Course Profile

Course Number : **MATH 220**	Course Title : Differential Equations
Required / Elective : Required	**Pre-requisite :** MATH 101
Catalog Description: Basic definitions, first order differential equations, second order linear differential equations with constant coefficients. Systems of first order linear differential equations with constant coefficients, Laplace transforms and its applications to linear differential systems. Linear differential equations with variable coefficients, series solutions of second-order linear differential equations.	**Textbook / Required Material :** William E. BOYCE & Richard C. DIPRIMA, *Elementary Differential Equations and Boundary Value Problems,* 9th edition, 2009, John Wiley & Sons, Inc.

Course Structure / Schedule : (3+0+2) 4 / 7 ECTS

Extended Description :

The course covers the basic theory of "Ordinary Differential Equations". Topics include first order differential equations (linear equations, method of integrating factors, separable equations, exact equations, existence and uniqueness); second order differential equations (homogeneous differential equations with constant coefficients, fundamental solutions of linear homogeneous equations, linear independence, reduction of order); non-homogeneous equations (method of undetermined coefficients, variation of parameters), higher order linear equations, Laplace Transform (initial value problem, differential equations with discontinuous forcing terms), systems of first order linear equations, series solutions.

Design content: None.	**Computer usage** No computer usage required

Course Outcomes: By the end of the course the students should be able to:

1. provide an understanding the concept of ODEs **[1, 2, 3, 6],**

2. select the appropriate method to solve differential equations with constant coefficients **[3, 6],**

3. understand the behavior of the solutions of differential equations with discontinuous non-homogeneous parts, use Laplace transforms to solve that kind of equations **[3, 6],**

4. use power series to solve ODEs **[3, 6],**

5. find the solutions of systems of first order linear equations **[3, 6].**

[1] demonstrate the ability of solving problems by using techniques from calculus, linear algebra, differential equations, probability and statistics,

[2] demonstrate knowledge of mathematics to construct, analyze and interpret mathematical models,

[3] demonstrate the ability to apply mathematics to the solutions of problems,

[6] have a basic knowledge of the main fields of mathematics, including analysis, algebra, differential equations, differential geometry.

Recommended reading: All "Elementary Differential Equation" books available in the Library.

Teaching methods:

Preparatory-readings, lectures, tutorials, discussions, assignments

Assessment methods:

Midterm exams, Quizzes, Final exam

Student workload:

Pre-reading	10 hrs
Lectures	45 hrs
Tutorials	30 hrs
Assignments	40 hrs
Preparatory reading	32 hrs
Discussions	11 hrs
Midterm exams	4 hrs
Final Exam	3 hrs
TOTAL ………………………	**175 hrs … to match 25 x 7 ECTS**

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