



## 5. Template for Course Plan of Mathematics 1

<b>I. Information about Faculty Member Responsible for the Course:</b>							
<b>Name of Faculty Member</b>	Asst. Prof. Dr. Adel Mohammed Alodhari	<b>Office Hours</b>					
<b>Location &amp; Telephone No.</b>	777654885	SAT	SUN	MON	TUE	WED	THU
<b>E-mail</b>	ass.prof.adel@gmail.com						

<b>II. Course Identification and General Information:</b>						
<b>1.</b>	Course Title: Calculus I	Mathematics 1				
<b>2.</b>	Course Number & Code:	FR001.				
<b>3.</b>	Credit hours:	C.H				TOTAL CR HRS
		Th.	Seminar/Tu.	Pr	Tr.	
		2	2	-	-	
<b>4.</b>	Study level/year at which this course is offered:	First Year- Second Semester.				
<b>5.</b>	Pre –requisite (if any):	None.				
<b>6.</b>	Co –requisite (if any):	None.				
<b>7.</b>	Program (s) in which the course is offered	Mechanical Engineering Program.				
<b>8.</b>	Language of teaching the course:	English Language.				
<b>9.</b>	System of Study:	Semesters.				
<b>10.</b>	Mode of delivery:	Lectures and Tutorials.				
<b>11.</b>	Location of teaching the course:	Mechanical Engineering Department.				

<b>III. Course Description:</b>
<p>In this course, students <b>will learn</b> process and techniques to <b>develop</b> mathematical modules relevant to <b>engineering</b>, by applying the essential concepts in algebra , <b>geometry and calculus</b> which contains the <b>following</b> functions, limits, derivatives, applications of derivatives, <b>as well as</b>, complex numbers with its operations, polar forms, <b>and</b> De Mover's theorem.</p>

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<b>IV. Intended learning outcomes (ILOs) of the course:</b>	
<ul style="list-style-type: none"> <li>Brief summary of the knowledge or skill the course is intended to develop:</li> </ul>	
<b>a1</b>	Recognize the basic concepts of algebra equations, inequalities, geometric shapes, theorems, functions, limits, derivatives complex numbers with its operations, polar forms and De Mover's theorem.
<b>a2</b>	Explain engineering phenomena related to topics examples.
<b>a3</b>	Describe engineering applications related to the mathematical aspect such as, the role of some function in engineering problems corresponding to real valued and complex valued functions.
<b>b1</b>	Analyze the concepts, theorems and principles of geometric shapes, graphs of functions, continuity and discontinuity of functions, derivatives, velocity, acceleration, De Mover's theorem. roots of complex numbers.
<b>b2</b>	Examine mathematical and engineering problems in different contexts.
<b>b3</b>	Analyze mathematical reasoning skill in interpreting mathematical theories and linking them in the interpretation of engineering applications.
<b>c1</b>	Apply some software programing and calculators to describe the graph of real valued and complex functions and calculating formulas mathematics.
<b>d1</b>	Review resources of mechanical engineering problems depend electrical networks, pipe and traffic flow, data fitting.

<b>V.Course Content:</b>				
<ul style="list-style-type: none"> <li>Distribution of Semester Weekly Plan Of course Topics/Items and Activities.</li> </ul>				
<b>A – Theoretical Aspect:</b>				
Order	Topics List	Sub Topics List	Week Due	Contact Hours
1	Essential of Algebra and Geometry	<ul style="list-style-type: none"> <li>Factorizing Polynomial Expression and Solving Polynomial Equations.</li> <li>Solving Inequalities.</li> <li>Solving Simultaneous Equations.</li> <li>Partial Fractions.</li> <li>Coordinates of Point in Cartesian and Polar Form, Distance and Centroid.</li> </ul>	1 <sup>st</sup> & 2 <sup>nd</sup> weeks	4

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		<ul style="list-style-type: none"> <li>▪ Straight Line, Circle, Parabola, Ellipse And Hyperbola.</li> </ul>		
2	Functions	<ul style="list-style-type: none"> <li>▪ Basic Concept of a Function</li> <li>▪ The Graphs of a Function.</li> <li>▪ Composition of Functions.</li> <li>▪ One to One Functions and</li> <li>▪ Inverse Functions.</li> <li>▪ Parametric Representation of a Function.</li> <li>▪ Common Engineering Functions:</li> <li>▪ Polynomial, Rational, Modulus, Unit Step, Impulse.</li> <li>▪ Even and Odd Functions.</li> </ul>	3 <sup>rd</sup> week	2
3	Trigonometric Functions.	<ul style="list-style-type: none"> <li>▪ Graph of Trigonometric and Inverse Trigonometric Functions</li> <li>▪ Trigonometric Identities and</li> <li>▪ Equations.</li> <li>▪ The Amplitude and Period of Functions.</li> <li>▪ Engineering Waves.</li> </ul>	4 <sup>th</sup> week	2
4	Logarithms and Exponential Functions.	<ul style="list-style-type: none"> <li>▪ Graph of Exponential, Laws of Indices and Simplifying Expression of Exp.</li> <li>▪ Hyperbolic Functions and Hyperbolic</li> <li>▪ Identities.</li> <li>▪ Graph of Logarithms Function and Laws of Logarithms.</li> <li>▪ Solving Equation Involving Logarithms and Exponentials.</li> <li>▪ Application of Engineering: Discharge of a Capacitor, Decay of a Current in Circuit, Signal Ratio and Decibels.</li> </ul>	5 <sup>th</sup> week	2
5	Limits and Continuity	<ul style="list-style-type: none"> <li>▪ Calculating Limits of Algebraic, Trigonometric, Exponential and Logarithmic by Computational Techniques.</li> <li>▪ Continuity of Functions.</li> <li>▪ Intermediate Value Theorem for Continuous Functions.</li> </ul>	6 <sup>th</sup> week	2

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6	Differentiation and its Applications	<ul style="list-style-type: none"> <li>▪ Techniques of Differentiation.</li> <li>▪ Derivatives of Trigonometric, Exponential, Logarithmic and Hyperbolic Functions.</li> <li>▪ Derivatives of Inverse Trigonometric and Hyperbolic Functions.</li> <li>▪ Implicit Differentiation.</li> <li>▪ Parametric Differentiation.</li> <li>▪ Velocity, Acceleration</li> <li>▪ Tangents and Normal.</li> <li>▪ Rolle's Theorem and The Mean Value Theorem.</li> <li>▪ Maxima and Minima.</li> <li>▪ Mclaurin and Taylor Series.</li> </ul>	7 <sup>th</sup>	1
7	Mid -Term Exam	<ul style="list-style-type: none"> <li>▪ The First 4 Topics</li> </ul>	8 <sup>th</sup> week	2
8	Differentiation and its Applications	<ul style="list-style-type: none"> <li>▪ Techniques of Differentiation.</li> <li>▪ Derivatives of Trigonometric, Exponential, Logarithmic and Hyperbolic Functions.</li> <li>▪ Derivatives of Inverse Trigonometric and Hyperbolic Functions.</li> <li>▪ Implicit Differentiation.</li> <li>▪ Parametric Differentiation.</li> <li>▪ Velocity, Acceleration</li> <li>▪ Tangents and Normal.</li> <li>▪ Rolle's Theorem and The Mean Value Theorem.</li> <li>▪ Maxima and Minima.</li> <li>▪ Mclaurin and Taylor Series.</li> </ul>	9 <sup>th</sup> 10 <sup>th</sup> 11 <sup>th</sup> weeks	6
9	Complex Numbers	<ul style="list-style-type: none"> <li>▪ The Algebra of Complex Numbers.</li> <li>▪ Complex Variables and the Argand Plane.</li> <li>▪ Multiplication and Division in Polar Form.</li> <li>▪ Exponential Form of Complex Numbers.</li> <li>▪ De Mover's Theorem.</li> </ul>	12 <sup>th</sup> 13 <sup>th</sup> 14 <sup>th</sup> 15 <sup>th</sup> weeks	6
10	Final Exam	<ul style="list-style-type: none"> <li>▪ All Topics</li> </ul>	16 <sup>th</sup> weeks	2

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<b>Number of Weeks /and Units Per Semester</b>	<b>16</b>	<b>32</b>
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<b>B – Tutorial Aspect:</b>			
Order	Topics List	Week Due	Contact Hours
1	<ul style="list-style-type: none"> <li>▪ Solving problems of factorizing polynomial expression, polynomial equations and finding roots of complex numbers.</li> <li>▪ Solving inequalities and solving simultaneous equations.</li> <li>▪ Partial fractions.</li> <li>▪ Solving problems straight line, circle, parabola, ellipse and hyperbola.</li> </ul>	1 <sup>st</sup> & 2 <sup>nd</sup> weeks	4
2	<ul style="list-style-type: none"> <li>▪ Solving problems of basic concept of a function and its graph.</li> <li>▪ Solving problems of basic inverse functions, composition of functions</li> <li>▪ Solving problems of parametric representation of a function and draw some common engineering Functions, like Polynomial, rational, modulus, unit step, impulse and even and odd Functions.</li> </ul>	3 <sup>rd</sup> week	2
3	<ul style="list-style-type: none"> <li>▪ Solving problems of trigonometric identities and equations.</li> <li>▪ And the amplitude and period of functions with engineering waves.</li> <li>▪ Solving problems of hyperbolic identities</li> </ul>	4 <sup>th</sup> and 5 <sup>th</sup> weeks	4
4	<ul style="list-style-type: none"> <li>▪ Solving problems of laws of indices and simplifying expression of exp, and laws of logarithms.</li> <li>▪ Solving problems of engineering related functions.</li> </ul>	6 <sup>th</sup> week	2
5	<ul style="list-style-type: none"> <li>▪ Solving problems of limits and continuous of functions.</li> <li>▪ Solving problems of intermediate value theorem for Continuous functions.</li> </ul>	7 <sup>th</sup> week	2
6	<ul style="list-style-type: none"> <li>▪ Solving problems of derivatives of different functions and their inverse.</li> <li>▪ Solving problems of derivatives of implicit differentiation.</li> <li>▪ Solving problems of parametric differentiation.</li> </ul>	8 <sup>th</sup> 9 <sup>th</sup> 10 <sup>th</sup>	8

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	<ul style="list-style-type: none"> <li>Solving problems about velocity, acceleration, tangents and normal lines.</li> <li>Solving problems maxima, minima and Mclaurin and Taylor series.</li> </ul>	and 11 <sup>th</sup> weeks	
7	<ul style="list-style-type: none"> <li>Solving problems of algebra of complex numbers and Argand plane.</li> <li>Solving problems of algebra of Multiplication and division in polar form and exponential form of complex numbers.</li> <li>Solving problems of De Mover's theorem.</li> </ul>	12 <sup>th</sup> 13 <sup>th</sup> and 14 <sup>th</sup> weeks	6
<b>Number of Weeks /and Units Per Semester</b>		<b>14</b>	<b>28</b>

## VI. Teaching strategies of the course:

- Lectures, Tutorials and Self-Learning
- Examinations, Test, Course Work, Assignments.

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<b>VII. Assignments:</b>				
<b>No</b>	<b>Assignments</b>	<b>Aligned CILOs(symbols)</b>	<b>Week Due</b>	<b>Mark</b>
1	Oral presentations explaining the following essential mathematical concepts: geometric shapes, graph of functions, engineering patterns of functions, describe points in different coordinates, tangents, normal, rates of change, velocity, acceleration, algebraic of complex numbers and properties of complex functions.	a1, a2, a3 b1, b2, b3, c1, d1	2 <sup>nd</sup> 4 <sup>th</sup> 6 <sup>th</sup> 8 <sup>th</sup> 10 <sup>th</sup> 12 <sup>th</sup>	3
2	Individual written assignments or in groups to solve Problems of: <ul style="list-style-type: none"> <li>• Essential of algebra and geometry.</li> <li>• Graph of functions, limits, continuity derivatives and its application.</li> <li>• Trigonometric Functions.</li> <li>• Logarithms and exponential functions.</li> <li>• Algebraic complex numbers.</li> <li>• Evaluation of complex functions.</li> <li>• Engineering problems.</li> </ul>	a1, a2, a3 b1, b2, b3, c1, d1	3 <sup>rd</sup> 5 <sup>th</sup> 7 <sup>th</sup> 9 <sup>th</sup> 11 <sup>th</sup> 31 <sup>th</sup>	4
3	Show solutions to selected problems from engineering applications related to the mathematical aspect.	a1, a2,a3, b1, b2,b3,c1,d1	4 <sup>th</sup> 8 <sup>th</sup> 12 <sup>th</sup>	3
<b>Total</b>				<b>10</b>

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<b>VIII. Schedule of Assessment Tasks for Students During the Semester:</b>					
No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Oral presentations of students	3, 5,8,10,12	15	10 %	a1, a2,a3, b1, b2,b3,c1,d1
2	Individual written assignments or in groups	7 <sup>th</sup> ,5 <sup>3rd</sup> , 3 <sup>th</sup> ,11 <sup>th</sup> ,19	15	10 %	a1, a2,a3, b1, b2,b3,c1,d1
3	Mid-term Exam	8 <sup>th</sup>	30	20 %	a1, a2,a3, b1, b2,b3,c1,d1
4	Final Exam	16 <sup>th</sup>	90	60 %	a1, a2,a3, b1, b2,b3,c1,d1
5	<b>Total</b>		<b>150</b>	<b>100 %</b>	

<b>IX. Learning Resources:</b>
• <i>Written in the following order: (Author – Year of publication – Title – Edition – Place of publication – Publisher).</i>
<b>1- Required Textbook(s) (maximum two ).</b>
<p><a href="#">1-David Cherney, Tom Denton, Rohit Thomas and Andrew Waldron- 2013-Linear Algebra- 1<sup>st</sup> - Edition- Davis California.</a></p> <p><a href="#">2- Dennis G. Zill- 2018- Advance Engineering Mathematics-6<sup>th</sup> -Edition- Jones &amp; Bartlett Learning, LLC.</a></p>
<b>2- Essential References.</b>
<p>1- <a href="#">Peter V. O' Neil-2011- Advance Engineering Mathematics-7<sup>th</sup> -Edition- Cengage.com.</a></p> <p>2-<a href="#">Erwin Kreyszig - 2011- Advance Engineering Mathematics-10<sup>th</sup> -Edition- John Wiley &amp; Sons, Inc.</a></p>
<b>3- Electronic Materials and Web Sites etc.</b>
<p>1-<a href="http://joshua.smcvt.edu/linearalgebra">http://joshua.smcvt.edu/linearalgebra</a></p> <p>2- <a href="https://www.khanacademy.org/math/linear-algebra">https://www.khanacademy.org/math/linear-algebra</a></p> <p>3- <a href="https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/">https://ocw.mit.edu/courses/mathematics/18-06-linear-algebra-spring-2010/</a></p>

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<b>X. Course Policies:</b>	
1.	<p><b>Class Attendance:</b></p> <p>-A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring <b>an approved</b> statement from university Clinic</p>
2.	<p><b>Tardy:</b></p> <p>- For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.</p>
3.	<p><b>Exam Attendance/Punctuality:</b></p> <p>- A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam.</p>
4.	<p><b>Assignments &amp; Projects:</b></p> <p>- The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time.</p>
5.	<p><b>Cheating:</b></p> <p>- For cheating in exam, a student will be considered as fail. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty.</p>
6.	<p><b>Plagiarism:</b></p> <p>Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee <b>proved</b> a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.</p>
7.	<p><b>Other policies:</b></p> <ul style="list-style-type: none"> <li>- Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room</li> <li>- Mobile phones are not allowed in class during the examination.</li> </ul> <p>Lecture notes and assignments my given directly to students using soft or hard copy</p>

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