Science
<b>Department:</b>	Mathematical science
<b>College:</b>	Science
<b>Institution:</b>	Princess Nourah bint Abdulrahman University

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<b>G. Course Quality Evaluation</b> .....	<b>7</b>
<b>H. Specification Approval Data</b> .....	<b>7</b>



## A. Course Identification

1. Credit hours:	4 (Contact hours: 3 Theoretical + 2 Tutorial)
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Level 8 / Year 4
4. Pre-requisites for this course (if any):	Group Theory, Math 443T
5. Co-requisites for this course (if any):	None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b></p> <p>Rings and example of rings, Homomorphisms, ideals and quotient rings, Field of quotient of an integral domain, Euclidean rings and polynomials rings, Fields and their extensions, Finite fields. Use program packages such as Mathematica, MatLab or Maple in some scheduled topics.</p>
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## 2. Course Main Objective

- Distinguish between the types of rings and fields and homomorphisms.
- Understand the theorems of ideals and fields.
- Develop the ability to understand new algebraic structures.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	Outline of Mathematics and Statistics: basics, Principles, theories and mathematical models	K.2
1.3	Mention mathematical theories with their proofs. Theories associated with the course with some proof	K.3
2	<b>Skills :</b>	
2.3	Evaluate different methods and techniques in solving problems, their effectiveness and applications through the subjects of the course	S.3
3	<b>Competence:</b>	
3.2	Demonstrate the ability to work effectively within teams to achieve specific goals.	C.2

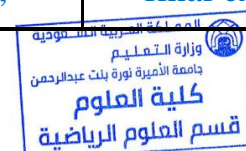
## C. Course Content

No	List of Topics	Contact Hours
1	Rings and examples of a partial ring and a group of units	5
2	Ideals, quotient rings, Homomorphisms, main rings, prime and maximal ideals	15
3	Field of quotient of an integral domain, characteristic of a ring, direct sum and modules	15
4	Euclidean rings and polynomials rings	15
5	Fields, their extensions and Algebraic extension	15
6	Finite fields	10
<b>Total</b>		75

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Outline of Mathematics and Statistics: basics, Principles, theories and mathematical models	Interactive lectures, Brainstorm, discussions,	Tests(Quizzes Mid-term exams and final exam)



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Mention mathematical theories with their proofs. Theories associated with the course with some proof	dialogue and presentation	Class participation, Homework, exercise
2.0	<b>Skills</b>		
2.3	Evaluate different methods and techniques in solving problems, their effectiveness and applications through the subjects of the course	Interactive lectures, Brainstorm, discussions, dialogue and presentation	Tests(Quizzes Mid-term exams and final exam) Class participation, Homework, exercise
3.0	<b>Competence</b>		
3.2	Demonstrate the ability to work effectively within teams to achieve specific goals.	Interactive lectures, Brainstorm, discussions, dialogue and presentation	Tests(Quizzes Mid-term exams and final exam) Class participation, Homework, exercise

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz1	5th	10%
2	Midterm exam	10th	20%
3	Homework, exercises, assignments	weekly	15%
4	Quiz2	13th	10%
5	Short research	11-12th	5%
6	Final exam	After 15	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.



- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	يوسف الخميس. نظرية الحلقات و امتداد الحقول . جامعة الملك سعود. الطبعة الثانية ٢٠٠٦
<b>Essential References Materials</b>	أي هيرستين ( مواضيع في الجبر ) ترجمة فوزي الذكرير وعلي السحيباني.. جامعة الملك سعود (٢٠٠٠). John B. Fraleigh , A First Course in Abstract Algebra, 7th Edition by Addison Wesley 2002
<b>Electronic Materials</b>	Will be determined later according to the course instructor
<b>Other Learning Materials</b>	Program Software packages such as Maple, Mathematica, MatLab

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students. The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones. There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	To be determined later depending on what is new





## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Cryptography and Coding</b>
<b>Course Code:</b>	<b>Math 445 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical science</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman</b>



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## A. Course Identification

1. Credit hours: <b>3 credit hours (3theoretical+0)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: <b>level 7, level 8 / 4<sup>th</sup> year</b>
4. Pre-requisites for this course (if any): <b>Number Theory Math 342 T</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>45</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b>  <b>Monalphabetic cipher systems, polyalphabetic cipher Systems, stream Systems.</b>  <b>Analysis of cipher systems. Exponentiation cipher systems, public key cipher systems( Exponentiation cipher system, RSA cipher system, El Gamal cipher system) Electronic signature and introduction of electronic government, Introduction of coding theory- linear coding systems – complete coding systems- periodic coding systems.</b></p>
<p><b>2. Course Main Objective</b>  <b>Apply the student algorithms used in algebra and the theory of numbers in cryptography and information protection.</b></p>



### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	Outline of Mathematics and Statistics: Principles, theories and mathematical models	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics	S.2
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish goals	C.1

### C. Course Content

No	List of Topics	Contact Hours
1	Monalphabetic cipher systems, polyalphabetic cipher Systems,	9
2	Streams systems: auto-key cipher-linear recursive cipher	6
3	Analysis of cipher systems. Exponentiation cipher systems	9
4	Public key systems (Exponential system, RSA system and El Gamal system)	6
5	Electronic signature - introduction of electronic government.	6
6	Introduction of coding theory- linear coding systems – complete coding systems- periodic coding systems.	9
Total		45

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Outline of Mathematics and Statistics: Principles, theories and mathematical models	Interactive lectures Brainstorming Discussion dialogue Presentations	tests (quizzes, midterms, final) – class participation – homework-exercises
1.4	Use mathematical definitions and formulas in thinking and logical processes.		
2.0	<b>Skills</b>		
2.2	Apply appropriate tools and processes, using advanced mathematics	Interactive lectures Brainstorming Discussion dialogue Presentations	tests (quizzes, midterms, final) – class participation – homework-exercises



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish goals.	Presentations, Interactive lectures	class participation, Home works, exercises.

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	6 <sup>th</sup> week	10
2	Midterm exam 1	9 <sup>th</sup> week	20
3	Midterm exam 2	12 <sup>th</sup> week	20
4	Homework and exercises	weekly	10
5	Final exam	after 15 <sup>th</sup> week	40

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

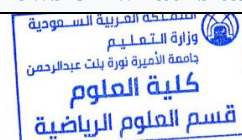
Required Textbooks	معروف سمحان، فوري الذكير. نظرية التعمية. دار الخريجي للنشر والتوزيع، ١٤٢٩ هـ، الرياض
Essential References Materials	Douglas R. Stinson. Cryptography: Theory and Practice. CRC Press 2000 D.G. Hoffman et al. Dekker. Coding Theory: The Essential. Press, latest edition.
Electronic Materials	To be determined by the professor of the course.
Other Learning Materials	To be determined by the professor of the course.

## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	Computers and data show.
<p><b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	Determined later according to the new circumstances

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and



		receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019





<b>Course Title:</b>	<b>Linear programming and Applications</b>
<b>Course Code:</b>	<b>Math 453 T (Taught in English)</b>
<b>Program:</b>	<b>College of sciences program (Bachelors of Mathematical Science)</b>
<b>Department:</b>	<b>Department of Mathematical science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>

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## A. Course Identification

1. Credit hours: <b>4 (contact hours: 3 Theoretical + 2 Exercises)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>Level 7 / Year 4</b>
4. Pre-requisites for this course (if any): <b>Math 241 T</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	4	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	30
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Introduction to linear programming, formulation of linear programming problem. Definitions: convex set, geometric approach to solve linear programming problem, extreme points. Simplex Method for linear programming problem, Degenerate solutions, two phase method. Duality. Revised Simplex, Sensitivity Analysis. Applications Using Mathematica, Maple or Matlab in some parts of this course.



## 2. Course Main Objective

- Gain skill in applying optimization to transportation, networking and employment issues, in addition to some applications in the field of trade, industry, food and others.
- Sensing problems while providing solutions to them by practicing higher thinking skills, analyzing, interpreting and discussing results and information.
- Gain experience in creating mathematical models for life issues, and analyze them in order to reach a solution.
- Gain skill in using computer technology and mathematical programs to treat mathematical models and solve applied problems.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K4
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	S2
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S3
2.5	Demonstrates an ability to use current mathematical: techniques, software, skills, and tools necessary for analyzing real life problems	S5
3	<b>Competence:</b>	
3.2	Demonstrates the need for and the ability to engage in continuing professional development	C2

2.5

## C. Course Content

No	List of Topics	Contact Hours
1	Definitions: convex set, extreme points.	6
٢	Geometric approach to solve linear programming problem,	٦
3	Simplex Method for linear programming problem, Degenerate solutions, two phase method, First midterm exam	٩
٤	Duality. Revised Simplex, Sensitivity Analysis Second med term exam , transportation problem	12
٥	Applications	12
٦	Software application and project presentation for solving problems	25
Total		70



## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Brainstorming Discussion Presentations	Quizzes Mid-term exams and final exam assignments
2.0	<b>Skills</b>		
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	Interactive lectures Brainstorming Discussion Presentations	Quizzes Mid-term exams and final exam assignments
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Presentations Interactive lectures Activities Practical training	Quizzes Mid-term exams and final exam assignments Homework assignments
2.5	Demonstrates an ability to use current mathematical: techniques, software, skills, and tools necessary for analyzing real life problems	Interactive lectures Brainstorming Discussion Presentations Practical training	Quizzes Mid-term exams and final exam assignments Homework assignments
3.0	<b>Competence</b>		
3.2	Demonstrates the need for and the ability to engage in continuing professional development	Software application	Software applications tests

### 2. Assessment Tasks for Students

#	Assessment task	Week Due	Percentage of Total Assessment Score
1	participation	Weekly	10
2	quizzes	5 <sup>th</sup> week 11 <sup>th</sup> week	20
3	Experimental test	Weekly	10
4	Midterm Exam	8 <sup>th</sup> week	20
5	Final Exam	15 <sup>th</sup> week	40

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members



through her site on the web.

- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	<p>-Bernard Kolman, R. Beck “ Elementry Linear Programming with Applications “Elsevier , 1995</p> <p>-Alan Sultan, Linear Programming, An Introduction with Applications, Academic Press, Inc., Harcourt Brace Jovanovich, Publishers, 1993</p>
Essential References Materials	<p>- Wayne L. Winston M, unirpallam Venkataramanan, Introduction to Mathematical Programming: Applications and Algorithms Duxbury, 2002, 4<sup>th</sup> Edition.</p> <p>- Richard Darst, Introduction to Linear Programming: Applications and Extensions (Pure and Applied Mathematics), Marcel Dekker Inc., 1991.</p> <p>الأسس الرياضية للبرمجة الخطية، تأليف سليمان الحميدان، عمر حامد و حسن حميدة، الناشر جامعة الملك سعود، الرياض</p>
Electronic Materials	<p>Math way , Graphing calculator , Geojebra</p> <p><a href="http://www.emis.de/ZMATH">http://www.emis.de/ZMATH</a></p> <p><a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a></p> <p><a href="http://www.math.dundee.ac.uk">http://www.math.dundee.ac.uk</a></p> <p><a href="http://www.focm.net/">http://www.focm.net/</a></p> <p><a href="http://math.uwaterloo.ca/">http://math.uwaterloo.ca/</a></p> <p><a href="http://www.mathfourm.org/advanced/numerical.htm">http://www.mathfourm.org/advanced/numerical.htm</a></p> <p><a href="http://www.numerical.rl.ac.uk/external/external.shtml">http://www.numerical.rl.ac.uk/external/external.shtml</a></p>
Other Learning Materials	<p>Math.softwares :</p> <p>Math way ,</p> <p>live physics(3D graphing calculator)</p> <p>Geojebra ( 2D graphing calculator )</p>

## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students. The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones. There will be a connection to the internet, and a modern air conditioning system and appropriate lighting</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	<p>Computers, soft wares and data show.</p>
<p><b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	<p>None</p>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment.	Students	Survey
Verifying of achievement of course learning outcomes	Program quality and accreditation unit	Learning outcomes matrix General students level
Verifying standards of student achievement.	Independent member teaching staff	<p>13- Check marking by an independent member teaching staff of samples of student work.</p> <p>14- Exchanging periodically to mark exams or a sample of assignments with faculty members</p>
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members inside the institution, students, program and collage quality	<p>13- Periodic review of courses by faculty members to discuss recurring problems to find the appropriate solution.</p> <p>14- Give the opportunity for students to express their views on what is</p>

الجامعة العربية السعودية  
جامعة الأميرة نورة بنت عبدالرحمن  
كلية العلوم  
قسم العلوم الرياضية

		taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019





<b>Course Title:</b>	Statistical Analysis
<b>Course Code:</b>	Math 463 T
<b>Program:</b>	Bachelors of Mathematical Science.
<b>Department:</b>	Mathematical science
<b>College:</b>	Science
<b>Institution:</b>	Princess Nourah bint Abdulrahman

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## A. Course Identification

<b>1. Credit hours:</b> 3 Credit hours (contact hours: 2 Theoretical +2 Tutorial)
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> Level 7, level 8 (the fourth year)
<b>4. Pre-requisites for this course (if any):</b> Theory of probabilities (Math362 T)
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	60
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

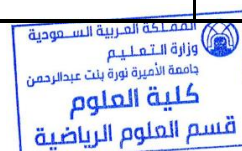
<p><b>1. Course Description</b>  <b>Sampling distributions: Introduction Random (probabilistic) sampling: Simple random sampling, Stratified sampling, Systematic sampling, Cluster sampling-Non probabilistic sampling: (Convenience sampling, Judgmental sampling) Sampling distributions: (Sampling distributions of sample means, Sampling distributions of sample proportions). Confidence intervals: Variance confidence intervals/Confidence intervals for ratio of variances/Sample size determination. Hypothesis testing: Introduction/General Concepts of the Neyman-Pearson Testing Hypotheses Theory/UMP Tests for Testing Certain Composite Hypotheses/Testing the Parameters of a Normal Distribution/Likelihood Ratio Tests.</b></p>
<p><b>2. Course Main Objective</b>  <b>Providing students with skill in dealing with databases and statistical analysis and applying them to public life issues.</b></p>

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions in sampling distributions, estimations, test of hypothesis	K.4
2	<b>Skills :</b>	
2.2	The student able to analyze a real life problem through estimations and hypothesis test.	S.2
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability. For example Statistical Applied (R,SPSS)	S.3
3	<b>Competence:</b>	
3.3	The student able to implement a given technique using computer software (SPSS,R).	C.3

## C. Course Content

No	List of Topics	Contact Hours
1	<p><b>Sampling distributions: Introduction</b>  <b>Random (probabilistic) sampling: Simple random sampling, Stratified sampling, Systematic sampling, Cluster sampling</b>  <b>Non probabilistic sampling: (Convenience sampling, Judgmental sampling)</b>  <b>Sampling distributions: (Sampling distributions of sample means, Sampling distributions of sample proportions)</b>  <b>Quiz1</b></p>	20



2	Confidence intervals: Variance confidence intervals/Confidence intervals for ratio of variances/Sample size determination	16
3	First Mid Term	4
4	Hypothesis testing: Introduction/General Concepts of the Neyman-Pearson Testing Hypotheses Theory/UMP Tests for Testing Certain Composite Hypotheses/Testing the Parameters of a Normal Distribution/Likelihood Ratio Tests	20
<b>Total</b>		<b>60</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Using mathematical concepts and laws in logical thinking and operations through the course topics.	Interactive lectures, discussions, dialogue, Brainstorm, presentation.	Quizzes, midterm exams, final exam Homework, assignments, class participation, exercises.
2.0	<b>Skills</b>		
2.2	Applying appropriate tools and processes using mathematics and computer programs through the course topics.	Interactive lectures, discussions, dialogue, Brainstorm, presentation.	Quizzes, midterm exams, final exam Homework, assignments, class participation, exercises
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability. Through the course topics	Interactive lectures, discussions, dialogue, Brainstorm, presentation.	Quizzes, midterm exams, final exam Homework, assignments, class participation, exercises
3.0	<b>Competence</b>		



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.3	Implement specific technology on real life data using a computer if necessary Through the course topics.	Interactive lectures, discussions ,dialogue, Brainstorm, presentation.	Quizzes, midterm exams, final exam Homework, assignments, class participation, exercises.

## 2. Assessment Tasks for Students

#	Assessment task	Week Due	Percentage of Total Assessment Score
1	Quiz 1	5th week	15
2	Midterm 1	10th week	20
3	Quiz 2	13th week	15
4	Project, homework and assessments	weekly	10
5	Final examination	After 15 week	40

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Walpole, R. E., Myers, R. H., and S. L. Myers (2007), Probability and Statistics for Engineers and Scientists, 8th ed., Prentice-Hall, inc., Upper Saddle River, new Jersey.
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<b>Essential References Materials</b>	Will be determined later
<b>Electronic Materials</b>	<a href="http://www.Library.uiuc.edu/doc/statistics.htm">http://www. Library.uiuc.edu/doc/statistics.htm</a>
<b>Other Learning Materials</b>	Statistical software such as: Minitab, SPSS

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	To be determined later in the light of new circumstances

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work



		-Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019





<b>Course Title:</b>	Differential Geometry
<b>Course Code:</b>	Math 473 T
<b>Program:</b>	Bachelor of Mathematical Science
<b>Department:</b>	Mathematical science
<b>College:</b>	College of Science
<b>Institution:</b>	Princess Nourah bint Abdulrahman University



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## A. Course Identification

1. Credit hours: <b>4 (contact hours: 3 Theoretical + 2 Exercises)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>Level 7 / Year 4</b>
4. Pre-requisites for this course (if any): <b>Linear Algebra Math 241 T &amp; calculus 4 math 204 T</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Curves in  $R^3$  space, Smooth curves and change parameters, Frenet frame, Existence and uniqueness theorem of curves in spaces, local theory of surfaces, simple surfaces, changing coordinates, tangents vectors and tangents fields, the first and second fundamental forms, principles, Gauss, mean and Geodesics curvature, Gauss codazzi mainardi equation.

Use program packages such as Mathematica, MATLAB or Maple in some scheduled topics.

### 2. Course Main Objective

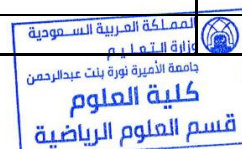
- 1- Providing students' knowledge and science in the field of differential engineering using mathematical programs and computer skills to stimulate mathematical thinking.
2. Giving students mental skills such as logical thinking, analysis, explanation, problem solving and decision making.
3. Understand the axioms, definitions and basic theories and develop the ability to understand the nature of mathematical proof

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using math and computer software through course topics	S.2
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
2.4	Illustrate an ability to communicate effectively with a range of audiences.	S.4
3	<b>Competence:</b>	
3.2	Demonstrates the need for and the ability to engage in continuing professional development.	C.2

## C. Course Content

No	List of Topics	Contact Hours
1	Curves in $R^3$ space	7.5
2	Smooth curves and change parameters	5
3	Frenet frame	7.5
4	Existence and uniqueness theorem of curves in spaces.	5
5	Local theory of surfaces	5
6	Med 1.	2



7	Simple surfaces	6.5
8	Changing coordinates	5
9	Tangents vectors and tangents fields	6.5
10	Med 2	2
11	First and second fundamental forms	6
12	Principles, Gauss , mean curvature	7
13	Geodesics curvature	5
14	Gauss codazzi mainardi equation	5
<b>Total</b>		75

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures, Brainstorm, Discussions and conversations, presentations	Written and oral tests (quizzes, midterms, final) – class work
2.0	<b>Skills</b>		
2.2	Apply appropriate tools and processes, using math and computer software through course topics	Interactive lectures, Brainstorm, Discussions and conversations, presentations	Written and oral tests (quizzes, midterms, final) – class work
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures, Brainstorm, Discussions and conversations, presentations	Written and oral tests (quizzes, midterms, final) – class work
2.4	Illustrate an ability to communicate effectively with a range of audiences	Interactive lectures, Presentations, Practical Training University activities	Follow up the homework assignments and discussing it with students.
3.0	<b>Competence</b>		
3.2	Demonstrates the need for and the ability to engage in continuing professional development.	Interactive lectures, Presentations, Practical Training University activities	Follow up the homework assignments and discussing it with students.

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Short research	Once in the term	50%



#	Assessment task*	Week Due	Percentage of Total Assessment Score
2	Homework Assignments	weekly	10%
3	First Midterm exams	7 <sup>th</sup> week	15%
4	Second Midterm exams	12 <sup>th</sup> week	20%
5	Quizzes	twice in the term	10%
6	Final exam	After 15 week	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	-A. Pressley, Elementary Differential Geometry, Springer, 2010 -R. Millman and G. Parker, Elements of Differential Geometry, Prentic-Hall, 1977
Essential References Materials	-A. Gray, Modern Differential Geometry of curves and surfaces, CRC press, 1998. -J. Oprea, Differential Geometry and its Applications, The Mathematical Association of America, 2nd edition (2007). -Aboglorf, differential geometry, darmeer Moscow, 1984 نصار عبدالعال السلمي, مقدمة في الهندسة التفاضلية, مكتبة الرشد, ٢٠٠٨.
Electronic Materials	Determined by the teacher of the course.
Other Learning Materials	Ready Software packages such as programs like: Mathematica - MATLAB or Mable

## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	<p>Computers devices and data show.</p>
<p><b>Other Resources</b></p>	<p>Will be determined later in the light of the new.</p>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what

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Evaluation Areas/Issues	Evaluators	Evaluation Methods
planning for its development		is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019





<b>Course Title:</b>	<b>Complex Analysis</b>
<b>Course Code:</b>	<b>Math 483 T</b>
<b>Program:</b>	<b>Bachelor of Mathematical Sciences</b>
<b>Department:</b>	<b>Mathematical sciences</b>
<b>College:</b>	<b>College of Sciences</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>

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## A. Course Identification

1. Credit hours:	4 Credit hours (3 Theoretical+2 Tutorial)		
2. Course type			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
3. Level/year at which this course is offered:	8 <sup>th</sup> Level / 4 <sup>th</sup> Year		
4. Pre-requisites for this course (if any):	Math. 381 T (Real Analysis 1)		
5. Co-requisites for this course (if any):	None		

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>



## B. Course Objectives and Learning Outcomes

### 1. Course Description

Complex numbers ( properties & representation ), power and roots of complex number, Complex functions, mappings , limits ,continuity, Derivatives: differentiation forms, Cauchy-Rieman equations, Analytic functions, necessary & sufficient conditions for the analyticity , harmonic functions, Elementary functions : exponential, logarithmic, trigonometric ,hyperbolic , Integration: Complex integrals: line Integrals, Cauchy-Goursat Theorem, Cauchy's Integral formulas, Representation of Analytic function by Taylor and Laurant Series.

Zeros, Singularities, Cauchy's Residue Theorem, applications of Residue theorem,

### 2. Course Main Objective

- The main objective of this course is to study the properties of complex numbers and analytical functions, complex integration and important integrative formulas
- Students' ability to memorize and recognize mathematical definitions, concepts and facts of limits, continuity, and derivation for complex functions.
- Students' ability to apply mathematical critical thinking skills and various techniques to prove or disprove mathematical arguments of complex functions and to solve some of their applied problems.
- Students' ability to be able to determine the appropriate technique and work as a cooperative team in order to facilitate finding constructive solutions for life problems

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3	<b>Competence:</b>	
3.2	Demonstrates the need for and the ability to engage in continuing professional development	C.2

## C. Course Content

No	List of Topics	Contact Hours
1	Complex numbers (properties & representation)	10
2	Complex functions, mappings , limits ,continuity .	10
3	Derivatives: differentiation forms, Cauchy-Rieman equations, necessary & sufficient conditions for the analyticity, harmonic functions.	12.5
4	Elementary functions : exponential, trigonometric ,hyperbolic and logarithmic functions, invers trigonometric functions	10



5	Integration: bounded integrals, contours, line Integrals, Cauchy-Goursat Theorem, Cauchy's Integral formula.	10
6	Liouville theorem, Representation of Analytic function by Taylor and Laurant Series.	10
γ	Zeros, Singularities, Cauchy's Residue Theorem, applications of Residue theorem, applications of Residue theorem .	12.5
<b>Total</b>		<b>75</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Discussions and conversations Brainstorm Presentations.	Written exams (quizzes, midterm, final), class discussions.
<b>2.0</b>	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures Discussions and conversations Brainstorm Presentations.	Written exams (quizzes, midterm, final), class discussions.
<b>3.0</b>	<b>Competence</b>		
3.2	Show an ability to function effectively within team to accomplish curtains goals	Interactive lectures Discussions and conversations Brainstorm Presentations.	Written exams (quizzes, midterm, final), class discussions.

#### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Two quizzes	(6 <sup>th</sup> & 10 <sup>th</sup> ) week	20%
2	Mid1	9 <sup>th</sup> week	15%
3	Mid2	13 <sup>th</sup> week	20%
4	Homework Assignment, activities and self-learning	Weekly	5%
5	Final exam	16 <sup>th</sup> week	40%

### E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours weekly), that will be attached with



the lectures table and be announced to the students.

- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	James Brown and Ruel Churchill, Complex Variables and Application, McGraw-Hill; 8th edition (2008).
<b>Essential References Materials</b>	<ul style="list-style-type: none"> <li>- A first Course in Complex Analysis with applications" " Dennis G. Zill and Patrick D. Shanahan</li> <li>- E. B. Saff and A. D. Snider, "Fundamentals of Complex Analysis for Mathematics, Science, and Engineering," 3rd Edition Prentice-Hall, Englewood Cliffs, New Jersey, (2003).</li> <li>- E. Freitag and R. Busam, Complex Analysis, Springer for Mathematics, Berlin, 2006.</li> </ul> <p>- التحليل المركب وتطبيقاته، تأليف و. ديريك (مترجم) ٢٠٠٢م.</p>
<b>Electronic Materials</b>	<a href="http://en.wikipedia.org">http://en.wikipedia.org</a> <a href="http://www.ams.org">http://www.ams.org</a> <a href="http://www.math.psu.edu">http://www.math.psu.edu</a> <a href="http://www.emis.de/ZMATH">http://www.emis.de/ZMATH</a> <a href="http://www.sciencedirect.com">http://www.sciencedirect.com</a>
<b>Other Learning Materials</b>	Mathematical software such as: Matlab, Mathematica and Maple

### 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> </ul>



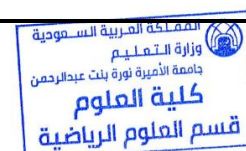
Item	Resources
	* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers devices and data show.
<b>Other Resources</b>	Will be determined later in the light of the new.

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Graduation Project</b>
<b>Course Code:</b>	<b>Math 491 T</b>
<b>Program:</b>	<b>Bachelors of Mathematical Science</b>
<b>Department:</b>	<b>Mathematical science</b>
<b>College:</b>	<b>Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

<b>1. Credit hours:</b>	3 (Contact hours: 3 Theoretical + 0 Exercises)
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	Level 8 / Year 4
<b>4. Pre-requisites for this course (if any):</b>	Passing at least 110 credit hours
<b>5. Co-requisites for this course (if any):</b>	None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	45
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	20

## B. Course Objectives and Learning Outcomes

The student in the eighth level conducts a survey of the topics that she chooses to research, under the supervision of a faculty member according to the possibility of the human department and laboratory.

The student selects the specialization that she wishes to accomplish her graduation project in his courses according to the possibility of the department in terms of accommodating the necessary numbers to supervise the work of the student.

The research plan is determined with the faculty member supervised by the chosen specialization, and then the student is implementing the plan following the supervising professor. Then write the research, and then discuss it through a seminar

## 2. Course Main Objective

Student learns to search for information and set a goal for research and follow-up of the former in the field of research as well as possess the student skill writing for scientific research.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Not applicable	
2	<b>Skills :</b>	
2.1	Develop mathematical and models of real life problems in a way that demonstrates its appropriateness and justification.	S.1
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	S.2
2.5	Demonstrates an ability to use current mathematical: techniques, software, skills, and tools necessary for analyzing real life problems	S.5
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	C.1
3.3	Implement a given technique on real life data using a computer if necessary.	C.3

## C. Course Content

No	List of Topics	Contact Hours
1	Reading and viewing through information sources to select the search point in consultation with the academic guiding.	6
2	Writing the research plan under the supervision of a faculty member in the specialty and presenting the plan at members of the section through the group search for approve it.	6
3	Achievement of the research plan.	18
4	Analysis the resulting.	6
5	Writing the search.	6
6	Discuss search and modify what have been proposed by the judging committee.	3
<b>Total</b>		45

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.1	None		
2.0	<b>Skills</b>		
2.1	Develop mathematical and models of real life problems in a way that demonstrates its appropriateness and justification.	Interactive lectures Brainstorming Discussion and dialogue Presentations	-Classroom Participation - Project Evaluation Committee
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs		
2.5	Demonstrates an ability to use current mathematical: techniques, software, skills, and tools necessary for analyzing real life problems	Exercises and discussions	
3.0	<b>Competence:</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	Interactive lectures Brainstorming Discussion and dialogue Presentations	Practical tests Classroom participation
3.3	Implement a given technique on real life data using a computer if necessary.		

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Timely attendance and commitment to tasks(Providing the necessary references for the research, attendance of the supervision hour, the extent of the student's activity and seriousness, its regularity in the work of the research, the extent of the organization of the information, accuracy and sequence)	Weekly	٪٣٠
2	Adherence to the criteria of scientific writing (the comprehensiveness of the title of the vocabulary of the research - the adoption of sound scientific methods in writing research - selection of information - the use of tools of scientific research - writing references in a scientific way - the level of research output)	Weekly	٪٣٠



#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Final evaluation of the project as a whole (diction and discussion - enable the student of scientific material - clarity of presentation - student personality)	After 15 <sup>th</sup>	٪٤٠

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

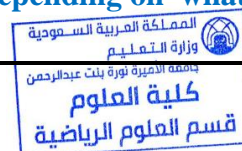
## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Determined by the supervisor according to the chosen subject
Essential References Materials	Determined by the supervisor according to the chosen subject
Electronic Materials	Determined by the supervisor according to the chosen subject
Other Learning Materials	Program Software, CD, statistical packages as SPSS, MINITAB, SAS, Maple, Mathematica, MatLab, and R-language.

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	(2-3) students, with integrated audio system, wired and wireless microphones internet connection, modern air conditioning system and suitable lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	smart board, computers
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	To be determined later depending on what is new



## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



# مقررات تدرس خارج قسم العلوم الرياضية

<b>Course Title:</b>	<b>Principles of Mathematics,</b>
<b>Course Code:</b>	<b>Math 100 T</b>
<b>Program:</b>	<b>Colleges (Education - Arts - Design and Arts - Business and Management - Social Work - Languages and Translation)</b>
<b>Department:</b>	<b>Mathematical Sciences</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah University</b>





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## A. Course Identification

1. Credit hours:	3 Credit hours (2 Theoretical + 2 Tutorial)		
2. Course type			
a.	University <input type="checkbox"/>	College <input checked="" type="checkbox"/>	Department <input type="checkbox"/>
	Others <input type="checkbox"/>		
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
3. Level/year at which this course is offered:	Starting from 1 <sup>st</sup> level/ 1 <sup>st</sup> year		
4. Pre-requisites for this course (if any):	None		
5. Co-requisites for this course (if any):	None		

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

The real number and properties – The number line – Absolute value – rational expressions – exponents and radicals – rationalizing denominators – first degree Equation – quadratic equation – Graphs – equation of line – linear inequalities – Function – Quadratic function – Exponential function - logarithmic function and properties - logarithmic and Exponential equation – Matrix operations and inverses – frequency distributions – measure mean , median ,mode, sample standard deviation

## 2. Course Main Objective

3. Ability to think positively and effectively and use numerical and algebraic mathematical skills and higher thinking skills to solve vital and social problems.
4. Developing mathematical logical thinking skills in dialogue, discussion and ability to judge results.
5. Gain communication skill and use mathematical programs and computer skills to stimulate mathematical thinking and understanding and solving mathematical problems.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics	K.1
1.2	Outline the mathematical and statistical: foundations, principles, theory and models.	K.2
1.3	State theorems of mathematics with their proofs.	K.3
2	<b>Skills :</b>	
2.4	Illustrate an ability to communicate effectively with a range of audiences.	S.4

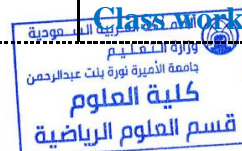
## C. Course Content

No	List of Topics	Contact Hours
1	The Real Numbers - Rational Expressions - Exponents and Radicals - First- Degree Equation - Quadratic Equations.	16
2	Graphs – Equations of Lines - Linear Inequalities	8
3	Functions - Quadratic Functions and Applications	4
4	Exponential Functions - Logarithmic Functions - 4 Exponential and Logarithmic Equations	8
5	Tow mid + Short two quizzes	8
6	Basic Matrix Operations - Matrix Product and Inverses	4
7	Frequency Distribution - Measures of Center - Measures of Variation.	8
^	Revision	4
<b>Total</b>		60

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.1	Describe knowledge of mathematics and statistics.	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quizzes Mid-term exams and final exam Homework Class work



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Outline in Mathematics and Statistics: Fundamentals, principles, theories and mathematical models	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quizzes Mid-term exams and final exam Homework Class work
1.3	State theorems of mathematics with their proofs	Interactive lectures Brainstorming Discussion and dialogue Presentations	Quizzes Mid-term exams and final exam Homework Class work
2.0	<b>Skills</b>		
2.4	Illustrate an ability to communicate effectively with a range of audiences.	Cooperative Education Problem Solving Discussion and dialogue	Study assignments, exercises and class participation

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Short two quizzes	(6 <sup>th</sup> and 13 <sup>th</sup> ) week	15%
2	First and second Midterm exams	(8 <sup>th</sup> and 12 <sup>th</sup> ) week	40%
3	Homework Assignments	weekly	5%
4	Final exam	After 15 <sup>th</sup> week	40%

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Precalculus-Finite Mathematics with Applications in the Management, Natural and Social Sciences. LIAI, HUNGERFORD, HOLCOMB AND MULLINS 11th Edition. Pearson education
Essential References Materials	1-Bvleen,K ;Zieglen,M& Barnett,R., Precalculus, McGraw-Hill College, 6th Edition.

كلية العلوم  
قسم العلوم الرياضية

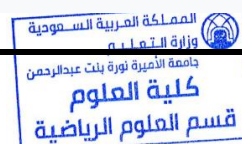
	<p>2-College Algebra with Trigonometry by Barnett, Ziegler, Byleen, Sobecki 9th Edition Elementary Statistics: A Step-by-Step Approach by Bluman, Allan 7th Edition</p> <p>3-Margaret L. Lial and Charles D. Miller, College Algebra, Harpercollins College Div, 6<sup>th</sup> Edition, (1992)</p>
<b>Electronic Materials</b>	To be determined depending on what is new
<b>Other Learning Materials</b>	Mathematica or Maple or Matlab

## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	Computers devices and data show.
<b>Other Resources</b>	Will be determined later in the light of the new.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students



Evaluation Areas/Issues	Evaluators	Evaluation Methods
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

#### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	Mathematics for Foundation Year
<b>Course Code:</b>	Math 101-1T
<b>Program:</b>	Bachelor of Mathematical science
<b>Department:</b>	Department of Mathematical science
<b>College:</b>	College of Science
<b>Institution:</b>	Princess Nourah bint Abdul Rahman

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## A. Course Identification

1. Credit hours:	<b>3 Credit hours (contact hours: 1 Theoretical + 2 Tutorial)</b>
2. Course type	
a.	University <input checked="" type="checkbox"/> College <input type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	<b>1<sup>st</sup> level/ 1<sup>st</sup> year</b>
4. Pre-requisites for this course (if any):	<b>None</b>
5. Co-requisites for this course (if any):	<b>None</b>

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	<b>36</b>	<b>100%</b>
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	<b>24</b>
2	Laboratory/Studio	
3	Tutorial	<b>12</b>
4	Others (specify)	
	<b>Total</b>	<b>36</b>
<b>Other Learning Hours*</b>		
1	Study	<b>15</b>
2	Assignments	<b>5</b>
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

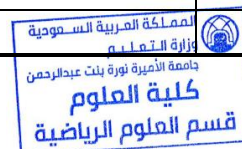
<p><b>1. Course Description</b>            Functions (the concept of relationships and functions - inverse functions - the composition function), Linear equations and applications. Linear inequalities. Complex numbers. Quadratic equations and applications. Exponential functions, Logarithmic functions. Properties of trigonometric Functions, inverse trigonometric functions. Parabola-ellipse-hyperbola. System of Linear equations in two variables. Matrix operations</p>
<p><b>2. Course Main Objective</b></p> <p>6. The ability to think positively and effectively in solving problems</p> <p>7. The ability to use numerical and algebraic mathematical skills and high thinking skills in solving biomathematical and social problems.</p> <p>8. Develop mathematical and logical reasoning skills in dialogue and discussion</p> <p>9. Develop the ability to judge results</p> <p>10. Acquiring the skill of communication and the use of mathematical programs and computer skills to stimulate mathematical thinking and understanding and solving mathematical issues</p>

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics:	K1
1.2	Outline the mathematical foundations, principles.	K2
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K4
2	<b>Skills :</b>	
2.1	Not Applicable	
3	<b>Competence:</b>	
3.1	Illustrate an ability to communicate effectively with a range of audiences.	C1

## C. Course Content

No	List of Topics	Contact Hours
1	Basic algebraic operations: real numbers, Exponents-radical-polynomials: basic operations-factoring, Rational expressions: basic operations.	3
2	Linear equations and applications.	3
3	Linear inequalities, absolute values in equations and inequalities.	3
4	Complex numbers, quadratic equations and applications.	3
5	Functions	3
6	Graphing functions- odd and even functions.	3



7	Operation on functions, inverse functions.	3
8	Exponential functions.	3
9	Logarithmic functions, Exponential and Logarithmic equations.	3
10	Solving right triangles.	3
11	Properties of trigonometric Functions, inverse trigonometric functions.	1
12	Parabola-ellipse-hyperbola. System of Linear equations in two variables	3
<b>Total</b>		<b>36</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.1	Describe knowledge of mathematics and statistics(Introduction(definition and importance of Statistics), introduction to probability, binomial and normal distributions).	Interactive lectures, brainstorming and discussions	Written exams (quizzes and mid-terms), class participations
1.2	Outline the mathematical and statistical foundations, principles, theory, and models. (data summarization and display, measures of central tendency and variation, correlation and regression, binomial and normal distributions, using t, F, and Chi square distribution tables, estimation and test of hypotheses).	Interactive lectures, brainstorming and discussions	Written exams(quizzes and mid-terms), class participations
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lectures, brainstorming and discussions	Written exams(quizzes and mid-terms), class participations
2.0	<b>Skills</b>		
2.1	Not applicable		
3.0	<b>Competence</b>		
3.1	Illustrate an ability to communicate effectively with a range of audiences.	Interactive lectures, brainstorming and discussions	Written exams(quizzes and mid-terms), class participations



## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	5	10
2	Mid1	8	20
3	Quiz 2	10	10
4	Mid2	12	20
5	Final exam	16-17	40

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	College Algebra and Trigonometry, third edition. J.S.Ratti, Marcus McWaters. With the online access to MyLap Math in Pearson.
Essential References Materials	
Electronic Materials	Determined by the Professor of the course at the time
Other Learning Materials	Other learning material such as computer-based programs/CD, professional standards or regulations and software.  MyLap Math in Pearson

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.



Item	Resources
	<p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Determine by the Lecturer of the course

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Calculus 2</b>
<b>Course Code:</b>	<b>MATH 103 T</b>
<b>Program:</b>	<b>Bachelor of (Physics - Chemistry - Computer and Information Sciences in the Computer Science Department and the Networking and Communication Systems Department – Engineering)</b>
<b>Department:</b>	<b>Mathematical sciences</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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<b>H. Specification Approval Data</b> .....	<b>8</b>



## A. Course Identification

1. Credit hours:	4(contact hours: 3 Theoretical + 2 Tutorial)		
2. Course type			
a. University	<input type="checkbox"/>	College	<input checked="" type="checkbox"/>
		Department	<input type="checkbox"/>
		Others	<input type="checkbox"/>
b. Required	<input checked="" type="checkbox"/>	Elective	<input type="checkbox"/>
3. Level/year at which this course is offered:	Starting from the 3 <sup>rd</sup> Level		
4. Pre-requisites for this course (if any):	MATH 101 T		
5. Co-requisites for this course (if any):	None		

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Integration (definition of specific integration and Riemann aggregation - the basic theory of integration - the average value theory in calculating integration - integral of trigonometric functions - differential and integral inverse trigonometry - differential and integral exponential, logarithmic, hyperbolic and inverse hyperbolic functions - integral by fractionation - integral by substitution - sequential reduction - compensation by functions Trigonometry - Integration with partial fractions). Unassigned values (definition of unassigned values and how to deal with them – L'Hospital rule - application to impaired integrals). Applications to integration (finding spaces - rotational volumes, surface length),



sequences and numerical sequences, representation of functions in power sequences, Taylor and Maclaurin series).

## 2. Course Main Objective

1. The ability to gain positive thinking and effective in solving problems.
2. Acquire numerical, algebraic, and higher-thinking mathematical skills in solving vital and social problems.
3. Developing mathematical and logical reasoning skills in dialogue, discussion, and the ability to judge results.
4. Giving students the communication skill to stimulate mathematical thinking and to understand and solve mathematical problems.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics	K.1
1.2	Outline the mathematical and statistical: foundations, principles, theory and models	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3.0	<b>Competence</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	C.1

## C. Course Content

No	List of Topics	Contact Hours
1	Definition of specific integration and Riemann synthesis - the basic theory of integration - the average value theory in calculating integration.	10
2	Integrals of several functions such as (polynomials, trigonometric, exponential, logarithmic functions, hyperbolic functions, and inverse trigonometric, inverse hyperbolic functions).	10
3	Integration by substitution-integration by parts- partial fraction decomposition- Trigonometric substitutions.	15
4	Indeterminate values for applying L'Hospital rule to find limits and apply it for improper integrals.	10
5	Finding (area - volume of revolutions- the arc length of several functions).	15
6	Sequence and series and their test of convergence	15
7	Represent function by using Maclaurin and Taylor series	5
<b>Total</b>		<b>75</b>



## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Describe knowledge of mathematics and statistics	Interactive lectures Discussions and conversations Brainstorm Presentations	Written exams (quizzes, midterm, final), class assignments, class discussions.
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	Interactive lectures Discussions and conversations Brainstorm Presentations	Written exams (quizzes, midterm, final), class assignments, class discussions.
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Discussions and conversations Brainstorm Presentations	Written exams (quizzes, midterm, final), class assignments, class discussions.
<b>2.0</b>	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures Discussions and conversations Brainstorm Presentations	Written exams (quizzes, midterm, final), class assignments, class discussions.
<b>3.0</b>	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	Interactive lectures Discussions and conversations Brainstorm Presentations Practical training	Written exams (quizzes, midterm, final), class assignments, home work assignments, class discussions.

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Two Short exams	5 <sup>th</sup> week & 10 <sup>th</sup> week	10%
2	Mid-term exam 1	8 <sup>th</sup> week	20%
3	Mid-term exam 2	13 <sup>th</sup> week	25%
4	Homework and participation	Every week	5%
5	Final exam	After 15 <sup>th</sup> week	40%



## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	H. Anton, I. Bivens, and S. Davis, Calculus: Late Transcendental Single and multivariable, 9th Edition, John Wiley and Sons (2010).
Essential References Materials	<ul style="list-style-type: none"> <li>• Earl W. Swokowski Calculus with analytic geometry, Pws-KENT Publishing Company 1988.</li> <li>• Smith, R. T. and Minton, Calculus Early Transcendental Function, Mc-Graw Hill. Third Edition.</li> </ul>
Electronic Materials	Will be determined according to course instructor
Other Learning Materials	Mathematical software such as: Mathematica, Maple and MATLAB.

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
Other Resources	Determine by the Lecturer of the course



Item	Resources
(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	Mathematics for Business,
<b>Course Code:</b>	Math 106T
<b>Program:</b>	Bachelors of business and administration
<b>Department:</b>	Mathematical Sciences
<b>College:</b>	Sciences
<b>Institution:</b>	Princess Nourah bint Abdelrahman University



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## A. Course Identification

<b>1. Credit hours:</b>	4 credits (3 theoretical +2 tutorial)
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	1st level/ 1st year
<b>4. Pre-requisites for this course (if any):</b>	None
<b>5. Co-requisites for this course (if any):</b>	None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	70	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours</b>		
1	Study	10
2	Assignments	0
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

Linear equations(Graphs of linear equations-Algebraic solutions of simultaneous linear equations- supply and demand analysis- Algebra- Transposition of formulae) -Non-Linear equations( Quadratic equations -Revenue ,cost and profit-Indices and logarithms-The exponential and natural logarithm functions)- Differentiation( The derivative of a function-Rules of differentiation-Marginal functions-Further rules of differentiation-Optimization of economic functions- The derivative of exponential and natural logarithm functions)-Integration( indefinite integration- definite integration)- Matrices( Basic matrix operations-Matrix inversion- Cramer's rule)-Use program packages such as Mathematica, Matlab or Maple in some scheduled topics.





## 2. Course Main Objective

11. Use numerical and algebraic mathematical skills and high thinking skills in solving life problems.
12. Developing mathematical and logical reasoning skills in dialogue and discussion to judge results.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	Outline the mathematical foundations, principles	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.4	Illustrate an ability to communicate effectively with a range of audiences.	S.4

## C. Course Content

No	List of Topics	Contact Hours
1	Linear equations(Graphs of linear equations-Algebraic solutions of simultaneous linear equations- supply and demand analysis- Algebra-Transposition of formulae)	17.5
2	Non-Linear equations( Quadratic equations -Revenue ,cost and profit-Indices and logarithms-The exponential and natural logarithm functions)	15
3	Differentiation( The derivative of a function-Rules of differentiation-Marginal functions-Further rules of differentiation-Optimization of economic functions- The derivative of exponential and natural logarithm functions)	17.5
4	Integration( indefinite integration- definite integration)	10
5	Matrices( Basic matrix operations-Matrix inversion- Cramer's rule)	15
Total		75

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.2	Outline the mathematical foundations, principles	Interactive lectures, discussions and dialogue, Brainstorm, presentation.	Quizzes Mid-term exams and final exam Class participation, Homework, exercises.
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures, discussions and dialogue, Brainstorm, presentation.	Quizzes Mid-term exams and final exam Class participation, Homework,
2.0	<b>Skills</b>		

جامعة الكويت  
كلية العلوم  
قسم العلوم الرياضية

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.4	Illustrate an ability to communicate effectively with a range of audiences.	Interactive lectures, discussions and dialogue, Brainstorm, presentation.	Quizzes Mid-term exams and final exam Class participation, Homework, exercises.

## 2. Assessment Tasks for Students

#	Assessment task	Week Due	Percentage of Total Assessment Score
1	Quizzes	6th and 9th week	10%
2	First and second Midterm exams	7th and 11th week	40%
3	Homework, Assignments, class participation	weekly	10%
4	Final exam	After 15 week	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Ian Jacques: "Mathematics For Economics and Business", Pearson. ISBN-10: 129219166X • ISBN-13: 9781292191669-9th edition, 2018
Essential References Materials	Determined by the Professor of the course at the time
Electronic Materials	Mathematica -Maple - Matlab

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.



Item	Resources
	<p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be determined later according to the new circumstances

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

### H. Specification Approval Data

<b>Council / Committee</b>	<b>The Mathematical Sciences Department</b>
<b>Reference No.</b>	<b>The 10<sup>th</sup> Council</b>
<b>Date</b>	<b>30/12/2019</b>



<b>Course Title:</b>	<b>Algebra</b>
<b>Course Code:</b>	<b>Math 141 T</b>
<b>Program:</b>	<b>Bachelor of Computer Science</b>
<b>Department:</b>	<b>Mathematical sciences</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours: <b>Contact hours: 3 Theoretical</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>The 1<sup>st</sup> Level / 1<sup>st</sup> year</b>
4. Pre-requisites for this course (if any): <b>None</b>
5. Co-requisites for this course (if any): <b>None</b>

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	<b>Total</b>	<b>45</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b> Studying functions and their role in solving problems. It covers topics including graph, linear functions, quadratic and exponential functions, as well as inverse functions. The student will be assigned to solve practical issues and explain the results of her work effectively. And functions using technology along with analytical methods.</p>
<p><b>2. Course Main Objective</b> Solving and demonstrating mathematical problems using data and procedures of the course. By completing this course, the student will be able to make effective decisions by applying appropriate technological tools to develop realistic mathematical models.</p>

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	K.2
2	<b>Skills</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3	<b>Competence</b>	
3.2	Demonstrates the need for and the ability to engage in continuing professional development.	C.2

## C. Course Content

No	List of Topics	Contact Hours
1	Quadratic functions, linear functions and fractional functions	6
2	Logarithmic and exponential functions, and their properties	6
3	Functions and numbering of functions	6
4	Graphs of functions and relationships	6
5	Systems of equations and inequalities	9
6	Field and range of functions	3
7	Operations on functions	1.5
8	Inverse Functions	1.5
9	Absolute value and root functions	1.5
10	Applications (such as curve fit, modeling, optimization, exponential growth and exponential decay)	4.5
<b>Total</b>		45

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		

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Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models	Interactive lecture, discussion and conversation, brainstorm, presentations	Written and oral tests (quizzes, midterms, final) – class work – homework
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lecture, discussion and conversation, brainstorm, presentations Practical Training	Written and oral tests (quizzes, midterms, final) – class work – homework
3.0	<b>Interpersonal Skills &amp; Responsibility</b>		
3.2	Demonstrates the need for and the ability to engage in continuing professional development.	Interactive lecture, discussion and conversation, brainstorm, presentations Practical Training	Written and oral tests (quizzes, midterms, final) – class work – homework

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodic exams	(3 <sup>rd</sup> , 5 <sup>th</sup> , 7 <sup>th</sup> , 9 <sup>th</sup> and 11 <sup>th</sup> ) week	50%
2	Research project	13 <sup>th</sup> week	10%
3	Final Exam	After 15 week	40%

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities





## 1. Learning Resources

<b>Required Textbooks</b>	College Algebra, 9 <sup>th</sup> edition, Michael Sullivan; Pearson; 9 edition (January 14, 2011) ISBN-10: 0321716817 ISBN-13: 978-0321716811
<b>Essential References Materials</b>	-College Algebra, Julie Miller, McGraw Hill Education, FEB-13 -College Algebra, John Coburn, Jeremy Coffelt, McGraw Hill Education, FEB-13 -College Algebra: Concepts Through Functions (2nd Edition) (Sullivan Concepts Through Functions Series), Michael Sullivan III and Michael Sullivan
<b>Electronic Materials</b>	Determined later
<b>Other Learning Materials</b>	Software packages: Mathematica and MATLAB

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers devices and data show.
<b>Other Resources</b>	Will be determined later in the light of the new.

## G. Course Quality Evaluation



Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>General Statistics</b>
<b>Course Code:</b>	<b>Math 160T</b>
<b>Program:</b>	<b>Bachelors of Scientific colleges</b>
<b>Department:</b>	<b>Mathematical Sciences</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah University</b>

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## A. Course Identification

1. Credit hours:	3 (2 Theoretic + 2 Practices)
2. Course type	
a.	University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Starting from The 1 <sup>st</sup> Level / 1 <sup>st</sup> year
4. Pre-requisites for this course (if any):	None
5. Co-requisites for this course (if any):	None

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	%100
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours</b>		
1	Study	10
2	Assignments	0
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b></p> <p>Introduction about and statistics and its usage, Collecting, presenting and sorting the data, Measures of central tendency. Measures of variations. Correlation, and simple linear regression.</p> <p>Index numbers, introduction to Probabilities and methods of counting, random variables and some of probabilities distributions, binomial distribution and Normal distribution, hypotheses test, use program packages such as SPSS, SAS, MINITAB</p>
<p><b>2. Course Main Objective</b></p> <ol style="list-style-type: none"> <li>1. Knowledge of the basics and skills of statistics science with the least amount of mathematics</li> <li>2. Apply the concepts of statistics in the field of disciplines for literary.</li> <li>3. Avoid the wrong uses of methods and methods to solve problems using statistics.</li> </ol>



### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics	K.1
1.2	Outline in Mathematics and Statistics: Fundamentals, principles, theories and mathematical models	K2
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills:</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	S.2

### C. Course Content

No	List of Topics	Contact Hours
1	Introduction about and statistics and its usage, Collecting, presenting and sorting the data, Data tabulation using frequency distribution and the most important pictorial methods to represent it	12
2	Measures of central tendency.	4
3	Measures of variations. Correlation, and simple linear regression.	12
4	Index numbers and its benefits and some of its formulas.	4
5	Probabilities, random variables and some of probabilities distributions, Normal distribution	22
6	hypotheses test	6
<b>Total</b>		<b>60</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.1	Describe knowledge of mathematics and statistics	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
1.2	Outline in Mathematics and Statistics: Fundamentals, principles, theories and mathematical models	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
2.0	<b>Skills</b>		
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	3 <sup>rd</sup> week	5%
2	Quiz 2	6 <sup>th</sup> week	5%
3	First Midterm exams	7 <sup>th</sup> week	



4	Second Midterm exams	12 <sup>th</sup> week	15%
5	volunteering	weekly	5%
6	Quiz 1 (Practical)	10 <sup>th</sup> week	5%
7	Quiz 2 (Practical)	13 <sup>th</sup> week	5%
8	Homework Assignments	weekly	5%
9	Final exam	After 15 <sup>th</sup> week	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	مبادئ الإحصاء للتخصصات النظرية إعداد قسم الإحصاء بجامعة الملك عبدالعزيز الناشر: خوارزم العلمية للنشر والتوزيع (جدة). ١٤١٨
Essential References Materials	مقدمة في الإحصاء والاحتمالات لعادل الوديان واحمد الصاوي وعبد الله الخريجي الرياض: مكتبة الرشد الطبعة الثالثة ١٤٢٨ مبادئ الإحصاء والاحتمالات لعنان بري واخرون الطبعة الثالثة: عمادة شئون المكتبات جامعة الملك سعود ١٤١٨ Triola, Mario F. Elementary Statistics Update (2004) 9th ed, Pearson Education. New York.
Electronic Materials	<a href="http://www.soldzresearch.com/statisticsresources.htm">http://www.soldzresearch.com/statisticsresources.htm</a>
Other Learning Materials	MINITAB

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students. * The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.





Item	Resources
	* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be determined later according to the new circumstances

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	
Reference No.	
Date	12/2019



<b>Course Title:</b>	<b>General Statistics</b>
<b>Course Code:</b>	<b>Math 161T</b>
<b>Program:</b>	<b>Programs in (College of Computer Sciences and Information + College of business and administration)</b>
<b>Department:</b>	<b>Mathematical sciences</b>
<b>College:</b>	<b>Sciences</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdul Rahman</b>



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## A. Course Identification

1. Credit hours:	4 credit hours(2 Theoretical +2 Tutorial)
2. Course type	
a.	University <input checked="" type="checkbox"/> College <input type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Starting from First year / first level
4. Pre-requisites for this course (if any):	None
5. Co-requisites for this course (if any):	None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

1. Course Description
Introduction (Definition and importance of Statistics), organization and display of data, measures of central tendency, measures of variation, correlation and regression, introduction to probability and counting methods, binomial and normal distribution, using tables of t, Chi-Square, F distributions and hypothesis testing, using statistical packages (e.g., SAS, SPSS, Minitab)
2. Course Main Objective
Recognize the basic concepts and principles of descriptive statistics and principles of probabilities and their applications.

### 3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	Knowledge:	

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قسم العلوم الرياضية

CLOs		Aligned PLOs
1.1	Describe knowledge of mathematics and statistics.	K.1
1.2	Outline the mathematical and statistical foundations, principles, theory, and models.	K.2
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	S.2
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish certain goals	C.1

### C. Course Content

No	List of Topics	Contact Hours
1	Classify data using frequency tables, and the most important graphical representation.	6
2	Measures of central tendency	6
3	Measures of variation Quiz	4
4	Correlation, and simple linear regression	4
5	Probability axioms	4
6	Conditional probabilities, independence of events, multiplication rules	4
7	Mid-term exam	2
8	Discrete random variable and its probability distribution, mathematical expectation, mean and variance of distribution.	4
9	Continuous random variable and its probability distribution (density function), the cumulative distribution function, mathematical expectation, mean and variance of distribution	4
10	Binomial distribution, its probability function, mean and variance (short exam (quiz))	6
11	Normal curve and the area under the density curve, standard normal table, central limit theorem, Approximating Binomial probability using the normal distribution. Using the statistical tables of: t, chi-square, and F distributions.	8
12	Estimation and hypothesis testing	8
<b>Total</b>		<b>60</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.1	Describe knowledge of mathematics and statistics.	Interactive lectures, brainstorming,	Exams(quizzes and mid-terms, final),



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Discussions and dialogue	class participations,
1.2	Outline the mathematical and statistical foundations, principles, theory, and models.	Interactive lectures, brainstorming, Discussions and dialogue	Exams(quizzes and mid-terms, final), class participations
2.0	<b>Skills</b>		
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	Interactive lectures, brainstorming, Discussions and dialogue	Exams(quizzes and mid-terms, final), class participations.
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish certain goals	Interactive lectures, brainstorming, Discussions and dialogue	Exams(quizzes and mid-terms, final), class participations.

## 2. Assessment Tasks for Students

#	Assessment task	Week Due	Percentage of Total Assessment Score
1	Quiz 1	5th week	10%
2	Mid-term exam	10th week	20%
3	Quiz 2	13th week	10%
4	Homework, exercise and research project	weekly	20%
5	Final exam	After 15th week	40%

## E. Student Academic Counseling and Support

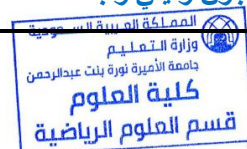
Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

- Assign and commit office hours (6 hours per week) that will be attached with lectures table and be announced to the students.
- Communicate with and asking questions by e-mail to faculty members through her sit or on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	-Walpole, R. E., Myers, R. H., and S. L. Myers (2007), Probability and Statistics for Engineers and Scientists, 8th ed., Prentice-Hall, Inc., Upper Saddle River, New Jersey.
Essential References Materials	- مقدمة في الإحصاء والاحتمالات لمحمد صبحي أبو صالح و عدنان عوض نيويورك: دار جون وايلي وأبنائه ١٩٨٣



	<p>- مبادئ الإحصاء و الاحتمالات لعندان بري وآخرون الطبعة الثالثة: عمادة شئون المكتبات جامعة الملك سعود ١٤١٨</p> <p>Ross, S (2004), Introduction to Probability and Statistics for Engineers and Scientists, 3rd ed., Jon Wiley &amp; Sons, New York.</p>
<b>Electronic Materials</b>	Determined by the Professor of the course at the time
<b>Other Learning Materials</b>	Statistical package such as SPSS, SAS, MINITAB.

## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	Computes and data show
<p><b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)</p>	Will be determined later according to the new circumstances

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course	Faculty members from within the institution, students, quality committees program and college	-Periodic review of the decisions by faculty members to discuss



and planning for its development		recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

#### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019





<b>Course Title:</b>	Introduction in Statistics
<b>Course Code:</b>	Math 161-1
<b>Program:</b>	Faculty of Basic Health Science, foundation year
<b>Department:</b>	Mathematical sciences
<b>College:</b>	Sciences
<b>Institution:</b>	Princess Nourah bint Abdulrahman University



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## A. Course Identification

<b>1. Credit hours:</b> 3 (Contact hours: 1 Theoretical + 2 Tutorial)
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input checked="" type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> Starting from first level.
<b>4. Pre-requisites for this course (if any):</b> None
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

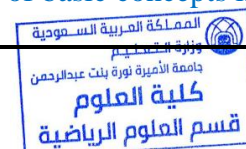
No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	45	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	15
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>45</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b></p> <p>Introduction (Definition and importance of Statistics), organization, summation and display of data, measures of central tendency, measures of variation, correlation and regression, introduction to probability and counting methods, binomial and normal distribution, using tables of t, Chi-square, F distributions and hypothesis testing, using statistical packages (e.g., SAS, SPSS, Minitab) if possible.</p>
<p><b>2. Course Main Objective</b></p> <ul style="list-style-type: none"> <li>Recognize conceptual and fundamental basics of descriptive statistics.</li> <li>Understand basic concepts of probability and its applications.</li> <li>Understand and study advanced courses that require knowledge of basic concepts in statistics.</li> </ul>



### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics	K.1
1.2	Identify the outlines in mathematics and statistics: foundations, principles, theories and mathematical models.	K.2
2	<b>Skills :</b>	
2.4	Illustrate an ability to communicate effectively with a range of audiences.	S.4
3	<b>Communication, Information Technology, Numerical:</b>	
	None	

### C. Course Content

No	List of Topics	Contact Hours
1	Introduction to statistics	3
2	Tabulation and classification of data , graphical representation of data	3
3	Measure of central tendency	3
4	Measure of dispersion	3
5	Simple linear regression and correlation	3
6	First- second midterm exam	6
7	Definition of probability- probability axioms	3
8	Conditional probability- independent events addition and multiplication rules-Bayes theorem	3
9	Discrete random variables and probability distributions- expected value and variance	3
10	Binomial distribution	3
11	Continuous random variables and probability distributions	3
12	Normal curve-standard normal distribution- central limit theorem(CLT)- normal approximation to the binomial distribution- t distribution- chi-Square distribution- f distribution-distribution tables	6
13	Estimation and hypotheses testing	3
<b>Total</b>		45

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
K.1	Describe knowledge of mathematics and statistics	Interactive lectures, brainstorm, dialogue and discussions	Written exams(quizzes and mid-terms), class participations
K.2	Identify the outlines in mathematics and statistics: foundations, principles, theories and mathematical models.		
2.0	<b>Skills</b>		



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
2.4	Show an ability to function effectively within teams to accomplish curtains goals.	Cooperative lecture, problem-solving, discussions.	Homework, exercises, class participations.
3.0	<b>Competence</b>		
3.1	None		

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	4th	5
2	Midterm exam	6th	15
3	Midterm exam	11th	20
5	Homework Assignment, exercises and class participation	weekly	10
6	Final examination	After 15	40

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1.Learning Resources

<b>Required Textbooks</b>	Ron Larson ,Betsy Farber (2015),Elementary Statistics, Pearson .
<b>Essential References Materials</b>	Walpole, R. E., Myers, R. H., and S. L. Myers (2007), Probability and Statistics for Engineers and Scientists, 8th ed., Prentice-Hall, Inc., Upper Saddle River, New Jersey. Statistics for people who think they hate statistics, sage pub., Neil Salkind.
<b>Electronic Materials</b>	Determined by the Professor of the course at the time
<b>Other Learning Materials</b>	Statistical package such as SPSS, SAS, MINITAB



## 2. Facilities Required

Item	Resources
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data show.
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be determining later according to the new circumstances.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

## H. Specification Approval Data

<b>Council / Committee</b>	The Mathematical Sciences Department
<b>Reference No.</b>	The 10 <sup>th</sup> Council
<b>Date</b>	30/12/2019



<b>Course Title:</b>	<b>Calculus III</b>
<b>Course Code:</b>	<b>Math 205 T</b>
<b>Program:</b>	<b>Bachelor of Engineering program</b>
<b>Department:</b>	<b>Mathematical sciences.</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman</b>



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## A. Course Identification

<b>1. Credit hours:</b>	<b>4 credit hours (3 Theoretical +2 exercises)</b>
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	<b>The 3<sup>rd</sup> level – 2<sup>nd</sup> year</b>
<b>4. Pre-requisites for this course (if any):</b>	<b>Calculus II-Math 103T</b>
<b>5. Co-requisites for this course (if any):</b>	<b>None</b>

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description of the Course:

**Parametric equations and polar coordinates:** curves defined by parametric equations, calculus of parametric curves, tangents, arc length, area, surface area.

**Polar coordinates:** definition of polar curves, symmetry, tangent of polar curves, areas and arc length in polar coordinates, conical cuts in polar coordinates.

**Vectors and geometry of space:** triple space system, vectors, internal multiplication, equations of lines and planes, bilayer cylindrical surfaces, cylindrical and spherical coordinates.

**Derivation (partial derivation of functions in several variables - terminations and communication - partial derivatives - implicit derivation - maximum values and minimum values of the functions in two variables - the Lagrange multipliers).**

**Integration (definition of integrals of functions in two and three variables - applications to find areas, surface areas and volumes - methods of conversion to polar and spherical coordinates). Use of software packages such as Mathematica, MATLAB or Maple in some course topics.**

### 2. Course Main Objective

1. Understand some of the concepts of analytic geometry in the representation of geometric shapes in the plane and 3-space and the function in one variable and multiple variables and find their derivatives, their maximum values and integrations.
2. Acquiring skills in the use of computer programs such as Mathematica, MATLAB or Maple.
3. Giving solution to some problems to practice higher thinking skills, analyze, interpret and discuss result

### 1. Course Learning Outcomes

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.2	<b>Outline the mathematical and statistical: foundations, principles, theory, and models.</b>	K.2
1.4	<b>Use mathematical definitions and formulas in thinking and logical processes.</b>	K.4
2	<b>Skills :</b>	
2.3	<b>Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.</b>	S.3
3	<b>Competence:</b>	
3.1	<b>Show an ability to function effectively within teams to accomplish curtains goals.</b>	C.1



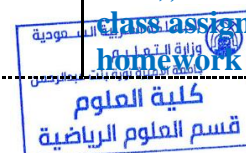
## C. Course Content

No	List of Topics	Contact Hours
1	Parametric equations and polar coordinates: Parametric curves, calculus of parametric curves, tangents, arc length, areas, surfaces.	10
2	Polar coordinates: definition of polar curves, symmetry, polarity curves, areas and arc length in polar coordinates, conical sections in polar coordinates.	15
3	Vector and Space: 3- Space System, Vector, inner product, Cross-Pole, Line and plane equations, Double-Cylindrical Spheres, Cylindrical and Spherical Coordinates	15
4	Differentiation (partial Differentiation of functions in several variables - limits and continuity - partial derivatives - implicit Differentiation - maximum and minimum values of a function in two variables - Lagrange multipliers).	20
5	Integration (definition of double integrals and triple integrals - applications to find areas, surfaces and volumes - methods of transformation to polar and spherical coordinates).	15
<b>Total</b>		<b>75</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models.	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
<b>2.0</b>	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, homework



Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
			assignments, class discussions.
3.0	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	discussions and conversations, presentations.	class assignments, homework assignments, class discussions.

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1	6 <sup>th</sup> , week	7%
2	Midterm exam 1	8 <sup>th</sup> week	20%
3	Midterm exam 2	12 <sup>th</sup> week	20%
4	Quiz 2	9 <sup>th</sup> week	8%
5	Home works and participation	All of the semester	5%
6	Final exam	After 15 week	40%

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	• H. Anton, I. Bivens, and S. Davis, Calculus:Late Transcendental Single and multivariable, 8th Edition, John Wiley and Sons (2005)
Essential References Materials	Earl W. Swokowski Calculus with analytic geometry, Pws-KENT Publishing Company 1988. Smith, R. T. and Minton, Calculus Early Transcendental Function, Mc Graw Hill. Third Edition. - إبراهيم سرميني، سلمان السلطان. (٢٥٤١). تطبيقات في حساب التفاضل والتكامل. الطبعة الثانية



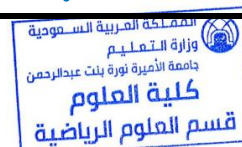
<b>Electronic Materials</b>	Will be determined according to course instructor
<b>Other Learning Materials</b>	Mathematical software such as: Mathematica, Maple and MATLAB

## 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers devices and data show.
<b>Other Resources</b>	Will be determined later in the light of the new.

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	<ol style="list-style-type: none"> <li>1. Checking the marking of a sample of students' work</li> <li>2. Exchange periodically to marked exams with faculty members.</li> </ol>



Evaluation Areas/Issues	Evaluators	Evaluation Methods
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Differential Equations</b>
<b>Course Code:</b>	<b>Math 221</b>
<b>Program:</b>	<b>Bachelor of (Chemistry- Computer and information Science)</b>
<b>Department:</b>	<b>Mathematical Sciences</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdul Rahman University</b>



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## A. Course Identification

1. Credit hours: <b>3 (contact hours: 2 Theoretical + 2 Exercises)</b>	
2. Course type	
a. University <input type="checkbox"/>	College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>Starting from the 3<sup>rd</sup> Level / Year 2</b>	
4. Pre-requisites for this course : <b>Math 103T</b>	
5. Co-requisites for this course: <b>None</b>	

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

1. Course Description	
Definition of Differential Equations with kind of ordinary and partial. Classifications of DE related to order, degree, homogeneous and non-homogeneous with applications, Methods of solving ODE of first order and first degree with applications, Solving PDE of first order and first degree with applications.	
2. Course Main Objective	
<ul style="list-style-type: none"> <li>Dealing with abstract mathematical concepts.</li> </ul>	

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كلية العلوم  
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- Develop the skill of writing accurate proofs.
- Providing the ability to express mathematically sound verbally and in writing.
- Providing the ability to analyze, explain and solve problems.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3	<b>Competence:</b>	
3.2	Demonstrates the need for and the ability to engage in continuing professional development	C.2

### C. Course Content

No	List of Topics	Contact Hours
1	Definition of Differential Equations with kind of ordinary and partial. Classifications of DE related to order, degree, homogeneous and non-homogeneous with applications.	18
2	Methods of solving ODE of first order and first degree with applications.	22
3	Solving PDE of first order and first degree with applications.	20
Total		60

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lectures Brainstorming Discussion dialogue Presentations	Written exams, Oral exams, Class assignments, Homework assignments, class discussions.
2.0	<b>Skills</b>		
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability	Interactive lectures Brainstorming Discussion dialogue Presentations	Written exams, Oral exams, Class assignments, Homework assignments, class discussions.
3.0	<b>Competence</b>		

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قسم العلوم الرياضية

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.2	Demonstrates the need for and the ability to engage in continuing professional development	Interactive lectures Brainstorming Discussion dialogue Presentation Practical Training	Written exams, Oral exams, Class assignments, Homework assignments, class discussions.

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz 1&2	5 <sup>th</sup> week & 9 <sup>th</sup> week	20%
2	Homework Assignment	weekly	5%
3	First Midterm	7 <sup>th</sup> week	15%
4	Second Midterm	13 <sup>th</sup> week	20%
5	Final examination	After 15 <sup>th</sup> week	40%

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Differential Equations ,third edition ,Richard Bronson, Gabriel B.Costa, Schaum's outline series
Essential References Materials	-سالم احمد سحاب-مقدمة في المعادلات التفاضلية. ١٤١٣هـ -وليم بوليس و ريتشارد دبر يما - مبادئ المعادلات التفاضلية. ١٩٩٣م. دار جون وايليو ابناؤه -حسن العويضي، عبدالوهاب رجب و سناء علي زارع، المعادلات التفاضلية العادية. الجزء الاول و الثاني. مكتبة الرشد. ٢٠٠٧
Electronic Materials	Will be determined later
Other Learning Materials	Mathematical software such as: MATLAB or Maple or Mathematica

## 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</p> <p>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</p>
<p><b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)</p>	<p>Computers devices and data show.</p>
<p><b>Other Resources</b></p>	<p>Will be determined later in the light of the new.</p>

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what

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Evaluation Areas/Issues	Evaluators	Evaluation Methods
planning for its development		is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

## H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>First Course in Differential Equation</b>
<b>Course Code:</b>	<b>Math225 T</b>
<b>Program:</b>	<b>Bachelor of Physics Program</b>
<b>Department:</b>	<b>Department of Mathematical Science</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

<b>1. Credit hours: 4 hours (3 Theoretical +2 Tutorial)</b>			
<b>2. Course type</b>			
a.	University <input type="checkbox"/>	College <input type="checkbox"/>	Department <input checked="" type="checkbox"/>
			Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>	
<b>3. Level/year at which this course is offered:</b>		<b>The 4<sup>th</sup> Level – 2<sup>nd</sup> Year</b>	
<b>4. Pre-requisites for this course (if any): Calculus (2) _Math103 T</b>			
<b>5. Co-requisites for this course (if any): None</b>			

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>



## B. Course Objectives and Learning Outcomes

### 1. Course Description

Introduction to differential equations, first order differential equations, modeling of first order differential equations, problems of elementary and marginal values, homogeneous and non-homogeneous equations, demotion, homogeneous linear equations with constant coefficients, solving systems of linear differential equations by deletion, principles of equations using differential separation method to find the solver of partial differential equations.

Use software packages such as Mathematica, MATLAB or Maple.

### 2. Course Main Objective

1. To recognize the importance of differential equations in basic sciences such as physics, chemistry and engineering sciences.
2. Training the student on methods and strategies for solving differential equations.
3. Acquiring the skill of using mathematical programs and computer skills to stimulate mathematical thinking, understanding and solving mathematical problems.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.1	Develop mathematical and models of real-life problems in a way that demonstrates its appropriateness and justification	S.1
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs.	S.2

## C. Course Content

No	List of Topics	Contact Hours
1	Introduction to ordinary differential equation.	2.5
2	Initial value problem (physical application).	2.5
3	Solve first order differential equations curves solution (physical application).	5
4	Solve first order differential equations : variable separation.	5
5	Solve first order differential equations: linear Differential Equations	5
6	Solve first order differential equations: exact Differential Equations	5
7	Solve first order differential equations by substitution	7.5
8	First order differential equations: Linear modeling (physical applications)	5
9	Equations. Basic theorems. Linear Equations. IVP. BVP	5
10	Homogeneous and non homogeneous Differential Equations. Reduction of order	5



11	Homogeneous Differential Equations with constant coefficients	5
12	Variation of parameters	5
13	Solving system of linear differential equations by elimination	7.5
14	Introduction to Partial Differential Equation	5
15	Using Separable method to form PDE	5
<b>Total</b>		<b>75</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lectures Brainstorming Discussion and dialogue Presentations	Tests (short quizzes- midterm - Final) Home work Class work
2.0	<b>Skills</b>		
2.1	Develop mathematical and models of real-life problems in a way that demonstrates its appropriateness and justification	Interactive lectures Brainstorming Discussion and dialogue Presentations	Tests (short quizzes- midterm - Final) Home work Class work
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs.	Interactive lectures Brainstorming Discussion and dialogue Presentations	Tests (short quizzes- midterm - Final) Home work Class work

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Mid(1)	8 <sup>th</sup> week	20%
2	Mid(2)	12 <sup>th</sup> week	20%
3	Quiz(1)	7 <sup>th</sup> week	5%
4	Quiz(2)	10 <sup>th</sup> week	5%
5	Participation	All weeks	5%
6	Assignments	All weeks	5%
7	Final Exam	16	40%



## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	D.G.Zill, A first Course in Differential Equations, with modeling Applications Brooks/Cole (2009).Ninth edition
Essential References Materials	Marcus, Differential Equations, An Introduction, Wm.C. Brown Publishers, 1991. D. G. Zill, Differential Equations with Computer Lap Experiments, Brooks Cole, 2 edition, 1998. إبراهيم ديب سرميني وآخرون. (١٤٢٥هـ —) مقدمة في المعادلات التفاضلية . مطابع جامعة الملك سعود، حسن العويضي ، عبدالوهاب رجب و سناء علي زارع ، المعادلات التفاضلية العادية، الجزء الاول و الثاني، مكتبة الرشد، ٢٠٠٧
Electronic Materials	Determined by the Professor of the course at the time
Other Learning Materials	Mathematica- Matlab

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>



Item	Resources
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>Computers devices and data show.</b>
<b>Other Resources</b>	<b>Will be determined later in the light of the new.</b>

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
<b>Course and teaching effectiveness</b>	<b>The Students</b>	<b>Survey</b>
<b>Verification of the learning outcomes of the course</b>	<b>Program quality Accreditation unit</b>	<b>Learning outcomes Matrix The General level of the students</b>
<b>Verification of the student achievement criteria</b>	<b>Independent faculty members from within the University</b>	<b>1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.</b>
<b>Planning procedures for periodic review of the effectiveness of the course and planning for its development</b>	<b>Faculty members from inside the university Students Quality management in the department or the college</b>	<b>1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.</b>
<b>Evaluation of the course file</b>	<b>Program quality Accreditation unit</b>	<b>Reviewing the content of the course report</b>

### H. Specification Approval Data

<b>Council / Committee</b>	<b>The Mathematical Sciences Department</b>
<b>Reference No.</b>	<b>The 10<sup>th</sup> Council</b>
<b>Date</b>	<b>30/12/2019</b>



<b>Course Title:</b>	<b>Linear Algebra</b>
<b>Course Code:</b>	<b>Math 242 T</b>
<b>Program:</b>	<b>Bachelors of (Physics+ Computer Sciences)</b>
<b>Department:</b>	<b>Mathematical Sciences</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours:	3 (contact hours: 2 Theoretical + 2 Practical)
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	Starting from the 3 <sup>rd</sup> level, 2 <sup>st</sup> year
4. Pre-requisites for this course (if any):	Math101 T
5. Co-requisites for this course:	None

## 6. Mode of Instruction (mark all that apply)

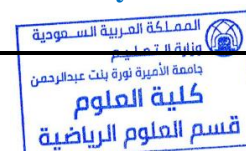
No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Activity</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b>  <b>Matrices and Determinants - linear equations systems – vector spaces – linear transformations. Internal multiplication - distinctive values and vectors – the use of software (in some parts of the methods).</b>  <b>Use program packages such as Mathematica, MATLAB or Maple in some scheduled topics.</b></p>
<p><b>2. Course Main Objective</b></p> <p>1. <b>Understanding and applying some algebraic basics and the ability to formulate and demonstrate algebraic expressions.</b></p>



2. Use the concepts mentioned in the course in life issues.
3. Gain the skill in using software packages to activate the educational process.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics	K.1
1.2	Outline the mathematical and statistical: foundations, principles, theory and models	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	S.2
3.0	<b>Competence</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals.	C.1

### C. Course Content

No	List of Topics	Contact Hours
1	Matrices and Determinants – Matrices and operations on them – elementary matrices – private matrices – Inverse matrix by using row operations – define the determinant - determinants properties – adjoint matrix and use it to find the inverse of matrices	12
2	Linear equation systems and methods of solving	12
3	Vector spaces: definitions and examples – linear composition – span sets – linear independence – basis and dimension	12
4	Inner product: definition – orthogonal – angle between two vectors	8
5	Linear transformation: definitions and its properties.	8
6	The distinctive values and vectors: definition and properties – find distinctive values and vectors	8
<b>Total</b>		60

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1	<b>Knowledge:</b>		
1.1	Describe knowledge of mathematics and statistics	Interactive lectures, discussions and conversations,	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.

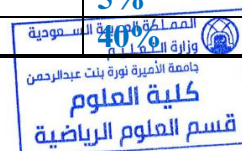




Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		brainstorm, presentations.	
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models.	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, class discussions.
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, class discussions.
2	<b>Skills :</b>		
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	Interactive lectures, discussions and conversations, brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, class discussions.
3	<b>Competence:</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals	Interactive lectures, discussions and conversations, brainstorm, presentations Practical training.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Two Quizzes	5 <sup>th</sup> week & 10 <sup>th</sup> week	10%
2	Two Midterm exams	7 <sup>th</sup> week & 13 <sup>th</sup> week	40%
3	Homework Assignments	weekly	5%
4	Practical training	weekly	5%
5	Final exam	After 15 <sup>th</sup> week	40%



## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

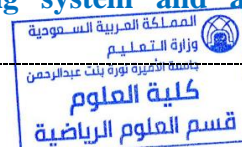
## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	Steven J. Leon, Linear Algebra with application, Person Prentic Hall, Eighth Edition, (2010)
<b>Essential References Materials</b>	<ul style="list-style-type: none"> <li>• Paul Thamos. Finite Dimensional Vector Space. Springer Verlag</li> <li>• H. Anton C. Rorres. Elementary Linear Algebra. John Wiley</li> <li>• W. H. Nicholson. Elementary Linear Algebra. McGraw-Hill</li> </ul>
<b>Electronic Materials</b>	<a href="http://sakharov.net/foundation.html">http://sakharov.net/foundation.html</a>
<b>Other Learning Materials</b>	Mathematica -Maple - Matlab

### 2. Facilities Required

Item	Resources
<p><b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)</p>	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>



Item	Resources
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>Computers devices and data show.</b>
<b>Other Resources</b>	<b>Will be determined later in the light of the new.</b>

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	Introduction to numerical analysis
<b>Course Code:</b>	Math 353 T
<b>Program:</b>	Bachelor of Computer Science colleges
<b>Department:</b>	Mathematical Sciences
<b>College:</b>	College of Science
<b>Institution:</b>	Princess Nourah bint Abdulrahman University



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## A. Course Identification

1. Credit hours: <b>4 credits (3Theoretical+2 Tutorial)</b>
2. Course type a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/> b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
3. Level/year at which this course is offered: <b>The 5<sup>st</sup> level/ 3<sup>st</sup> year</b>
4. Pre-requisites for this course : <b>Calculus (2), Math103T, Linear Algebra, Math 242T + CS101T</b>
5. Co-requisites for this course: <b>None</b>

## 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	45
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>75</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

### 1. Course Description

#### Theoretical part:

Error and Computer Arithmetic (Numerical Errors; Floating point Representation; Rounding; Errors; operation), Root finding Problem (Bisection method, Fixed-point iterations, Newton Method, Secant Method). Interpolation and approximation (Linear and Quadratic Lagrange Polynomial Cubic spline interpolation), Numerical differentiation and integration (the Trapezoidal and Simpson rules) and Gaussian quadrature Numerical Solution of linear Systems: Gauss Elimination LU Decompositions, Cholesky decomposition. Iterative methods: Jacobi and Gauss Seidel methods.

Numerical solution of ordinary differential equations (Euler method, Runge-Kutta methods. Convergence and error analysis.

#### Practical part:

Use program packages such as Mathematica, MATLAB or Mabel in some scheduled topics.

### 2. Course Main Objective

1. Acquiring the skill of using numerical methods for solving the equations by using computer facilities to achieve results and numerical approximation to the exact solutions using the given data.
2. Using the mathematical methods and computational skills to stimulate the mathematical thinking and solve mathematical problems.
3. Describing and analyzing the mathematical methods that obtain numerical solutions to problem difficult to solve using traditional algebraic methods.

### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.2	Apply the right tools and operations using mathematics and computer programs	S.2
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability	S.3
3	<b>Competence:</b>	
3.3	Implement a given technique on real life data using a computer if necessary	C.3

### C. Course Content

No	List of Topics	Contact Hours
1	Error and Computer Arithmetic: Numerical Errors; Floating-Point Representation; Rounding; Errors Sources; Errors; operation.	5
2	Root Finding: Bisection Method, Newton's Method, Secant Method, Fixed Point Iterations	10



3	Interpolation and Approximation: Taylor polynomial, Approximation of order n, Polynomial Error, Linear and Quadratic Interpolation, Lagrange Interpolation, Newton Divided Difference Method, Error Evaluation, Spline Interpolation	15
4	Numerical Integration and Differentiation: The Trapezoidal and Simpson Rules, Gaussian Quadrature, Numerical Differentiation.	15
5	Numerical Solution of Linear Systems: Gauss Elimination, LU and Cholesky Decompositions, Iterative Methods: Jacobi and Gauss-Siedel Methods, Error Analysis.	15
٦	Numerical Solution of Ordinary Differential Equations: Euler's Method, Runge-Kutta Methods, Convergence and Error Analysis.	15
<b>Total</b>		<b>75</b>

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.4	Use mathematical definitions and formulas in thinking and logical processes	Interactive lectures, discussions and conversations, Brainstorm, presentation	Tests (Quizzes Mid-term exams and final exam) Homework Assignments Class assignments
2.0	<b>Skills</b>		
2.٢	Apply the right tools and operations using mathematics and computer programs	Interactive lectures, discussions and conversations, Brainstorm, presentation	Tests (Quizzes Mid-term exams and final exam) Homework Assignments Class assignments
2.٣	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability	Interactive lectures, discussions and conversations, Brainstorm, presentation	Tests (Quizzes Mid-term exams and final exam) Homework Assignments Class assignments
3.0	<b>Competence</b>		





Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
3.3	Implement a given technique on real life data using a computer if necessary	Interactive lectures, discussions and conversations, Brainstorm, presentation Practical Training	Practical tests Class participation Homework and Class assignments

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First midterm exam	7 <sup>th</sup> week	20%
2	second Midterm exam	12 <sup>th</sup> week	20%
3	Project, final practical test	Project: weekly	10%
4	Quizzes and Homework Assignments	weekly	10%
5	Final exam	After 15	40%

## E. Student Academic Counseling and Support

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	-Elementary Numerical Analysis , 3 edition, Kendall Atkinson ; Weimi
Essential References Materials	- Richard L.Burden and J. Douglas Faires and Albert C .Reynolds, NUMERICAL ANALYSIS, 9 edition, Brooks/Cole Cengage Learning, 2011.



<b>Electronic Materials</b>	<b>Determined by the Professor of the course at the time</b>
<b>Other Learning Materials</b>	<b>Mathematica -Maple - MATLAB</b>

## 2. Facilities Required

<b>Item</b>	<b>Resources</b>
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contain ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	<b>Computers devices and data show.</b>
<b>Other Resources</b>	<b>Will be determined later in the light of the new.</b>

## G. Course Quality Evaluation

<b>Evaluation Areas/Issues</b>	<b>Evaluators</b>	<b>Evaluation Methods</b>
<b>Course and teaching effectiveness</b>	<b>The Students</b>	<b>Survey</b>
<b>Verification of the learning outcomes of the course</b>	<b>Program quality Accreditation unit</b>	<b>Learning outcomes Matrix The General level of the students</b>
<b>Verification of the student achievement criteria</b>	<b>Independent faculty members from within the University</b>	<ol style="list-style-type: none"> <li>1. Checking the marking of a sample of students' work</li> <li>2. Exchange periodically to marked exams with faculty members</li> </ol>



Evaluation Areas/Issues	Evaluators	Evaluation Methods
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

#### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	<b>Applied Biostatistics</b>
<b>Course Code:</b>	<b>Math360T</b>
<b>Program:</b>	<b>Bachelor of Science in biology</b>
<b>Department:</b>	<b>Mathematical science.</b>
<b>College:</b>	<b>College of Science</b>
<b>Institution:</b>	<b>Princess Nourah bint Abdulrahman University</b>



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## A. Course Identification

1. Credit hours:	3credits (2theoretical+2 Exercises)
2. Course type	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered:	The 5 <sup>th</sup> , 6 <sup>th</sup> , 7 <sup>th</sup> or 8 <sup>th</sup> level/ the 3 <sup>rd</sup> or 4 <sup>th</sup> year
4. Pre-requisites for this course (if any):	General Statistics, Math 261T
5. Co-requisites for this course (if any):	None

## 6. Mode of Instruction

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

## 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours</b>		
1	Study	10
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others(specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b></p> <p><b>Theoretical part:</b> Study of frequency distribution, probability modeling techniques, solve problem on the mean and standard deviation, distribution of samples around the mean, solve problem on t-test, solve problem f-test, comparison between more than two mean, solve problem on chi-square test, solve problem on regression analysis and correlation of statistical tests.</p> <p><b>Practical part:</b> Practical experiences related to gaining practical experience in biostatistics.</p>
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## 2. Course Main Objective

13. Studying the various statistical applications in the life sciences.

14. Using statistical methods to control and prove the results of research, the study of probability theory, data analysis, measures of central tendency, variation, simple linear correlation and the use of computer in statistical analysis.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.1	Describe knowledge of mathematics and statistics.	K.1
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models.	K.2
1.4	Use mathematical definitions and formulas in thinking and logical processes	K.4
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	S.2
2.4	Illustrate an ability to communicate effectively with a range of audiences.	S.4
3	<b>Competence:</b>	
3.1	Show an ability to function effectively within teams to accomplish curtains goals	C.1

## C. Course Content

No	List of Topics	Contact Hours
	<b>First: Theoretical part</b>	
1	Frequency Distributions	3
2	Graphs	2
3	Probability	3
4	Averages, standard deviation and error	4
5	Distribution of samples	2
6	T-test	2
7	F-test	2
8	Comparison between means	4
9	Chi square test and correlation coefficients	4
10	regression analysis and correlation of statistical tests	4
11	Review or study new developments in this area	4
	<b>Second : Lab parts</b>	
12	Concept measurements and samples	2
13	Data preparation	2
14	measures of central tendency	2
15	measures of variation	2
16	Probability	2
17	Distribution	2
18	Statistical tests	4
19	Analysis of frequency	2



20	Correlation	2
21	Analysis of regression	2
22	Analysis of variance	4
	Total	60

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
1.1	Describe knowledge of mathematics and statistics.	Interactive lectures, discussions and conversations, Brainstorm, presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
1.2	Outline the mathematical and statistical: foundations, principles, theory, and models.		
1.4	Use mathematical definitions and formulas in thinking and logical processes.		
<b>2.0</b>	<b>Skills</b>		
2.1	Apply appropriate tools and processes, using advanced mathematics and computer programs	Interactive lectures, discussions and conversations, Brainstorm, presentations.	Written exams (quizzes, midterm, final), Class assignments, homework assignments, class discussions.
2.4	Illustrate an ability to communicate effectively with a range of audiences.	Interactive lectures, discussions and conversations, Practical Training presentations.	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.
<b>3.0</b>	<b>Competence</b>		
3.1	Show an ability to function effectively within teams to accomplish curtains goals	Interactive lectures, discussions and conversations, Brainstorm, presentations Practical training	Written exams (quizzes, midterm, final), class assignments, homework assignments, class discussions.



## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First and second Midterm exams	The 4 <sup>th</sup> ,8 <sup>th</sup> week	20%
2	Homework Assignments	weekly	20%
3	Lab parts	weekly	20%
4	Final exam	After 15 week	40%

## E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

- Assign and commit to office hours (6 hours weekly), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising and helping students to face any problem related to the course (either studying or academic problem).

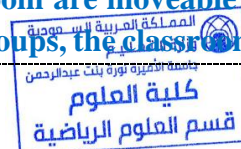
## F. Learning Resources and Facilities

### 1. Learning Resources

Required Textbooks	Biostatistics: A foundation for analysis in the health sciences, by Daniel, W. (1995). USA Burt, B.G. Basic Biostatistic : statistic for public health practice, 2017
Essential References Materials	Will be determined later
Electronic Materials	Will be determined later
Other Learning Materials	SPSS-Minitab

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<p>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</p> <p>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains</p>



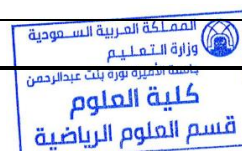
Item	Resources
	ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones. * There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	Computers and data projector
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be determined later according to the new circumstances

### G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course and teaching effectiveness	The Students	Survey
Verification of the learning outcomes of the course	Program quality Accreditation unit	Learning outcomes Matrix The General level of the students
Verification of the student achievement criteria	Independent faculty members from within the University	1. Checking the marking of a sample of students' work 2. Exchange periodically to marked exams with faculty members.
Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from inside the university Students Quality management in the department or the college	1 - Periodic review of the courses by faculty members to discuss recurring problems to find the appropriate solution. 2 - Giving the opportunity for the students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality Accreditation unit	Reviewing the content of the course report

### H. Specification Approval Data

Council / Committee	The Mathematical Sciences Department
Reference No.	The 10 <sup>th</sup> Council
Date	30/12/2019



<b>Course Title:</b>	Probability Theory
<b>Course Code:</b>	Math 367 T
<b>Program:</b>	Bachelor of Computer Science
<b>Department:</b>	Mathematical sciences
<b>College:</b>	Sciences
<b>Institution:</b>	Princess Nourah bint Abdulrahman University



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## A. Course Identification

<b>1. Credit hours:</b> 3 credits (2 theoretical+2 tutorial)
<b>2. Course type</b>
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b. Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b> The 5 <sup>th</sup> Level / 3 <sup>rd</sup> year
<b>4. Pre-requisites for this course (if any):</b> (Calculus II (Math 103T), General Statistics (Math 161T))
<b>5. Co-requisites for this course (if any):</b> None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	Blended		
3	E-learning		
4	Correspondence		
5	Other		

### 7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	30
2	Laboratory/Studio	
3	Tutorial	30
4	Others (specify)	
	<b>Total</b>	<b>60</b>
<b>Other Learning Hours*</b>		
1	Study	15
2	Assignments	5
3	Library	
4	Projects/Research Essays/Theses	
5	Others (specify)	
	<b>Total</b>	<b>20</b>

## B. Course Objectives and Learning Outcomes

<p><b>1. Course Description</b></p> <p>Study of the basic concepts in probability theory, properties of random variables, univariate and bivariate discrete and continuous distributions, moments and moments generating moments, conditional expectation and variance, function distributions in random variables, random sampling, point and period estimation, hypothesis tests, variance analysis, and linear regression analysis.</p>
<p><b>2. Course Main Objective</b></p> <p>Study the probability distributions in more than one random variable, hypothesizes, analysis of variance and linear regression.</p>



### 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge:</b>	
1.3	State theorems of mathematics with their proofs	K.3
1.4	Use mathematical definitions and formulas in thinking and logical processes.	K.4
2	<b>Skills :</b>	
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	S.2
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	S.3
3	<b>Competence :</b>	
3.1	N/A	

### C. Course Content

No	List of Topics	Contact Hours
1	Revision on: Sample space (discrete and continuous), events, Probability function, Axioms of probability, Conditional probabilities, Independent events.	4
2	Random variables and their types, Distribution Functions and their types. Density and Mass Functions. Mathematical Expectation, (Mean and Variance), Moments and Moment Generating Functions. Examples, Normal, Exponential, & Binomial and Poisson.	10
3	Distribution of multiple Random Variables. Joint and Marginal Distributions. Conditional Distributions and Independence. Moment Generating Functions of multiple random variables. Covariance and Correlation. Bivariate Distributions. Examples include the Bivariate normal distribution.	10
4	Distribution of some important Functions of Random Variables.	4
5	Common Families of Distributions. Exponential Families. Locations and Scale Families.	4
6	Properties of a Random Sample, Basic Concepts of Random Samples. Sampling Distribution.	4
7	Point and Interval Estimation.	6
8	Hypothesis Testing.	6
9	Analysis of variance	6
10	Regression Models	6
<b>Total</b>		<b>60</b>

### D. Teaching and Assessment

#### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	<b>Knowledge</b>		
1.3	State theorems of mathematics with their proofs	Interactive lectures Brainstorming	tests (quizzes, midterms, final) – homework كلية العلوم قسم العلوم الرياضية

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
		Discussion dialogue Presentations	
1.4	Use mathematical definitions and formulas in thinking and logical processes.	Interactive lectures Brainstorming Discussion dialogue Presentations	Written and oral tests (quizzes, midterms, final) – class work – homework
<b>2.0</b>	<b>Skills</b>		
2.2	Apply appropriate tools and processes, using advanced mathematics and computer programs	Interactive lectures Brainstorming Discussion dialogue Presentations	Written and oral tests (quizzes, midterms, final) – class work – homework
2.3	Appraise different methods and techniques of problem-solving, assessing their effectiveness and applicability.	Interactive lectures Brainstorming Discussion dialogue Presentations	Written and oral tests (quizzes, midterms, final) – class work – homework

## 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Quiz1	5th week	5%
2	First and second Midterm exam	7th week and 12th week	40%
3	Quiz 2	13th week	5%
4	Homework and Assignment	weekly	10%
5	Final Exam	After the 15th week	25%

## E. Student Academic Counseling and Support

**Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :**

- Assign and commit to office hours (6 hours per week), that will be attached with the lectures table and be announced to the students.
- Communicate with and ask questions by e-mails to the faculty members through her site on the web.
- Providing help and guidance for any inquiry or consultation that related to the given course, this will include helping students to understand the material and contribute to the process of academic advising, and helping students to face any problem related to the course (either studying or academic problem).

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	Casella G. & Berger R. L. Statistical Inference. Second edition, Duxbury Press, 2007
<b>Essential References Materials</b>	Sheldon Ross. A First Course in Probability (1998) 5th ed., Prentice Hall, New Jersey
<b>Electronic Materials</b>	Department internet website Department's teaching staff personal websites on University site University library <a href="http://www.Statoft.com/textbook/stexdes.html">http://www. Statoft.com/textbook/stexdes.html</a>
<b>Other Learning Materials</b>	Mathematical software such as: Minitab- SPSS

### 2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	<ul style="list-style-type: none"> <li>* Classroom designed for theoretical lectures and equipped for the traditional and e-learning, the classroom should allow interaction between teacher and students so that the estimated number of students ranging from 30 to 40 students.</li> <li>* The seats of the classroom are moveable so to allow arranging a workshop groups, the classrooms contains ordinary, paper, and smart blackboards, there should be a platform speaker with integrated sound system and wired and wireless microphones.</li> <li>* There will be a connection to the internet, and a modern air conditioning system and appropriate lighting.</li> </ul>
Technology Resources (AV, data show, Smart Board, software, etc.)	Computers and data show.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Will be determined later according to the new circumstances

## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching and assessment methods.	Students	Survey
Extent of achievement of course learning outcomes.	Program quality and accreditation unit	-Learning Output Matrix -General level of female students
Verifying standards of student achievement.	Independent member teaching staff	-Checking the correction of a sample of students' work -Exchange periodically to correct tests with faculty member.





Planning procedures for periodic review of the effectiveness of the course and planning for its development	Faculty members from within the institution, students, quality committees program and college	-Periodic review of the decisions by faculty members to discuss recurring problems to find the appropriate solution. -Give the opportunity for students to express their views on what is taught and receive proposals and study the effectiveness.
Evaluation of the course file	Program quality and accreditation unit	Check and review the course file content.

#### H. Specification Approval Data

<b>Council / Committee</b>	<b>The Mathematical Sciences Department</b>
<b>Reference No.</b>	<b>The 10<sup>th</sup> Council</b>
<b>Date</b>	<b>30/12/2019</b>

