Course Syllabus

(PHYSICS 101)

1	**Course title**	**Introductory Physics 1**	
2	**Course number**	**0302101**	
3	**Credit hours**	**3**	
	Contact hours (theory, practical)	**3**	
4	**Prerequisites/corequisites**	**None**	
5	**Program title**		
6	**Program code**		
7	**Awarding institution**	**The University of Jordan**	
8	**School**	**School of Science**	
9	**Department**	**Department of Physics**	
10	**Course level**	**100 Level**	
11	**Year of study and semester(s)**	**2022 / 2023, First Semester**	
12	**Other department(s) involved in teaching the course**	**None**	
13	**Main teaching language**	**English**	
14	**Delivery method**	☒Face to face learning ☐Blended ☐Fully online	
15	**Online platforms(s)**	☐Moodle ☒Microsoft Teams ☐Skype ☐Zoom ☐Others……	
16	**Issuing/Revision Date**	**November, 15, 2022**	

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17 Course Coordinator:

Name: **Moneeb T. M. Shatnawi** Contact hours: **Sundays, Tuesdays, Thursday: (12:30 – 1:30) pm**
Office number: **123 / Physics Building** Phone number: **Office: Ext. 22064, Mobile: 0775509916**
Email: **Moneeb.shatnawi@ju.edu.jo**

18 Other instructors:

Name: **Prof. Mousa Jafar**

Office number:

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Contact hours:

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Name: **Prof. Mahmoud Al-Hussain**

Office number:

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Name: **Prof. Nour Aldeen Shuair**

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Name: **Dr. Khalifeh Abu Saleem**

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Name: **Dr. Walaa Al-Tamimy**

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Name: **Dr. Alaa Al-Azzam**

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Name: **Dr. Moneeb T. M. Shatnawi**

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19 Course Description:

As stated in the approved study plan.

This course (Introductory Physics 1) introduces the basic concepts in elementary mechanics. In particular, it describes motion (either one or two or three dimensional), kinematics of motion, Newton's laws of motion, work, energy, linear and angular momenta, rotational motion of rigid bodies, and the basic mechanical conservation laws.

20 Course aims and outcomes:

(Physics 101 Students Learning Outcomes):

After successful completion of this course, students are expected to be able to:

Chapter 1:

- Distinguish between vectors and scalars.

- Draw vectors and perform vector addition graphically.

- Decompose vectors into their X, Y and Z components.

- Write vectors in terms of the three unit vectors.

- Perform scalar and vector multiplications.

Chapter 2:

- Interpret the concepts of motion, displacement, velocity, and acceleration.

- Analyze one dimensional motion problems.

- Analyze the motion of freely-falling bodies.

Chapter 3:

- Generalize the concepts of displacement, velocity and acceleration in three dimensions using vector language.

- Analyze projectiles motion and decompose it into horizontal and vertical motions.

- Analyze circular motion problems either uniform or non-uniform ones.

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Continue: Course aims and outcomes:

Chapter 4:

- State and discuss Newton's first, second, and third laws of motion.

- Distinguish between mass and weight.

- Analyze forces acting on a particle through the use of free-body diagrams.

Chapter 13:

- Analyze and interpret Newton's law of gravitation.

- Calculate the acceleration due to gravity for a planet.

Chapter 5:

- Describe static and dynamic equilibriums based on Newton's first law of motion.

- Apply Newton's second law for non-equilibrium situations.

- Analyze and interpret static and dynamic friction forces.

- Apply Newton's second law for circular motion problems.

Chapter 6 and 7:

- Demonstrate conceptual understanding of work, kinetic energy, potential energy and power.

- Analyze mechanical problems using the concept of work-kinetic energy principle.

- Distinguish between conservative and non-conservative forces.

- Interpret the relationship between a conservative force and the corresponding potential energy term associated with it.

- Analyze problems involving elastic potential energy and spring force.

- Interpret and analyze problems involving conservation of mechanical energy.

- Use the energy conservation principle for solving different mechanical problems.

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Continue: Course aims and outcomes:

Chapter 8:

- Demonstrate conceptual understanding of momentum, impulse, elastic and inelastic collisions.

- Apply the law of conservation of total linear momentum for isolated systems.

- Distinguish between elastic and inelastic collisions.

- Calculate the center of mass for a given discreet mass distributions.

Chapter 9:

- Interpret the concepts of angular displacement, angular velocity and angular acceleration.

- Analyze rotational motion problems when the angular acceleration is constant.

- Interpret the relationship between linear and angular quantities.

- Use the energy conservation principle to deal with problems involving rotational motion.

- Calculate the moment of inertial for a given discreet mass distribution.

Chapter 10:

- Interpret the concepts of torque and angular momentum.

- Apply Newton's second law for rotational motion problems.

- Calculate the work and power in rotational motion.

- Calculate angular momentum for a particle and for a rigid body.

- Apply the concept of angular momentum conservation to solve and analyze rotational motion problems.

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A- Aims: **See above.**

B- Students Learning Outcomes (SLOs):

(Physics Program Learning Outcomes):

For purposes of mapping the course SLOs to the physics program SLOs, at the successful completion of the physics program, graduates are expected to be able to:

SLO (1): Master professionally a broad set of knowledge concerning the fundamentals in the basic areas of physics: Quantum Mechanics, Classical Mechanics, Electrostatics and Magnetism, Thermal Physics, Optics, Theory of Special Relativity, Mathematical Physics, Electronics.

SLO (2) Apply knowledge of mathematics and fundamental concepts in the basic areas of physics to identify and solve physics related problems.

SLO (3) Utilize computers and available software in both data collections and data analysis.

SLO (4) Utilize standard laboratory equipment, modern instrumentation, and classical techniques to design and conduct experiments as well as to analyze and interpret data.

SLO (5) Develop recognition of the need and ability to engage in life-long learning.

SLO (6) Demonstrate ability to use techniques, skills, and modern scientific tools necessary for professional practice.

SLO (7) Communicate clearly and effectively in both written and oral forms.

SLO (8) Apply proficiently team-work skills and employ team-based learning strategies.

SLO (9) Apply professional and ethical responsibility to society.

Upon successful completion of this course, students will be able to:

Program SLOs / Course SLOs	SLO (1)	SLO (2)	SLO (3)	SLO (4)	SLO (5)	SLO (6)	SLO (7)	SLO (8)	SLO (9)
1. SLO of Chapter 1	✓	✓				✓			
2. SLO of Chapter 2	✓	✓				✓			
3. SLO of Chapter 3	✓	✓				✓			
4. SLO of Chapter 4	✓	✓				✓			
5. SLO of Chapter 5	✓	✓				✓			
6. SLO of Chapter 6	✓	✓				✓			
7. SLO of Chapter 7	✓	✓				✓			

8. SLO of Chapter 8	✓	✓				✓			
9. SLO of Chapter 9	✓	✓				✓			
10. SLO of Chapter 10	✓	✓				✓			

21. Topic Outline and Schedule:

The University of Jordan ***School of Science*** ***Department of Physics***		***General Physics 1*** ***PHYSICS (0302101)*** ***First Semester 2022/2023***

Course Number: *0302101*

Course Title: *Introductory Physics 1*

Prerequisites and/or Corequisites: *None*

Textbook: "University Physics with Modern Physics".

H. D. Young and R. A. Freedman

15th edition (Pearson, 2020)

Recommended References:

1. *R. A. Serway and J. W. Jewett Jr.,* ***"Physics for Scientists and Engineers with Modern Physics",*** *9th edition, (Thomson Learning, Belmont, CA, USA, 2014).*
2. *D. Halliday, R. Resnick, and J. Walker,* ***"Extended Principles of Physics",*** *9th Edition (John Wiley & Sons, Inc., 2011).*
3. *W. Bauer, G. D. Westfall,* ***"University Physics with Modern Physics",*** *(McGraw Hill, 2011).*
4. *J. S. Walker,* ***"Physics"*** *Fourth Edition, (Addison – Wesley, 2010).*
5. *Giancoli,* ***"Physics for Scientists & Engineers with Modern Physics",*** *Fourth Edition, (Pearson Education, 2009).*
6. *Ohanian and Market,* ***"Physics for Engineers and Scientists"****, Extended Third Edition, (W. W. Norton & Company, 2007).*

➢ ***Course Contents:***

Chapter	***Contents***
1	***Units, Physical Quantities and Vectors*** *1.7 Vectors and Vector Addition*

	1.8 Components of Vectors *1.9 Unit Vectors* *1.10 Products of Vectors*
2	***Motion Along a Straight Line*** *2.1 Displacement, Time, Average Velocity* *2.2 Instantaneous Velocity* *2.3 Average and Instantaneous Acceleration* *2.4 Motion with Constant Acceleration* *2.5 Freely Falling Objects* *2.6 Velocity and Position by Integration*
3	***Motion in Two or Three Dimensions*** *3.1 Position and Velocity Vectors* *3.2 The Acceleration Vector* *3.3 Projectile Motion* *3.4 Motion in a Circle*
4	***Newton's Laws of Motion*** *4.1 Force and Interactions* *4.2 Newton's First Law* *4.3 Newton's Second Law* *4.4 Mass and Weight* *4.5 Newton's Third Law* *4.6 Free body Diagrams*
13	*13.1 Newton's Law of Gravitation* *13.2 Weight*
5	***Applying Newton's Laws*** *5.1 Using Newton's First Law: Particles in Equilibrium* *5.2 Using Newton's Second Law: Dynamics of Particles* *5.3 Friction Forces* *5.4 Dynamics of Circular Motion*

	5.5 The Fundamental Forces of Nature
6	***Work and Kinetic Energy*** *6.1 Work* *6.2 Kinetic Energy and the Work-Energy Theorem* *6.3 Work and Energy with Varying Forces* *6.4 Power*
7	***Potential Energy and Energy Conservation*** *7.1 Gravitational Potential Energy* *7.2 Elastic Potential Energy* *7.3 Conservative and Non-Conservative Forces* *7.4 Force and Potential Energy*
8	***Momentum, Impulse, and Collisions*** *8.1 Momentum and Impulse* *8.2 Conservation of Momentum* *8.3 Momentum Conservation and Collisions* *8.4 Elastic Collisions* *8.5 Centre of Mass (No Integrals)*
9	***Rotation of Rigid Bodies*** *9.1 Angular Velocity and Acceleration* *9.2 Rotation with Constant Angular Acceleration* *9.3 Relating Linear and Angular Kinematics* *9.4 Energy in Rotational Motion* *9.5 Parallel-Axis Theorem*
10	***Dynamics of Rotational Motion*** *10.1 Torque* *10.2 Torque and Angular Acceleration for a Rigid Body*

	10.4 Work and Power in Rotational Motion *10.5 Angular Momentum* *10.6 Conservation of Angular Momentum*
11	***Equilibrium and Elasticity (Self-reading)*** *11.1 Conditions for Equilibrium* *11.2 Centre of Gravity* *11.3 Solving Rigid-Body Equilibrium Problems*

Course Coordinator:

- *Dr. Moneeb Shatnawi*
  E-mail: moneeb.shatnawi@ju.edu.jo

  User name at Teams: ***Moneeb Shatnawi***

Course Website: ***Students of all sections of physics 101 are required to frequently check the announcements written at the course e-learning web site:***

https://elearning.ju.edu.jo/moodle10/course/view.php?id=25827

Attendance Policy:

Students enrolled in each section should attend at the allocated time and place. Absences that exceed 15% of the total allocated teaching hours will result in an "F" score.

Examinations:

All exams are multiple-choice and computerized.

Exam	*Weight %*	*Tentative Date*	*Included Material*
First	***30 %***	***To be announced later***	***Required sections in chapters:*** ***1, 2, 3, 4, Sec. 13.1 and 13.2***
Second	***20 %***	***To be announced later***	***Required sections in chapters:*** ***4, 5, 6, and 7***
Final	***50 %***	***To be announced later***	***Required sections in all chapters***

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Good Luck!!!

Week	Lecture	Topic	Intended Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1							
	1.2							
	1.3							
2	2.1							
	2.2							
	2.3							
Week	**Lecture**	**Topic**	**Intended Learning Outcome**	**Learning Methods (Face to Face/Blended/ Fully Online)**	**Platform**	**Synchronous / Asynchronous Lecturing**	**Evaluation Methods**	**Resources**
3	3.1							
	3.2							
	3.3							
4	4.1							
	4.2							
	4.3							
5	5.1							
	5.2							
	5.3							
6	6.1							
	6.2							
	6.3							
7	7.1							
	7.2							

	7.3							
8	8.1							
	8.2							
	8.3							
9	9.1							
	9.2							
	9.3							
10	10.1							
	10.2							
	10.3							
11	11.1							
	11.2							
	11.3							
12	12.1							
	12.2							
	12.3							
13	13.1							
	13.2							
	13.3							
14	14.1							
	14.2							
	14.3							
15	15.1							
	15.2							
	15.3							

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22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
First Exam	**30%**	**Chapters 1, 2, 3, 4 and Sections 13.1 and 13.2**		**9th**	**University Exam platform**
Second Exam	**20%**	**Chapters 5, 6, and 7**		**13th**	**University Exam platform**
Final Exam	**50%**	**All course content**		**At the end of semester**	**University Exam platform**

23 Course Requirements

(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):

Enrolled students have registered accounts on Microsoft Teams through their university e-mails. We do use Microsoft Teams and the university E-learning website as plate forms where we post lecture notes and course announcement.

24 Course Policies:

A- Attendance policies: **Required**

B- Absences from exams and submitting assignments on time:

Just legal excuses are accepted to allow students to take the makeup exams.

C- Health and safety procedures:

Students will not be exposed to any hazardous materials in this course.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

The university laws are considered and applied for each case.

E- Grading policy:

All exams are computerized where the grading is completely done by the computer.

F- Available university services that support achievement in the course:

There are many computer facilities with fast internet connections that are distributed throughout the university campus, as well as the university library, which contains many useful books and references that enable students to study and learn very well in this course.

25 References:

A- Required book(s), assigned reading and audio-visuals:

Textbook: "University Physics with Modern Physics".

H. D. Young and R. A. Freedman

15th edition (Pearson, 2020)

B- Recommended books, materials, and media:

- **R. A. Serway and J. W. Jewett Jr., "Physics for Scientists and Engineers with Modern Physics", 9th edition, (Thomson Learning, Belmont, CA, USA, 2014).**
- **D. Halliday, R. Resnick, and J. Walker, "Extended Principles of Physics", 9th Edition (John Wiley & Sons, Inc., 2011).**
- **W. Bauer, G. D. Westfall, "University Physics with Modern Physics", (McGraw Hill, 2011).**
- **J. S. Walker, "Physics" Fourth Edition, (Addison – Wesley, 2010).**
- **Giancoli, "Physics for Scientists & Engineers with Modern Physics", Fourth Edition, (Pearson Education, 2009).**
- **Ohanian and Market, "Physics for Engineers and Scientists", Extended Third Edition, (W. W. Norton & Company, 2007).**

26 Additional information:

Name of Course Coordinator: **Moneeb T. M. Shatnawi** Signature: ---------- Date: ----------
Head of Curriculum Committee/Department: ---------- Signature: ----------
Head of Department: ---------- Signature: ----------
Head of Curriculum Committee/Faculty: ---------- Signature: ----------
Dean: ---------- Signature: ----------