

## **BA123- Mathematics (1)**

### **CREDIT HOURS**

3 Hours

### **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2

### **COURSE COORDINATOR**

Dr Ahmed El Bakly

### **TEXT BOOK:**

- Robert T. Smith and Roland B. Minton, *Calculus: Early Transcendental Functions*, Mc GRAW. Hill, latest edition.
- Printed Notes.

### **COURSE DESCRIPTION:**

The aim of this course is the differentiation and some of its applications, basic differentiable functions of one variable. It includes definitions and intuitive meanings of derivatives; Higher derivatives; Basic techniques of differentiation; Chain Rule; Parametric equations; Partial differentiation; Implicit differentiation; Inverse function theorem; Logarithmic differentiation; differentiation; Logarithmic functions; Exponential functions; Trigonometric functions; Inverse trigonometric functions; Hyperbolic functions; Differentiation of those; Physical and geometric applications of differentiation; Limits;  $N^{\text{th}}$  derivative; L'Hôpital rule; Maclaurin's expansion as approximations of functions; Analytic geometry; Translation of Axes; Conic sections.

### **PREREQUISITE:**

None

### **RELATION OF COURSE TO PROGRAM:**

Required

### **COURSE INSTRUCTION OUTCOMES:**

The student develops skills in the techniques of differentiation, and enables him/her to grasp its intuitive meaning. It also provides him/her with essential knowledge and skills in analytic geometry.

### **TOPICS COVERED:**

Basic techniques and rules of differentiation - Trigonometric function: properties, basic identities and their derivatives - Inverse of trigonometric and their derivatives - Logarithmic functions: their properties, basic identities and derivatives - Exponential functions: their properties, basic identities and derivatives - Derivative of hyperbolic

functions and their inverse - Parametric differentiation and implicit differentiation - The  $N^{\text{th}}$  derivative - L' Hopital rule - Partial differentiation - Maclaurin's expansion. - Physical application - Curve sketching - Conic sections - General revision.

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

| <b>Professional Component Content</b> |                           |                          |                           |
|---------------------------------------|---------------------------|--------------------------|---------------------------|
| <b>Math and Basic Sciences</b>        | <b>Engineering Topics</b> | <b>General Education</b> | <b>Engineering Design</b> |
| ✓                                     |                           |                          |                           |

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

| <b>Student Outcomes</b> |  | <b>Course Outcomes</b> |
|-------------------------|--|------------------------|
| <b>a.</b>               | An ability to apply knowledge of mathematics, science, and engineering.  | ✓                      |
| <b>b.</b>               | An ability to design and conduct experiments, analyze and interpret data.  |                        |
| <b>c.</b>               | An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. |                        |
| <b>d.</b>               | An ability to function on multi-disciplinary teams.  |                        |
| <b>e.</b>               | An ability to identify, formulate, and solve engineering problems.   | ✓                      |
| <b>f.</b>               | An understanding of professional and ethical responsibility.   |                        |
| <b>g.</b>               | An ability to communicate effectively.   |                        |
| <b>h.</b>               | The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal content   |                        |
| <b>i.</b>               | A recognition of the need for, and an ability to engage in life-long learning.   |                        |
| <b>j.</b>               | A knowledge of contemporary issues within and outside the electrical engineering profession.   |                        |
| <b>k.</b>               | An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.  |                        |