Course Specification

(Postgraduate)

Course Title: **Ordinary Differential Equations**
Course Code:**MATH659**
Program: **Master Program in Mathematics**
Department: **Mathematics**
College: **Science**
Institution: **University of Tabuk, KSA**
Version: **2**
Last Revision Date:**1/12/1443 H**

Table of Contents

A. General information about the course:

Course Identification					
1. Credit hours:	3 H				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered: Level 1					
4. Course general Description The course covers some basic fundamentals of Ordinary Differential Equations, Uniqueness and Existence Theorem of Picard's method, the Lipschitz Condition and the Lipschitz constant, the eigenvalues and eigenfunctions for the given eigenvalue problems, converting the given differential equation in to the Sturm-Liouville Equation, orthogonality of Eigen functions.					
5. Pre-requirements for this course (if any): None					
6. Co- requirements for this course (if any): None					
7. Course Main Objective(s) 1. Student continues to mature in their understanding of ordinary differential equations . 2. Student studies Picard's method, the Lipschitz Condition and learn to find the Lipschitz constant. 3. Student studies how to determine the interval of validity for the initial value problems, determine the interval of validity for the Nonlinear Differential Equations using the Lipschitz Condition. 4. Students acquires knowledge of some special types of Boundary conditions. 5. Students able to learn the properties of the Sturm-Liouville Boundary value problems and orthogonality of Eigenfunctions. 6. Students able to construct an orthogonal system of eigenfunctions corresponding to the regular Sturm-Liouville Boundary Value Problem.					

1. Teaching mode(mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	45	100 %
2.	E-learning		
3.	Hybrid ● Traditional classroom ● E-learning		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	3 H /week
2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	Total	45

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	Knowledge and understanding The students will be able to:			
1.1	Demonstrate the importance of Ordinary Differential Equations.	K1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Research project, presentation, interactive discussion and participation, Surveys.
1.2	Describe and applying the ordinary Differential Equations in advance technology.	K2		
1.3	Enhance knowledge and understanding of current topics and research area in Ordinary Differential Equations.	K3		
2.0	Skills The students will be able to:			
2.1	Apply the concepts of ODE on Lipschitz Contition in finding the Lipschitz constant .	S1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Exams, Quizzes, Home works, Assignments, Research project, presentation, interactive discussion and participation, Surveys.
2.2	Analyze the intervals of validity for the linear and non-linear ODEs with IVPs.	S2		
2.3	Communicate ideas concisely and accurately using available resources	S4		
3.0	Values, autonomy, and responsibility			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	The students will be able to:			
3.1	Perform professionally tasks with autonomy.	V1	Lectures, Group works, Presentations, Classroom discussion, Seminar, Case study, problem solving session	Research project, Home works, Assignments, presentation, interactive discussion and participation, Surveys.
3.2	Demonstrate the responsibility for solving problems in selected topics individually or as group research	V2		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction and Previous Knowledge of Ordinary Differential Equations.	3
2	Picard's Iterative Method –Problems	3
3	Lipschitz Condition	3
4	Uniqueness and Existence of Picard's Iterative Method and Problems,	3
5	Finding the Interval of Validity for the Linear and Non-Linear ODEQ's	3
6	Eigen Value and vectors Problems	3
7	**Mid-Exam #**	---
7	Sturm-Liouville Equations-Problems	3
8	Sturm-Liouville Equations-Problems	3
9	Regular Sturm-Liouville Boundary value Problems	3
10	Regular Sturm-Liouville Boundary value Problems	3
11	Orthogonality of EigenFunctions.	3
12	Orthogonality of EigenFunctions.	3
13	Sequence of Eigenvalues and Eigenfunction Expansion	3
14	Laplace Transform for solving IVPs.	3
15	Laplace Transform for solving BVPs.	3
16+17	**Revision & Final Exam**	
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Home works and Assignments	Weekly basis	20%
2.	Mid-term exam	7th week	25%
3.	Presentation and discussion	During the Semester	15%
4.	Final Exam	At End of Semester	40 %

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1. Feliz Manuel Minhós ،João FialhoNonlinear Differential Equations and Dynamical Systems: Theory and pplications. (2021). 2. M.D.Raisinghania, Advanced Differential Equations, S. CHAND & COMPANY PVT. LT, Ramnagar, New Delhi, Eighteenth Revised Edition, 2015.
Supportive References	
Electronic Materials	Saudi Digital Library
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Lecture Room with capacity of 30 students and equipped with White Board, Library
Technology equipment (projector, smart board, software)	Overhead projector and internet connection.
Other equipment (depending on the nature of the specialty)	None

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Direct and Indirect
Effectiveness of students assessment	Teacher	Direct
Quality of learning resources	Students	Indirect
The extent to which CLOs have been	Teacher, Quality Committee	Direct and Indirect

Assessment Areas/Issues	Assessor	Assessment Methods
achieved		
Other		

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods(Direct, Indirect)

G. Specification Approval Data

Council / Committee	**Approval by the Department Council**
Reference No.	DEPARTMENT COUNCIL NO (26)
Date	**11/9/1444 H**