



Course Specifications

Course Title:	Classical Mechanics 1
Course Code:	PHY2501
Program:	Physics
Department:	Physics
College:	Applied Sciences
Institution:	Umm Al-Qura University

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A. Course Identification

1. Credit hours: 4
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" 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: Level 4 / 2 nd year
4. Pre-requisites for this course (if any): General Physics (3)
5. Co-requisites for this course (if any):

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	40	100%
2	Blended		
3	E-learning		
4	Distance learning		
5	Other		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	40
2	Laboratory/Studio	
3	Tutorial	
4	Others (specify)	
	Total	40

B. Course Objectives and Learning Outcomes

1. Course Description The course covers the vector algebra and vector differentiation, as well as Newton's laws of motion and the rectilinear motion of a single particle. The course, also, covers the simple harmonic motion, the damped and forced harmonic oscillator. Finally, the course covers the general motion of a particle in three dimensions.
2. Course Main Objective The student will be able to <ul style="list-style-type: none">- Describe the rectilinear motion of a single particle using vector algebra.- Describe the damped and forced harmonic motion mathematically.- Calculate the terminal velocity of a falling body in resisting medium.



- Calculate the resonant frequency and the quality factor of a resonant system.
- Determine the velocity vector of a projectile in a uniform gravitational field.
- Derive the physical formulas related to the constrained motion of a particle.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge and Understanding	
1.1	Define the physical quantities related to the motion of a single particle.	K1
1.2	Describe Newton's laws mathematically.	K1
2	Skills:	
2.1	Solve problems related to the motion of a particle using vector algebra.	S1
2.2	Explain the laws and formulas related to the motion of a particle.	S2
3	Values:	
3.1	Work effectively and responsibly in teamwork.	V2

C. Course Content

No	List of Topics	Contact Hours
1	Fundamental Concepts Vectors <ul style="list-style-type: none"> - Revision of vectors - Triple products - Derivative of a vector. - Position vector of a particle velocity and acceleration in rectangular coordinates. - Velocity and acceleration in polar coordinates. - Velocity and acceleration in cylindrical and spherical coordinates. 	10
2	Newtonian Mechanics, Rectilinear Motion of a Particle <ul style="list-style-type: none"> - Newton's law of motion. - Rectilinear Motion: uniform Acceleration under a constant force. - Position-dependent forces. - The Concepts of kinetic and potential energy. - Velocity-dependent forces. - Fluid resistance and terminal velocity. 	12
3	Oscillations <ul style="list-style-type: none"> - Linear Resorting Force: harmonic motion. - Energy considerations in harmonic motion. - Damped harmonic motion. - Forced harmonic motion: resonance. 	8
4	General Motion of a Particle in Three Dimensions <ul style="list-style-type: none"> - The potential energy function in three-dimensional motion: The del operator. - Forces of the separable type. - The harmonic oscillator in two and three dimensions. - Constrained motion of a particle. 	10
Total		40



D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
1.1	Define the physical quantities related to the motion of a single particle.	1. Demonstrating the basic principles through lectures. 2. Discussing phenomena with illustrating pictures and diagrams. 3. Lecturing method: Board, Power point. 4. Discussions 5. Brain storming Start each chapter by general idea and the benefit of it.	- Solve some examples - Discussions during the lectures Exams: a) Quizzes. b) Midterm exams. c) Final exam.
1.2	Describe Newton's laws mathematically.		
2.0	Skills		
2.1	Solve problems related to the motion of a particle using vector algebra.	1. Preparing main outlines for teaching. 2. Following some proofs. 3. Define duties for each chapter	1. Exams: a) Quizzes. b) Midterm exams. c) Final exam 2. Homework's.
2.2	Explain the laws and formulas related to the motion of a particle.		
3.0	Values		
3.1	Work effectively and responsibly in teamwork.	<ul style="list-style-type: none"> - Organize the students in small groups (teamwork). - Give students tasks as a small project. 	<ul style="list-style-type: none"> - Evaluate the scientific reports. - Discussing the reports with each teamwork. - Evaluate the efforts of each student in preparing the report.

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Midterm Exam	8 th	30%
2	Homework's & Quizzes & Reports	All weeks	20 %



#	Assessment task*	Week Due	Percentage of Total Assessment Score
3	Final Exam	End of the semester	50%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

Each student will be supervised by an academic adviser in Physics Department and the time table for academic advice were given to the student each semester. (4 hours per week)

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Analytical Mechanics by G. R. Fowles and G. L. Cassiday (2005), 7 th edition.
Essential References Materials	
Electronic Materials	
Other Learning Materials	<ul style="list-style-type: none"> Classical Mechanics by John R. Taylor (2005). Classical Dynamics of Particles and Systems by S. Thornton, and J. Marion (2004), 5th edition.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	- Classroom
Technology Resources (AV, data show, Smart Board, software, etc.)	- Black Board - Data show
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of teaching Strategies	Students	Questionnaire
Effectiveness of student assessment	Instructor	Exams



Evaluation Areas/Issues	Evaluators	Evaluation Methods
Extent of achievement of course learning outcomes	Instructor	Course report
Quality of learning resources	Instructor	Course report

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	

