

# MAT113 Applied Mathematics 1

<b>Instructor/coordinator</b>	DR ABDELOUAHED EL KHALIL
<b>Credits</b>	4
<b>Prerequisite:</b>	None
<b>E-Mail:</b>	<a href="mailto:alakhil@imamu.edu.sa">alakhil@imamu.edu.sa</a>
<b>office Phone :</b>	(25) 81944
<b>Office Location:</b>	Department of Mathematics & Statistics, College of Science, Office SR-89. Level 3
<b>Textbook:</b>	<b>Calculus, Early Transcendental Functions</b> , Robert Smith and Roland Minton, McGraw-Hill International Edition, 3 <sup>rd</sup> Edition, 2007.

## Objectives:

- To get the intuitive knowledge of limits and continuity of a function.
- To be able to find and interpret the derivative of elementary functions.
- To be able to understand the meaning of derivative in terms of a rate of change and local linear approximation and to use derivatives to solve a variety problems.
- To understand the meaning of definite integral as a limit of Riemann sum.
- To be able find the integral of elementary functions.

## Syllabus:

- **Limits and Continuity:** The Concept of Limit, Computation of Limits, Continuity and its Consequences, Limits Involving Infinity, Asymptotes.
- **Differentiation:** Tangent Lines and Velocity, The Derivative, Computation of Derivatives: The Power Rule, Higher Order Derivatives, The Product and Quotient Rules, The Chain, Derivatives of Trigonometric Functions, Derivatives of Exponential and Logarithmic Functions, Hyperbolic functions and their inverses, Derivatives of hyperbolic functions, Implicit Differentiation and Inverse Trigonometric Functions, The Mean Value Theorem, Numerical Differentiation.
- **Applications of Differentiation:** Linear approximation and Newton's Method, Indeterminate Forms and L'Hopital's Rule, Maximum and Minimum Values, Increasing and Decreasing Functions, Concavity and the Second Derivative Test, Overview of Curve Sketching, Optimization, Related Rates.
- **Integration:** Anti-derivatives, Riemann sums, Area, The Definite Integral, Area between curves, Average Value of a Function, The Fundamental Theorem of Calculus, Indefinite Integral and Integration by Substitution, Area between curves.

## Assessment:

Assessment task	Week due	Proportion of Final Assessment
Midterm 1	Around 6 <sup>th</sup> -7 <sup>th</sup> week	20 %
Midterm 2	Around 11 <sup>th</sup> -12 <sup>th</sup> week	20 %
Quizzes, Attendance, Participation and Homeworks	All the semester	20 %
Final Exam	Around 15 <sup>th</sup> -16 <sup>th</sup> week	40 %



### Schedule and Lecture Plan

Chapter	Lectures		Tutorials
	Number of week	Sections	Suggested Exercises*
1. Limits and Continuity	1	1.2 Concept of limit	2, 4, 6, 32, 42
		1.3 Computation of limits	2, 10, 14, 18, 22, 28, 40, 44, 46, 48, 66
	1	1.4. Continuity and its consequences	2, 6, 8, 14, 16, 26, 32, , 34, to add two exercises related to IVT.
		1.5 Limits involving $\infty$ ; Asymptotes	2, 4, 7, 8, 12, 22, 28, 30, 72, 82.
2. Differentiation	1	2.1 Tangent lines and velocity	5, 7, 18, 24, 35
		2.2 Derivative	2, 4, 6, 12, 14, 40, 58, 62.
	1	2.3. Computation of derivatives	30, 34, 41, 44, 46.
		2.4. The product and Quotient rules	2, 4, 10, 22, 50, 52.
	1	2.5 the Chain rule	2, 8, 24, 26, 34 38, 41.
		2.6 trigonometric functions	4, 9, 28, 30, 38, 43(d), 48.
	1.5	2.7 Exponential and logarithmic functions	2, 4, 20, 26, 29, 49, 50, 52.
		2.8. Implicit differentiation and Inverse Trigonometric functions	2, 9, 12, 16, 24, 15, 24, 30, 32, 45.
		2.9 The mean Value Theorem	2, 10, 13, 14, 15, 18, 20, 30, 40, 45.
<b>MIDTERM 1</b>			
3. Applications of Differentiation	1	3.1 Linear Approximations & Newton's method	2, 4, 17, 20, 42, 47.
	1.5	3.2 Indeterminate forms & l'Hopital's rule	2, 4, 6, 14, 23, 28, 30, 31, 49, 50.
		3.3 Maximum and Minimum values	2, 6, 10, 32, 34, 36, 46, 55, 56.
	1	3.4 Increasing and decreasing functions	2, 10, 12, 14, 22, 36, 52, 61.
		3.5. Concavity & second derivative test	2, 4, 8, 10, 14, 16, 23, 30, 37, 42, 48.
	1.5	3.6 Overview of curve sketching	6, 8, 10, 34, 44, 50, 53.
3.7 Optimization		4, 6, 8, 9.	
<b>MIDTERM 2</b>			
4. Integration	1	4.1 Antiderivatives	5, 8, 12, 14, 16, 22, 27, 32, 39, 42, 46, 50, 62, 64, 66, 69.
		4.2 Sums and Sigma notations	2, 6, 14, 20, 24, 36, 42.
	1	4.3 Area (Riemann sum)	2, 3, 16, 18.
		4.4 The Definite Integral	6, 10, 12, 18, 20, 24, 28, 30, 34, 48, 56
	1	4.5 The Fundamental Theorem of Calculus	2, 12, 16, 18, 28, 30, 36, 41, 54, 56, 75.
		4.6 Integration by substitution	2, 5, 10, 26, 32, 38, 56.
1	4.8 Area between curves	1, 4, 10, 20, 24.	
<b>Final Exam</b>			

\* Note for student: Please solve suggested **exercises** in advance to be prepared.

