

Course Syllabi

1. MAES-00122 DIFFERENTIAL EQUATIONS

2. 144 credits hours.

3. Bibliography

- Ecuaciones diferenciales y problemas con valores en la frontera, William E. Boyce & Richard C. DiPrima, 2003
- Matemáticas avanzadas para ingeniería, Erwin Kreyszing, 2003

4. Specific Course Information

a. Computer Science and Differential Equations Differential equations are mathematical equations that relate a function to one or more of its derivatives. These equations allow mathematically to represent certain phenomena of reality that are complex. Once the phenomenon is modeled, it is necessary to create algorithms or numerical methods of solution to be implemented and executed on a computer in order to owe the characteristics of the phenomenon under study. Differential actions come from different fields such as engineering, physics, chemistry, economics and biology. Some of these phenomena are population growth, spread of diseases, currents and voltages in electrical circuits, flows in drinking water networks, traffic in data networks, vehicular traffic, speed of heat transfer in an auditorium, in a swimming pool, atmospheric phenomena, ecological phenomena, etc. The fields of Computer Science that use ecu Differential ations are artificial intelligence, software engineering, robotics, systems. The subject is organized into seven chapters of study. In the first chapter the origin of differential equations is described. A classification of differential equations is presented. In chapter 2 the methods of solution of first order differential equations and applications are presented. In chapter 3 the methods of solution of the differential equations of second or second order are presented. Chapter 4 presents the methods of solving the differential equations of higher order. Chapter 5 presents the solution of the differential equations by applying the method of power series. Chapter 6 examines the solution of differential equations by applying the Laplace transforms. Chapter 7 examines the solution of the systems of linear equations of first order.

b. Prerequisites:

- MAES-00121 INTEGRAL CALCULUS

5. Learning Objectives of the Course

- a. Understand the most important concepts and techniques for the resolution of ordinary differential equations; apply acquired and developed skills and skills to the modelling of physical, mechanical, electrical phenomena, among others; later, determine a solution to the model in differential equations and finally, interpret and contrast the results of the model.
- Understand a perspective of the study of differential equations. quations. Some of the most important figures and trends in the historical development of matter are presented.
 - Describe the different methods to solve the differential equations of the first order.
 - Understand the linear differential equations of the second order
 - Understand the linear differential equations of the higher order
 - Understand the serial solutions of the differential equations of the second order
 - Understand the method of the Laplace Transform to r solver for the resolution of linear differential equations.
 - Study the resolution of the systems of first order differential equations.

b. Learning Outcomes

- Solve first-order linear differential equations
- Apply the laplace transform method in the resolution of differential equations.
- Solve the systems of first-order differential equations.
- Solve first-order linear differential equations
- Solve first-order linear differential equations
- Solve linear equations of superior order
- Apply power series to solve second-order linear equations
- Solve second-order linear differential equations.
- Solve second-order linear differential equations.
- Solve linear equations of superior order
- Apply power series to solve second-order linear equations
- It correctly identifies the different classes and subclasses of differential equations.
- It correctly identifies the different classes and subclasses of differential equations.
- Solve second-order linear differential equations.
- Apply power series to solve second-order linear equations
- Apply the laplace transform method in the resolution of differential equations.
- Solve the systems of first-order differential equations.
- Solve the systems of first-order differential equations.
- It correctly identifies the different classes and subclasses of differential equations.
- It correctly identifies the different classes and subclasses of differential equations.
- Apply the laplace transform method in the resolution of differential equations.
- Solve second-order linear differential equations.

6. Course Topics

- Introduction
- First order differential equations
- Second order linear equations
- Linear equations of higher order
- Serial solutions of second order linear equations
- The laplace transform
- Systems of linear equations of first order