University/Academy: Arab Academy for Science, Technology and Maritime Transport
Faculty/Institute: College of Computing and Information Technology
Program: Computer Science

Course title	**Calculus 1**
Course code	**BA101**

Form No. (11A)
Knowledge and skills matrix for a course

Week	Course content	Knowledge	Intellectual skills	Professional skills	General skills
1	Basic rules of differentiation.	• Define differentiation in its physical meaning. • Define differentiation in its geometrical meaning. • Recognize the properties of differentiation and its basic rules.	• Apply differentiation to some functions.	• Solve applications from different fields involving various meanings of the derivative. •	• Enhance the use numeracy, calculation and statistical methods.
2	Trigonometric function and their derivatives.	• Define the trigonometric functions. • Drawing the trigonometric function in the xy-plan. • Recognize some properties between the trigonometric functions.	• Classify even and odd functions. • Simplify forms of trigonometric functions. • Apply differentiation to trigonometric functions.		
3	Inverse of trigonometric and their derivatives.	• Define the inverse of a function and consequently the inverse of trigonometric functions.	• Transform from one domain to another and vice versa. • Apply differentiation to inverse trigonometric functions.	• Solve applications from different fields involving various meanings of the derivative. •	• Enhance the use numeracy, calculation and statistical methods.

Week	Course content	Knowledge	Intellectual skills	Professional skills	General skills
4	Logarithmic function and their derivatives.	• Define the logarithmic function. • Define the natural number e. • Recognize how to differentiate logarithmic function.	• Apply an operator to an equation. • Simplify forms by using the properties of logarithmic function. • Apply differentiation to logarithmic functions.	• Solve applications from different fields involving various meanings of the derivative. •	• Enhance the use numeracy, calculation and statistical methods.
5	Exponential function and their derivatives.	• Define the exponential function as the inverse function of the logarithmic function. • Recognize how to differentiate exponential function.	• Apply differentiation to exponential functions.	• Solve applications from different fields involving various meanings of the derivative. •	• Enhance the use numeracy, calculation and statistical methods.
6	Derivatives of hyperbolic functions and their inverse.	• Define the hyperbolic functions and its relation with exponential function. • Define the inverse hyperbolic function and its relation with logarithmic function. • Recognize how to differentiate hyperbolic functions and its inverse.	• Construct a function from another one, a functional. • Apply differentiation to hyperbolic and inverse hyperbolic functions.	• Solve applications from different fields involving various meanings of the derivative. •	• Enhance the use numeracy, calculation and statistical methods.
7	Parametric differentiation, Implicit differentiation.	• Define another form of a function, the parametric form. • Define the implicit form of a function. • Explain the possibility of getting the implicit form from the parametric one.	• Classify many types for a function.	• Solve applications from different fields involving various meanings of the derivative. •	• Enhance the use numeracy, calculation and statistical methods.
8	The n th derivatives.	• Explain how to get the nth derivative for a given	• Applying the induction procedures to get a general form	• Solve applications from different fields	• Enhance the use numeracy,

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		function.	for the nth derivative.	involving various meanings of the derivative. •	calculation and statistical methods.
9	L'Hospital rule.	• Define the limit of a function. • Recognize the undetermined quantities. • Explain L'Hospital rule.	• Calculate the limit of a function. • Know the undetermined quantities. • Appling L'Hospital rule.	• Solve applications from different fields involving various meanings of the derivative. •	• Enhance the use numeracy, calculation and statistical methods.
10	Partial Differentiation.	• Define a function in more than one variable. • Recognize how to differentiate a function in more than one variable to a specific one.	• know how to differentiate a function in more than one variable to a specific one.		• Enhance the use numeracy, calculation and statistical methods.
11	Maclaurin's expansion.	• Define a continuously differentiable function. • Explain how to expand a function in a power series of its variable in a neighborhood of a point by Taylor's expansion. • Define Maclaurin's expansion as a special case of Taylor's expansion.	• Getting an approximation of a function at a given point. • Calculate the nth derivative of a function at a given point.	• Solve applications from different fields involving various meanings of the derivative. •	• Enhance the use numeracy, calculation and statistical methods.
12	Physical application	• Define velocity and acceleration as differentiation of some physical quantities. • Define the tangent and the normal lines to a curve at a given point.	• know the applications of the differentiation.	• Apply tools and techniques for the design and development of applications	• Develop Creativity, imagination skills, and analytic ability.

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13	Curve sketching.	• Define a local maximum and local minimum points and reflection points. • Define the increasing and decreasing intervals, the concavity of a curve • Explain how to sketch a curve.	• Imagine the shape of a curve.	• Use calculus to compute, graph, model, and solve problems. • Set up max/min problems and use differentiation to solve them. •	• Develop Creativity, imagination skills, and analytic ability.
14	Conic sections.	• Define the conic sections. • Recognize the parabola, hyperbola, and the ellipse.	• Discuss and sketch the conic sections.	• Use calculus to compute, graph, model, and solve problems.	• Develop Creativity, imagination skills, and analytic ability.
15	Final revision.	•	•		•

Course Instructor

Name:

Signature:

Head of Department

Name: **Dr. Essam Kosba**

Signature:

Dean - College of Computing and Information Technology

Name: **Prof. Dr. Khaled Mahar**

Signature:

Executive Manager of Quality Assurance Center - AASTMT

Name: **Prof. Dr. Aziz Ezzat**

Signature: