



Course Specification

— (Bachelor)

Course Title: **Mathematical methods for medical physics**

Course Code: **MPHY6242**

Program: **Medical Physics**

Department: **Physics**

College: **Science**

Institution: **University of Bisha**

Version: **1**

Last Revision Date: 5 September 2023

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A. General information about the course:

1. Course Identification

1. Credit hours:	3
2. Course type	
A. University <input type="checkbox"/>	College <input type="checkbox"/> Department <input type="checkbox"/> Track <input type="checkbox"/> Others <input type="checkbox"/>
B. Required <input checked="" type="checkbox"/>	Elective <input type="checkbox"/>
3. Level/year at which this course is offered:	5 th Level / 3 rd year
4. Course general Description	
This course covers a selection of advanced topics related to mathematical physics. Based on prior knowledge in mathematical science, the following topics are considered: the complex numbers, the fundamentals of matrices algebra and vector spaces.	
5. Pre-requirements for this course (if any):	
Calculus-2 MPHY6111	
6. Co- requirements for this course (if any):	
NA	
7. Course Main Objective(s)	
Recognize the fundamentals of complex numbers, matrices algebra and vector spaces.	

1. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1.	Traditional classroom	3	100%
2.	E-learning		
3.	Hybrid <ul style="list-style-type: none"> • Traditional classroom • E-learning 		
4.	Distance learning		

2. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	Lectures	45





2.	Laboratory/Studio	
3.	Field	
4.	Tutorial	
5.	Others (specify)	
	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 the concepts of the complex numbers.	K.3	Lecturing	Quizzes Homework Midterm exam Final exam
1.2	Recognize the fundamentals of matrices algebra.	K.3		
1.3	Recognize the vector spaces.	K.3		
2.0	Skills			
2.1	Solve problems in complex numbers.	S.1	Solve problems.	Quizzes Homework Midterm exam Final exam
2.2	Solve problems in matrices algebra.	S.1		
2.3	Solve problems in vector spaces.	S.1		
3.0	Values, autonomy, and responsibility			
3.1	Exhibit self-learning skills independently in the field of specialization.	V.2	Self-learning	Reports Presentation

C. Course Content

No	List of Topics	Contact Hours
1.	Functions of a complex variables 1. Complex Numbers. 2. Powers and Roots.	5
2.	Functions of a complex variables 3. Sets in the complex plane. 4. Functions of a complex variable.	5
3.	Functions of a complex variables 5. Cauchy-Riemann equation. 6. Exponential and Logarithmic functions.	5
4.	Matrices 1. Matrix Algebra 2. Rank of a Matrix.	4
5.	Matrices	4





	3. Determinants. 4. Properties of Determinants.	
6.	Matrices 5. Inverse of a Matrix. 6. Systems of Linear Algebraic Equations	4
7.	Matrices 7. Cramer's Rule. 8. The Eigen value Problem.	4
8.	Vector spaces 1. Algebraic operations on vectors	4
9.	Vector spaces 2. Vectors in 2 dimensions 3. Vectors in 3 dimensions	5
10.	Vector spaces 4. Hilbert space	5
Total		

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Homework, quizzes, reports, and presentation.	1: 15	10 %
2.	First term exam	7: 8	20 %
3.	Second term exam	12:13	20 %
4.	Final exam	End of Semester	50 %

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Advanced Engineering Mathematics, 5th edition, Dennis G. Zill & Warren S. Wright, Jones & Bartlett Learning, LLC, an Ascend Learning Company, (2014).
Supportive References	<ul style="list-style-type: none"> - Mathematical Methods for Physics and Engineering, K. F. Riley, M. P. Hobson and S. J. Bence, (3rd Ed.), Cambridge University Press, (2006). - Essential Mathematical Methods for Physicists, H. J. Weber and G.B. Arfken, Academic Press, (2003). - Complex Variables and their applications, A.D. Osborne, (1999).
Electronic Materials	<ul style="list-style-type: none"> - Blackboard. - PowerPoint presentations.





	- Digital library of University of Bisha https://ub.deepknowledge.io/Bisha
Other Learning Materials	None

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	NA
Technology equipment (projector, smart board, software)	Projector or smart board
Other equipment (depending on the nature of the specialty)	NA
Other equipment	NA

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Extent of achievement of course learning outcomes.	Teachers, students.	Direct (Final exams), Indirect (Questionnaire).
Effectiveness of teaching.	Teachers, students.	Indirect (Questionnaire)
Effectiveness of assessment.	Teachers, students.	Indirect (Questionnaire)
Quality of learning resources	Teachers, students.	Indirect (Questionnaire)
Quality of facilities available	Teachers, students.	Indirect (Questionnaire)
Fairness of evaluation	Peer reviewer.	Direct (Final exams reevaluation).

G. Specification Approval Data

COUNCIL /COMMITTEE	College of Science Council
REFERENCE NO.	1
DATE	5 September 2023

