SULTAN QABOOS UNIVERSITY

COURSE OUTLINE

PROGRAM: Bachelor of Science in Physics

Course Owner		College: Science	Department: Physics

COURSE GENERAL INFORMATION			
1.	**Course Code**		PHYS 2101
2.	**Course Title**		General Physics I
3.	**Credits**		4 credit-hours ,16 CP, 8 ECTS
4.	**Workload**		12 hours per week (*time spent on study in and out of class*)
5.	**Language of Instruction**		English
6.	**Course Category**		College Requirement
7.	**Course Type**		Lecture/Lab
8.	**Prerequisites**		To register in this course student should have passed the following courses: FPEL0560 and FPMT0105 or FPEL0560 and FPMT0109 or FPEL0600 and FPMT0105 or FPEL0600 and FPMT0109 or FPEL0601 and FPMT0105 or FPEL0601 and FPMT0109 or FPEL0602 and FPMT0105 or FPEL0602 and FPMT0109 or FPEL0603 and FPMT0
9.	**Co-requisites**		To register in this course student should register in the following courses: ---None---------- ---------- ----------
10.	**Equivalent Courses**		---None---------- ---------- ----------
11.	**Incompatible Course**		---None---------- ---------- ----------
13.	**Course Description**		

An introductory course that develops a sound understanding of the basic physical principles underlying natural phenomena related to translational dynamics, rotational dynamics, statics, and fluids using elementary calculus and experimental techniques. The emphasis is on developing an intuition for the behavior of physical systems and problem-solving.

14. Course Contents

1. **Measurements** (Lengths, Time and Mass)
2. **Motion along a Straight Line** (Position, Displacement, Average velocity, Acceleration, Free fall acceleration and Graphical integration in motion analysis)
3. **Vectors** (Vectors and their components, Unit vectors and adding vectors by components)
4. **Motion in Two and Three Dimensions** (Position and Displacement, Projectile motion, Uniform circular motion and Relative motion in one and two dimensions)
5. **Force and Motion** (Newton's Laws of motion, Applying Newton's Laws, Friction, Drag force and terminal velocity, Uniform circular motion)
6. **Kinetic Energy and Work** (Kinetic energy, Work-Energy Theorem, Work done by gravitational force, Work done by spring force and work done by variable force, Power)
7. **Potential Energy and Conservation of Energy** (Potential Energy, Conservation of mechanical energy, Reading potential energy curve, Conservation of energy)
8. **Center of Mass**

9. **Linear Momentum** (Newton's second law for a system of particles, Linear momentum, Collision and impulse, Conservation of linear momentum, Momentum and kinetic energy in collisions, Elastic collision in one and two dimensions)
10. **Rotation** (Rotational variables, Rotation with constant angular acceleration, Kinetic energy of rotation, Calculating the rotational inertia, Torque, Newton's second law for rotation, Work and rotational kinetic energy)
11. **Equilibrium** Some examples of static equilibrium
12. **Gravitation** (Newton's law of gravitation and gravitation near Earth's surface)
13. **Oscillations** (Simple harmonic motion, Energy in simple harmonic motion, Pendulum and Circular motion)

15. Course Learning Outcomes	**Relevant Program Learning Outcomes**
After successfully completing this course a student is expected to be able to a. Apply kinematic relations to solve problems in 1D and 2D motion b. Apply Newton's laws and simple mathematics to solve problems of translational and rotational motions as well as simple harmonic motion c. Assess the use of different principles and approaches in solution of the same problem in mechanics d. Collect, analyze and present data from simple experiments	2. Use appropriate mathematical and computational tools to solve problems in physics 3. Assemble and conduct experiments, as well as analyze and interpret data 6. Work independently and within a team 8. Demonstrate integrity and honesty in their work

16. Course Applicability

This course is required as a college requirement for:

- Chemistry program, Earth Science Program, Geophysics Program and the Science Education Program.
- General Physics II – PHYS2102
- Dynamics – PHYS3001

It enables the students to (list, in your own words, relevant items from PLO):

- Use appropriate mathematical tools to solve problems in physics
- Work within a team to solve context rich problems
- Conduct simple experiments and analyze data obtained
- Demonstrate integrity and honesty in their work

17. Teaching/Learning Approach

In fall 2022, the department will deliver this course on campus with face-to-face learning that includes lectures, labs, and tutorials. Also, Moodle, along with other platforms if necessary, will be used for teaching, assessment, communication, and other announcements online. We will make use of simulations, movies, and demonstration experiments where appropriate and necessary.

Students are expected to do the following:

a. Before lectures: Read the assigned section(s) of a chapter in the given textbook, and do the reading check
b. During lectures: Take notes, participate in Peer Instruction questions, and engage the lecturer with questions where needed or items are unclear
c. After lectures a student is expected to:
    - Revise his/her lecture notes
    - Solve the textbook exercise problems at home (some are recommended by the instructor for emphasis)
    - Attend bi-weekly online tutorial sessions, solve tutorial problems and complete a short quiz.
    - Attend bi- weekly online lab sessions, do experiments using suggested virtual resources or using homemade setups, complete data analysis and submit reports online.

18. Assessment

The assessment will consist of the following components

Component	**Weight (%)**
1. Reading Quiz	00.0
2. Peer Instruction Questions	02.0

3. Labs	10.0
4. Tutorials (Weekly Assessments)	10.0
5. Midterm Test-1	16.0
6. Midterm Test-2	16.0
7. Final Exam	44.0

Evaluation and Grading Rubric

The course is graded in letter grades **A-F**. The letter grades are assigned following a performance-based rubric.

Grade	Student Performance	Mark % (± 3)
A	**Exceptional performance**: All course-learning outcomes achieved and met in a consistently outstanding manner.	≥ 80
B	**Very Good Performance**: Majority of the course learning outcomes achieved (majority being at least two-thirds) and met in a consistently thorough manner.	65 – 79
C	**Satisfactory Performance**: At least most of course, learning outcomes have been achieved and met satisfactorily.	50 – 64
D	**Minimally Acceptable Performance**: Less than the majority but more than the minimum required course learning outcomes achieved; learning outcomes met at a minimally acceptable level.	40 – 49
F	**Unacceptable performance**: Minimum required course learning outcomes have not been met; learning outcomes not met at a minimally acceptable level.	< 40

19. Textbook(s) and Supplemental Material

Textbook: Fundamental of Physics, Halliday, Resnick and Walker

20. Amendment

Last amended in September 2023

21. Student Responsibilities

It is the student's responsibility to know and comply with all University Academic Regulations relevant to participation in this course. These regulations specifically include attendance requirements and students' academic code of conduct.

For attendance, it is the student's responsibility to be punctual and to attend all classes.

Students are expected to perform their work with honesty, integrity, and commitment. Do not engage in academic misconduct or use dishonest methods to gain an academic advantage or benefit. This can take many forms, including but not limited to the following: copying, plagiarism, collusion, and forging documents. Please refer to the Undergraduate Academic Regulations and the Student Academic Misconduct Policy for more information.

COURSE SPECIFIC INFORMATION				
Semester/ Year	Fall/2023	**Section(s)**	10,20,30	
Day, Time, and Place	Lectures: (10) Monday, Wednesday 08.00 - 09.20 (20) Monday, Wednesday 10.00 - 11.20 (30) Monday, Wednesday 12.00 – 13.20 Lab / Tutorial : (11) Sunday 10.00-12.50 (12) Tuesday 10.00-12.50 (21) Sunday 14.15-17.05 (31) Sunday 14.15-17.05 (32) Tuesday 14.15-17.05 (32) Tuesday 14.15-17.05			
Course Coordinator	Afsal Manekkathodi			
Office Location	Room 1132	**Office Hours**	Mondays: 2-4 pm	
Office Tel. Ext.	1451	**Email**	a.manekkathodi@squ.edu.om	

Tentative Schedule			
Week	**Lecture #**	**Topic/Material to be covered**	**Labs/Tutorials**
1	1	Introduction to the course, Chapter 1-Measurements	
	2	Chapter 3-Vectors	
2	3	Chapter 2-Motion Along a Straight Line	CRP-Intro and practice
	4	Chapter 2- Motion Along a Straight Line	
3	5	Chapter 4- Motion in Two and Three Dimensions	Tutorial 1: Ch 3 (CRP+NPs)
	6	*Prophets Birthday*	
4	7	Chapter 4-Motion in Two and Three Dimensions (contd.)	Lab #1 (Graph Plotting) + CRP
	8	Chapter 4-Motion in Two and Three Dimensions (contd.), Chapter 5- Newton's Laws of Motion	
5	9	Chapter 5- Newton's Laws of Motion (contd.)	Tutorial 2: Ch 2-4 (CRP+CPs) Lab #2 (measurements)
	10	Chapter 6- Applications of Newton's Laws	
6	11	Chapter 6- Applications of Newton's Laws	Tutorial 3: Ch 5/6 (CRP+NPs)
	12	Chapter 3- Vectors (contd.) Chapter 7- Work and Kinetic Energy	
7	13	Chapter 7- Work and Kinetic Energy	Midterm -1: Sunday, 22nd October 2023 Chapter 1-6
	14	Chapter 8-Potential Energy and Conservation of Energy	
8	15	Chapter 8- Potential Energy and Conservation of Energy (contd.)	Tutorial 4: Ch 7 (CRP) Lab #3 (Free Fall)
	16	Chapter 9-Linear Momentum and Collisions	
9	17	Chapter 9-Linear Momentum and Collisions (contd.)	Tutorial 5: Ch 8 (CRP) Lab #4 (Hook's law)
	18	Chapter 9-Linear Momentum and Collisions (contd.)	
10	19	Chapter 10- Rotation	Tutorial 6: Ch 9 (CRP) Lab #5 (Center of Mass)
	20	Chapter 10- Rotation (contd.)	
11	21	Chapter 10- Rotation (contd.)	Tutorial 7: Ch 10 (CRP+NPs)
	22	Chapter 11- Angular Momentum	
12	23	Chapter 11- Angular Momentum	Midterm -2: Sunday, 26th November 2023 Chapter 7-10
	24	*National day*	
13	25	Chapter 12- Equilibrium	Tutorial 8: Ch 11 (CRP) Lab #6: (Pendulum)
	26	Chapter 12- Equilibrium; Chapter 13- Gravitation	
14	27	Chapter 15- Oscillations	Tutorial 9: Ch 11 (CRP+CPs)
	28	Chapter 15- Oscillations (contd.)	
15	29	Chapter 15- Oscillations (contd.)	
	30	Revision	
16			**Final exam Tuesday 26th December 2023**

APPENDIX A: INSTRUCTORS OF MULTIPLE SECTIONS

Sec	Instructor	Lecture Date Time and Place	Office room and Extn	Email	Office hours
10	Dr. Ridha Horchani	Mon/Wed 08:00 –09:20 CMT/LET2	Room:1128 Ext. 1457	horchani@squ.edu.om	by Appointment
20	Dr. Nidhal Sulaiman	Mon/Wed 10:00 –11:20 CMT/E12	Room:1133. Ext. 2242	nidhal@squ.edu.om	by Appointment
30	Dr. Afsal Manekkathodi	Mon/Wed 12:00 –13:20 CMT/LET4	Room:1132 Ext. 1451	a.manekkathodi@squ.edu.om	Mondays: 2-4 pm

APPENDIX B: COURSE CATEGORIES, COURSE TYPES AND ASSESSMENT COMPONENTS

Course Category	University Requirement	University Elective
	College Requirement	College Elective
	Department Requirement	Department Elective
	Specialization Requirement	Specialization Elective
	Other (specify):	
Course Type	Lecture	Lecture/Lab
	Lecture/Seminar	Lecture/Studio
	Lecture/Tutorial	Lecture/Lab/Tutorial or Seminar
	Tutorial	Laboratory (Practical)
	Field or Work Placement	Studio
	Seminar	Internship
	Workshop	Project

Assessment Components		
Quizzes	Practical	Other (specify):
Homework assignments	Project	
In-term examination(s)	Final examination	
Grading Methods		
A-F Scale	Pass/Not passed	

APPENDIX C: SQU GRADUTE ATTRIBUTES		
A. SQU graduates should be able to:	**B. SQU graduates possess**	**SQU graduates should .**
1. Apply the knowledge and skills relevant to the specialization 2. Communicate effectively and use information and communication technologies 3. Critically analyse complex information and present it in simple clear manner	1. Interpersonal communication skills and alignment with culture of international labour market to assist them in practical life and in living successfully 2. Skills and motivation for independent learning and engagement in lifelong learning and research 3. Work ethics and positive values, and intellectual independence and autonomy 4. Teamwork skills and display potential leadership qualities	Relish good citizenship qualities, be conscious of their national identity and be socially responsible, engage in community affairs and be mindful of contemporary issues.

APPENDIX D: PROGRAM EDUCATIONAL OBJECTIVES AND PROGRAM LEARNING OUTCOMES

Program Educational Objects: The Physics Department Educational Objectives of its Bachelor Degree are to

a. *prepare its graduates to successfully undertake programs of graduate study in physics and related disciplines*
b. *prepare its graduates to perform as professionals in a broad range of careers requiring scientific and technical knowledge*
c. *instill work ethics and cultural values in its graduates*

Program Learning Outcomes: The Physics Department Bachelor Degree graduates are expected to be able to

1. *Demonstrate knowledge of classical mechanics, quantum mechanics, electrodynamics and thermal physics and apply it in optics and lasers, condensed matter physics and nuclear physics and in other fields.*
2. *Use appropriate mathematical and computational tools to solve problems in physics.*
3. *Assemble and conduct experiments, as well as analyse and interpret data*
4. *Conduct study in research setting environment using mathematical/computer modelling or laboratory experimentation*
5. *Explain natural phenomena using the principles of physics*
6. *Work independently and within a team*
7. *Write and present reports which communicate results to scientific and non-scientific audience*
8. *Demonstrate integrity and honesty in their work*

APPENDIX E: MAPPING of SQU GRADUATE ATTRIBUTES TO PROGRAM EDUCATIONAL OBJECTIVES AND PROGRAM LEARNING OUTCOMES

Graduate Attributes	Educational Objective	Learning Outcome
A	a, b	1,2,3,4
B	b, c	5,6,7,8
C	c	8

APPENDIX F: ADDITIONAL INFORMATION