

## Course specifications

Programme(s) on which the course is given	pre-master of pure of Mathematics
Major or minor element of programmes	Major
Department offering the programme	Mathematics
Department offering the course	Mathematics
<b>Academic year / Level</b>	<b>Post-graduate studies</b>
Date of specification approval	2010-2011

### A- Basic Information

Title: Ordinary Differential Equation

Code: M6119

Credit Hours: 2 hrs

Lecture: 2 hrs

Tutorial: -

Practical:-

Total: 2 hrs

### B- Professional Information

#### 1 – Overall aims of course

This course aims to

- 1- Understand Existence and uniqueness theorem, fundamental matrix, non-homogeneous linear systems.
- 3- Understand and solve linear systems with constant coefficients.
- 4- Have knowledge about stability theory and autonomous system.
- 5- Understand Sturm's comparison theorem, elementary linear oscillations.

#### **6 –Have idea about Liapunove function.**

#### 2 – Intended learning outcomes of course (ILOs)

##### a- Knowledge and understanding:

*The student should be able to*

- a1- Learn Exact of nth order linear D.E, system of 1<sup>st</sup> order Eqs..
- a2- Understand Existence and uniqueness theorem, fundamental matrix.
- a3- Understand and solve linear systems with constant coefficients.
- a4- Have good idea about stability theory and autonomous system

##### b- Intellectual skills

- b1- Understand Existence and uniqueness theorem.
- b2- Understand the idea of autonomous system and stability theory

- b3- Study Existence and uniqueness of solutions of systems.
- c- Professional and practical skills
  - c1-. Solve system of 1<sup>st</sup> order Equations.
  - c2- Solve Linear systems with constant coefficients.
- d- General and transferable skills
  - d1- creative thinking to use the concepts and principles learned from this course.
  - d2- able to develop his skills in this area of study.

### 3- Contents

<b>Topic</b>	<b>No. of hours</b>	<b>Lecture</b>
<b>-Existence and Uniqueness of Solutions</b>	<b>4</b>	<b>2</b>
<b>Fundamental solution theorem</b>	<b>4</b>	<b>2</b>
<b>Oscillatory behavior of solutions of second order equations</b>	<b>4</b>	<b>2</b>
<b>Two dimensional linear system</b>	4	2
<b>Two dimensional dynamic and mechanical Systems</b>	4	2
<b>Autonomous equations in <math>\mathbb{R}^2</math></b>	2	1
<b>Liapunov,s method for autonomous equations</b>	4	2
<b>Stability Theory</b>	2	1

## 7-Stability Theory

#### 4– Teaching and learning methods

4.1- Lectures.

4.2- Oral discussion.

#### 5- Student assessment methods

5.1 Midterm exam to assess understanding competencies.

5.2 Oral exam to assess attendance and interesting.

5.3 Final exam to assess comprehension.

#### Assessment schedule

Assessment 1 Midterm	Week 7
Assessment 2 Semester activities	Week 5 and 8
Assessment 3 Final exam	Week 14.

#### 6- Weighting of assessments

Mid-Term Examination	20 %
Final-term Examination	60 %
Semester Work	20 %
Total	100 %

Any formative only assessments

#### 7- List of references

7.1- Course notes

7.2- Essential books (text books)

#### 8- Facilities required for teaching and learning

Course coordinator: Prof. Dr. Mohamed El-Sheikh ,Dr. Raga' Salam

Head of Department: Mohamed A. Ramadan

Date: / /