KINGDOOM OF SAUDI ARABIA
Ministry of Education
Al Imam Mohammad Ibn Saud Islamic University
College of Science
Department of Physics

المملكة العربية السعودية
وزارة التعليم
جامعة الإمام محمد بن سعود الإسلامية
كلية العلوم
قسم الفيزياء

SYLLABUS

Course Code	*Course Num.*	*Course Name*	*Credit Hours*	*Lec.*	*Lab.*	*Tut.*	*Private study*	*Pre-requisites*	*Course Level*	*Language*
PHY	**334**	**Mathematical Physics (2)**	**3**	**2**	**0**	**2**	**5**	**PHY 333**	**6**	**English**

A. Course Description

This course provides an introduction to some mathematical methods useful in handling problems in physics as well as other areas of science, and to develop practical skills in the use of these methods. The mathematical methods covered in this course include partial differentiations, complex variables, partial differential equations, and integral equations. This is not a course in pure mathematics, but rather on the application of mathematics to problems of interest in the physical sciences.

B. Course Outcomes

At the end of this course the student will be able to**:**

1. Learn and understand the basic knowledge of mathematical methods used in physics.
2. Learn and understand the basic knowledge of partial differentiation, complex variables, partial differential equations, and integral equations.
3. Demonstrate competence with a wide variety of mathematical tools and techniques.
4. Demonstrate a breadth of general knowledge in mathematical physics as well as depth in topics covered in this course.
5. Understand the interactions between mathematics and physics and demonstrate the ability to apply mathematical concepts and techniques into problems in physics.

C. References

Required Textbook

Boas M.L. ***Mathematical Methods in the Physical Sciences***, 3rd Edition, John Wiley (2006).

Other references

- Chow T., ***Mathematical Methods for Physicists: A Concise Introduction***, Cambridge University Press (2000).
- Arfken G.B. and Weber H.J., ***Mathematical Methods for Physicists***, Academic Press; 6th Edition (2005).

Course Website: http://www.imamm.org/

D. Topics Outline

1. ***Partial differentiation:*** *Definitions, exact and inexact differentials, useful theorems, change of variables, Taylor's theorem for many variable functions, thermodynamics notation, differential of integrals (*Contact hours*: 12).*
2. ***Complex Variables:*** *Definitions and functions of complex variable, Cauchy-Riemann relations, Power series, some elementary functions, complex integrals, Cauchy's theorem, Cauchy's integral formula, Taylor and Laurent series, Residue theorem. Application: complex potential (*Contact hours*: 24).*

3. ***Applications on partial differential equations:*** *General form and particular solution, linear second order PDEs, classification of PDEs, separation of variables: solution of: Laplace equation – the wave equation-Poisson's equation, inhomogeneous problems, integral transform methods. boundary value Problems (*Contact hours*: 16).*
4. Integral equations *(*Contact hours*: 8).*

E. Office Hours

Office hours give students the opportunity to ask in-depth questions and to explore points of confusion or interest that cannot be fully addressed in class.

F. Exams & Grading System

The semi-official dates of the exams for this course are:

- **Midterm 1:** 6th or 7th week.
- **Midterm 2:** 11th or 12th week.
- **Quizzes & Homeworks:** During the semester.
- **Final Exam**: 16th week.

Your course grade will be based on your semester work as follows:

Midterm 1: 20 %	**Midterm 2:** 20 %	**Final Exam:** 40 %
Quizzes, Homework, Attendance & Participation: 20 %		

The grading distribution:

A+	A	B+	B	C+	C	D+	D	F
[95, 100]	[90, 95)	[85, 90)	[80, 85)	[75, 80)	[70, 75)	[65, 70)	[60, 65)	[0, 60)

G. Student Attendance/Absence

Only three situations will be considered as possible excused absences:

- Occurrence of a birth or death in the immediate family will be excused. ("Immediate family" is defined by the University as spouse, grandparents, parents, brother, or sister).
- Severe illness in which a student is under the care of a doctor and physically unable to attend class will be excused. Students are not excused for a doctor's appointment. Do not make appointments that conflict with rehearsals. Notes from the University Health Center will be accepted.

Executive Rules for Study Regulations and Exams
goo.gl/ykm7t3