هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

T-104
2022

Course Specification

Course Title	Mathematical Physics 2
Course Code:	PHYS 301
Program:	B.Sc. in Physics
Department:	Department of Physics and astronomy
College:	College of Science
Institution:	King Saud University
Version:	2.0.0
Last Revision Date:	Sep 2023

Table of Contents:

A. General information about the course:

Course Identification					
1. Credit hours:	3(2+0+2)				
2. Course type					
a.	University ☐	College ☐	Department☒	Track☐	Others☐
b.	Required ☒	Elective☐			
3. Level/year at which this course is offered:	fifth level / third year.				
4. Course general Description Complex numbers; Complex Analytic Functions; Power Series (Taylor Series, Laurent Series); Complex Integrals; Contour Integration by the Method of residues.					
5. Pre-requirements for this course (if any): Math 209					
6. Co- requirements for this course (if any):					
7. Course Main Objective(s) 1- The students have to learn the fundamentals of Complex analysis including: complex numbers, complex analytic functions, Laurent series, complex integrals, the method of residues. 2- Increase students experience in the mathematical methods that are essential to physics majors. 3- Improving the logical think of the students. 4- The students should be trained on physical and generic skills (knowledge – cognitive – interpersonal – communication – problem solving – IT)					

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	60	100%
2.	E-learning	0	0
3.	Hybrid • Traditional classroom • E-learning	0	0
4.	Distance learning	0	0

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	30
2.	Laboratory/Studio	0

3.	Field	0
4.	Tutorial	30
5.	Others (specify)	0
	Total	60

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	**Outline the mathematical operations on complex numbers**	K1	• Give extensive examples during lecture. • Give problem sheets to be discussed during lectures.	• Hold Class discussion, tutorial sessions. • Give quizzes, mid-term exams and final exam.
1.2	**Reproduce Taylor or Laurent series for complex variable functions**	K2		
2.0	Skills			
2.1	**Evaluate integrals along a path in the complex plane using Cauchy's residue Theorem**	S1	• Give extensive examples during lecture • Give problem sheets to be • Discussions in the classes • Assignments.	• Hold Class discussion, tutorial and lab sessions. • Quizzes, • Midterm Exams and Final Exam.
2.2	**Analyze physical problems using the methods of complex analysis**	S1		
3.0	Values, autonomy, and responsibility			
3.1	**Present an oral and/or written communication on mathematical physics topics**	V1	• Assignments. • Homework	Hold Class discussion
3.2	**Evaluate series, derivatives and integrals of complex**	V3	• Discussions in the classes • Assignments.	• Quizzes • Homeworks

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
	functions using computer programs			

C. Course Content

No	List of Topics	Contact Hours
1.	**Complex Numbers**	6
2.	**Complex Analytic Functions**	6
3.	**Complex Integrals**	6
4.	**Power Series, Taylor Series, Laurent Series**	4
5.	**Integration by the Methods of Residues**	4
6.	**Applications: complex wave solutions in oscillations, electromagnetism, example of complex solutions to Maxwell's equations, and the complex wave function in quantum mechanics.**	4
Total		30

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	First Midterm Exam.	Approx. W-6	25%
2.	Second Midterm Exam.	Approx.W-12	25%
3.	Quizzes	Weekly	10%
4.	Final Exam.	W-16 to 18	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	Fundamentals of Complex Analysis with Applications to Engineering, Science, and Mathematics, By Edward B. Saff, Arthur David Snider, Third Edition, 2014, Pearson.
Supportive References	Complex Analysis, by Ian Stewart and David Tall, 1st edition, 1983, Cambridge University Press
Electronic Materials	LMS (BB) of the course
Other Learning Materials	Internet sites relevant to the course

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	A classroom which accommodates 25 students.
Technology equipment (projector, smart board, software)	Whiteboard and Smart board
Other equipment (depending on the nature of the specialty)	Not applicable

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students\ Peer Reviewer	Indirect \ direct
Effectiveness of students assessment	Students- Faculty	Direct
Quality of learning resources	students	Indirect
The extent to which CLOs have been achieved	Faculty	Indirect
Other	None	None

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

G. Specification Approval Data

COUNCIL /COMMITTEE	Physics Department's council
REFERENCE NO.	17th (2nd term/1445 H)
DATE	16/10/1445H