COURSE SPECIFICATIONS
(CS)

Mathematical Physics 2

PHYS 301

June 2018

Course Specifications

Institution: King Saud University	Date: 12/2017
College/Department: Science/Physics and Astronomy	

A. Course Identification and General Information

1. Course title and code: Mathematical Physics 2 - **PHYS 301**
2. Credit hours: 3(2+2+0)
3. Program(s) in which the course is offered: B.Sc. in Physics (If general elective available in many programs indicate this rather than list programs)
4. Name of faculty member responsible for the course: Dr. Maien Yahya Binjonaid
5. Level/year at which this course is offered: Level 5/ Year 3
6. Pre-requisites for this course (if any): MATH 209
7. Co-requisites for this course (if any): None
8. Location if not on main campus: NA
9. Mode of Instruction (mark all that apply)

a. traditional classroom	*	What percentage?	100
b. blended (traditional and online)		What percentage?	
c. e-learning		What percentage?	
d. correspondence		What percentage?	
f. other		What percentage?	

Comments:

B Objectives

1. What is the main purpose for this course? **1- The students have to learn the fundamentals of Complex analysis including: complex numbers, complex analytic functions, Luarent series, complex integrals, the method of residues.** **2- Increase students experience in the mathematical methods that are essential to physics majors.** **3- How Those mathematical methods are used in describing physical phenomenon and problems such as: complex wave solutions in oscillations, and electromagnetism, complex solutions to Maxwell's equations, and the complex wave function in quantum mechanics.** **4- Improving the logical think of the students.** **5- The students should be trained on physical and generic skills(knowledge – cognitive – interpersonal – communication – problem solving – IT)**
2. Briefly describe any plans for developing and improving the course that are being implemented. (e.g. increased use of IT or web based reference material, changes in content as a result of new research in the field). The content of the course will be made available via Blackboard. The use of mathematical physics packages such as Mathematica and Matlab will be implemented in the problem-solving skills of the course.

C. Course Description (Note: General description in the form used in Bulletin or handbook)

Course Description: **Complex numbers; Complex Analytic Functions; Power Series (Taylor Series, Laurent Series); Complex Integrals; Contour Integration by the Method of residues; Applications to Physics: (a) complex wave solutions in oscillations, and electromagnetism. (b) Complex Field solutions to Maxwell's Equations, (b) Complex wavefunction solutions to Schrödinger Equation.**

1. Topics to be Covered

List of Topics	No. of Weeks	Contact hours
Complex Numbers, Complex Analytic Functions	4	8
Complex Integrals	3	6

Power Series, Taylor Series, Laurent Series	3	6
Integration by the Methods of Residues	2	4
Applications to Physics: (a) complex wave solutions in oscillations, and electromagnetism. (b) Complex Field solutions to Maxwell's Equations, (b) Complex wavefunction solutions to Schrödinger Equation.	3	6

2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory or Studio	Practical	Other:	Total
Contact Hours	30	30	NA	NA		60
Credit	30	15	NA	NA		45

3. Additional private study/learning hours expected for students per week. 3

4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

On the table below are the five NQF Learning Domains, numbered in the left column.

First, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

Code #	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.0	**Knowledge**		
1.1	To outline the mathematical methods of complex analysis	Lecture, Smart Board	Exams and homework
1.2	To recognize the use of these methods in describing physical phenomena	Lecture, Smart Board	Exams and homework
2.0	**Cognitive Skills**		
2.1	Explain the mathematical methods of complex	Lecture, Discussion	Discussion

	analysis		
2.2	Analyze physical problems using the methods of complex analysis	Lecture, Discussion	Discussion
3.0	**Interpersonal Skills & Responsibility**		
3.1	Use the methods of complex analysis competently	Group discussion, Inverted class	Presentation / discussion
3.2			
4.0	**Communication, Information Technology, Numerical**		
4.1	Illustrate mathematical and physical examples that can be solved by the methods of complex analysis	Presentation	Group presentations
4.2			
5.0	**Psychomotor**		
5.1			
5.2			

6. Schedule of Assessment Tasks for Students During the Semester

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Midterm 1	5	15%
2	Midterm 2	11	15%
3	Quiz	Throughout	10%
4	Homework	Throughout	10%
5	In-class discussion	Throughout	10%
6	Final	End of term	40%
7			
8			

D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

2 hours per week of office hours

E Learning Resources

1. List Required Textbooks Mathematical Methods for Physicists By George Arfken Hans Weber Frank E. Harris, Seventh Edition, 2012, Academic Press Fundamentals of Complex Analysis with Applications to Engineering, Science, and Mathematics, By Edward B. Saff, Arthur David Snider, Third Edition, 2003, Pearson
2. List Essential References Materials (Journals, Reports, etc.) Mathematical Methods for Physics and Engineering By by K. F. Riley, M. P. Hobson, S. J. Bence, Thrid Edition, 2006, Cambridge Press
3. List Recommended Textbooks and Reference Material (Journals, Reports, etc)
4. List Electronic Materials, Web Sites, Facebook, Twitter, etc.
5. Other learning material such as computer-based programs/CD, professional standards or regulations and software.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access etc.)
1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.) Lecture hall for 30 students

2. Computing resources (AV, data show, Smart Board, software, etc.) Smart Board
3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching Feedback to be taken at the end of each class
2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department Peer consultation
3 Processes for Improvement of Teaching Developing teaching based on regular feedback and peer consultation
4. Processes for Verifying Standards of Student Achievement (e.g. check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution) Double-checking by independent peers

5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

Creating a table for the course to ensure that the goals are achieved, and taking into account feedback and peer consultation

Name of Instructor: _____

Signature: _____ Date Report Completed: _____

Name of Field Experience Teaching Staff _____

Program Coordinator:_____

Signature: _____ Date Received: _____