Course Specification
(Postgraduate)

Course Title:	**Integral Equations**
Course Code:	**202700-3**
Program:	**Master of Pure Mathematics**
Department:	**Mathematics and Statistics**
College:	**Science**
Institution:	**Taif University**
Version:	*Course Specification Version Number*
Last Revision Date:	**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
B.	☐Required		☒ Elective	
3. Level/year at which this course is offered: (..... Level 2....)				
4. Course general Description:				
Volterra integral equations- Basic concepts- Resolvent Kernal of Volterraintegral equations -The unique solvability Volterra integral equations- Successive approximation method for integral equations-Convolution type equations-Solutions of integral–differential equations with the aid of Laplace transformation- Voltera integral equations with limt $(x-\infty)$- Voltera integral equations of the first kind - Abel's integral equation- Fredholm integrals of the second kind- Iterated Kernel - Fredholm integrals- Integral equations with degenerate Kernels Hammerstein Type Equation- Characteristic number and and Eigen-functions - Fredholm integral equations with difference Kernels - Nonhomogeneous symmetric integral equations- Fredholm alternative – constrict the Greens function – Singular integral equation				
5. Pre-requirements for this course (if any)**:**				
None.				
6. Pre-requirements for this course (if any)**:**				
None.				
7. Course Main Objective(s):				
1. **Study the Basic concepts of the integral equations.** 2. **Study the different methods for solving the Voltera integral equations** 3. **Study the Voltera integral equations with limt $(x-\infty)$** 4. **Study Abel's integral equation-** 5. **Study the Fredholm integrals of the second kind- Iterated Kernel.** 6. **Study Characteristic number and and Eigen-functions of the integral equations** 7. **Study the Fredholm integral equations with difference Kernels , Nonhomogeneous symmetric integral equations and Fredholm alternative.** **8.Study the Greens function and Singular integral equation finite fields**				

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	3	100%
2	E-learning	0	0
3	Hybrid • Traditional classroom • E-learning	0	0
4	Distance learning	0	0

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

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	0
3.	**Field**	0
4.	**Tutorial**	0
5.	**Others (specify).....**	45
	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** basic concepts of the integral equations and different methods for solving the Voltera integral equations	K1	• Lectures	- Quizzes - Exams Assignments
1.2	**Describe** Voltera integral equations with limt $(x - \infty)$ and Abel's integral equation.	K3	• Lectures	- Quizzes - Exams Assignments
...				
2.0	**Skills**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
2.1	**Apply** the successive approximation method for integral equations	S1	• Lectures	- Quizzes - Exams Assignments
2.2	**Demonstrate** Greens function and singular integral equation finite fields	S5	• Lectures	- Quizzes - Exams Assignments
...				
3.0	**Values, autonomy, and responsibility**			
3.1	**Participate** effectively within groups and independently.	V1	Projects.	Through the oral presentation of the projects.
3.2	**Give** responsibility for learning importance and continuing personal and professional development.	V2	Projects.	Through the oral presentation of the projects.
...				

C. Course Content:

No	List of Topics	Contact Hours
1.	The types of the integral equations and Basic concepts of the integral equations	3
2.	Resolvent Kernal of Volterraintegral equations	3
3.	The unique solvability Volterra integral equations	3
4.	Successive approximation method for integral equations	3
5.	Convolution type equations	3
6.	Solutions of integral–differential equations with the aid of Laplace transformation	3
7.	Voltera integral equations with limt $(x - \infty)$	3
8.	Voltera integral equations of the first kind	3
9.	Abel's integral equation	3
10.	Iterated Kernel - Fredholm integrals	3
11.	Integral equations with degenerate Kernels Hammerstein Type Equation	3
12.	Fredholm integral equations with difference Kernels	3
13.	Nonhomogeneous symmetric integral equations- Fredholm alternative	3
14.	Constrict the Greens function	3
15.	Singular integral equation	3

Total		45

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	**Quizzes and Homework's**	**Continues**	**10 %**
2.	**Midterm exam**	**8th -9th**	**20 %**
3.	**Final exam**	**15th**	**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	https://link.springer.com/content/pdf/10.1007%2F978-3-0348-9215-5.pdf
Supportive References	https://www.cambridge.org/core/books/integral-equations-and-applications/3B21DE6C3B218916ACF354FFEEB4B8FA
Electronic Materials	**YouTube Lecturers , https://www.youtube.com/watch?v=P_BayV54k7o**
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**
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**	**Indirect**
Effectiveness of students assessment	**Students**	**Indirect**

Assessment Areas/Issues	Assessor	Assessment Methods
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.	
DATE	7/4/1445

قسم الرياضيات والإحصاء
Mathematics and Statistics Department
TU
جامعة الطائف
TAIF UNIVERSITY