Course Specification
— (Postgraduate)

Course Title: Generalized Functions	
Course Code: 202654-3	
Program: Master of pure Mathematics	
Department: Mathematics and Statistics Department	
College: Faculty of Sciences	
Institution: Taif University	
Version: 1	
Last Revision Date: 20/05/2023	

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A. General information about the course:

1. 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 3 / 3th year

4. Course general Description:

This course covers: Extension local functions problem–Functions of one variable test – Generalized Functions of one variable – Examples on Generalized Functions – Ordinary differential equations – the divided of Unit – Convergence in generalized functions spaces – Curvature of generalized functions - Torsion of generalized functions - Fourier transformations of generalized functions.

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. Study the concept extension local functions problem.
2. Study the functions of one variable test.
3. Study generalized Functions of one variable.
4. Study examples on generalized Functions.
5. Study ordinary differential equations.
6. Study the divided of Unit.
7. Study convergence in generalized functions spaces.
8. Study curvature of generalized functions.
9. Study torsion of generalized functions.
10. Study Fourier transformations of generalized functions.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	√	100%
2	E-learning		

No	Mode of Instruction	Contact Hours	Percentage
3	Hybrid • Traditional classroom • E-learning		
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	**Define** fundamentals of extension local functions problem.	K1	Lectures, group discussion `	Exams, Quizzes, Assignments
1.2	**Classify** problems related to the basic concepts of generalized Functions.	K3	Lectures, group discussion	Exams, Quizzes, Assignments
2.0	**Skills**			
2.1	**Apply** appropriate mathematical theories, and tools in proving various Theorems of curvature of generalized functions.	S1	Lectures, group discussion	Exams, Quizzes, Assignments, report

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.2	**Use** important mathematical concepts, principles, theorems, formulas, computational techniques in the concept of torsion of generalized functions and Fourier transformations of generalized functions.	S5	Lectures, group discussion	Exams, Quizzes, Assignments, report
3.0	**Values, autonomy, and responsibility**			
3.1	**Work** effectively within groups and independently.	V1	Collaborative Learning Self-learning	Scientific activity
3.2	**Articulate** responsibility for learning importance and continuing personal and professional development.	V2	Lectures	Assignments
...				

C. Course Content:

No	List of Topics	Contact Hours
1.	Definitions of extension local functions problem.	3
2.	Functions of one variable test	3
3.	Generalized Functions of one variable. Definition and examples	3
4.	Generalized Functions of one variable. Operations and properties	3
5.	Convergence in generalized functions spaces.	3
6.	Differentiation of generalized functions	3
7.	Hadamard's finite part and some pseudofunctions generated by it	3
8.	Distributional derivatives of some pseudofunctions	3
9.	Ordinary differential equations. First and Second order and fundament solutions	3
10.	Divided of Unit.	3
11.	**Midterm exam**	3

12	Curvature of generalized functions.	3
13.	Torsion of generalized functions.	3
14.	Fourier transformations of generalized functions.	3
15	Fourier transformations of generalized functions.	3
Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes and homeworks	Continuous Evaluation	10 %
2.	Midterm Exam	10-11	20 %
3.	Final Exam	15-16	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	1.Distribution Theory and Transform analysis by A. H. Zemanian 2. Generalized Functions, Volume 1: properties and operations, Edited by I. M. Gel'fand, G. E. Shilov
Supportive References	Generalized Functions: Theory and Applications 3rd Edition , by Ram P. Kanwal.
Electronic Materials	Lectures available in Blackboard
Other Learning Materials	

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

Items	Resources
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, Program Leader	Direct& Indirect
Effectiveness of students' assessment	Faculty, Program Leader	Direct
Quality of learning resources	Students, Faculty	Indirect
The extent to which CLOs have been achieved	Faculty	Direct& Indirect
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	Department Council
REFERENCE NO.	
DATE	October 2023

قسم الرياضيات والإحصاء
Mathematics and Statistics Department

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جامعة الطائف
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