



Course Specification

— (Postgraduate)

Course Title: Numerical Solution of PDE
Course Code: 202610-3
Program: Master of applied mathematics
Department: Mathematics and Statistics
College: Science
Institution: Taif university
Version: 1
Last Revision Date: 20/10/2023



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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)

2. Course type

A. University College Department Track

B. Required Elective

3. Level/year at which this course is offered: Level 1/First Year

4. Course general Description:

In this course, we will study Dynamical Systems – Existence and uniqueness of solutions of linear systems – eigenvalues and eigenvectors – Rayleigh-Ritz method - perturbation method.

5. Pre-requirements for this course (if any):

None

6. Pre-requirements for this course (if any):

None

7. Course Main Objective(s):

The student will be taught as follows:

1. Studying Dynamical Systems
2. Studying Existence and uniqueness of solutions of linear systems
3. Studying eigenvalues and eigenvectors.
4. Studying Rayleigh.
5. Studying Ritz method
6. Studying perturbation method.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning		
3	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		



No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning		

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45
2.	Laboratory/Studio	NA
3.	Field	NA
4.	Tutorial	NA
5.	Others (specify).....	NA
	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			
1.1	Recognize Existence and uniqueness of solutions of linear systems.	K1	Lectures, discussion, group	Exams, Quizzes, Assignments
1.2	Describe perturbation method.	K3	Lectures, discussion, group	Exams, Quizzes, Assignments
2.0	Skills			
2.1	Apply perturbation method - Existence and uniqueness of solutions of linear systems.	S1	Lectures, discussion, group	Exams, Quizzes, Assignments, report
2.2	Demonstrate Ritz method. eigenvalues and eigenvectors.	S5	Lectures, discussion, group	Exams, Quizzes, Assignments, report
3.0	Values, autonomy, and responsibility			
3.1	Participate effectively within groups and independently.	V1	Lectures, discussion, group	Exams, Quizzes, Assignments, report
3.2	Give responsibility for learning importance	V2	Lectures, discussion, group	Exams, Quizzes, Assignments,



Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	and continuing personal and professional development.			report

C. Course Content:

No	List of Topics	Contact Hours
1.	Numerical solution of ordinary differential equations.	6
2.	Numerical solution of Partial differential equations.	6
3.	Classify types of boundary conditions among PDEs..	6
4.	Finite difference solution of partial differential equations	6
5.	Finite difference discretization of Elliptic equation.	6
6.	Iterative methods for Elliptic equations.	6
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm exam	8th -9th	30 %
2.	Final exam	16th	70%

*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	Numerical solution of partial differential equations and code
Supportive References	Numerical Methods for Partial Differential Equations
Electronic Materials	https://www.google.com.sa/search?q=numerical+solution+of+pde+pdf&sxsrf=AOaemvIDCfLxMODFsLnLIRBe3KFopR-Hmw%3A1638044726258&source=hp&ei=NpSiYbD8DOWdlwS4soToDA&iflsig=ALs-wAMAAAAYaKiRmPTDerCg-CVrf7yZpb6PcMto4X2&oq=Numerical+Solution+of++PDE&gs_lcp=Cgdnd3Mtd2l6EAEYATIFCAAQgAQyBQgAEIAEMgUIABCABDIGCAAQFhAeMgYIABAWEB4yBggAEBYQHjIGCAAQFhAeMgYIABAWEB4yBggAEBYQHjIGCAAQFhAeUABYAGCqGWgAcAB4AIABzwOIAZ



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Other Learning Materials	None

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classrooms
Technology equipment (Projector, smart board, software)	Data show, Blackboard, Maple and MATLAB software
Other equipment (Depending on the nature of the specialty)	Wi-Fi internet connections

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students	Indirect
Effectiveness of students assessment	Students	Indirect
Quality of learning resources	Students	Indirect
The extent to which CLOs have been achieved	Peer reviewer	Direct
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	Department of Mathematics and Statistics
REFERENCE NO.	11
DATE	17-3-1445 H

قسم الرياضيات والإحصاء
Mathematics and Statistics
Department

