Course Syllabus for General Physics (Phys 1011)

1. Brief Information

[Name of the University]	
College Of Natural and Computational Sciences	
Department Of Physics	
Course Title	**General Physics**
Course Credits	Credit Hours: 3 = (2 + 1) ECTS: 5
Code	Phys 1011

Target Students' Major	Natural Science	**Target Year**	1st Year
Prerequisite(s) for enrollment	**None**	**Capacity (Maximum Number)**	

Instructor		**Office Hour:**	Week, [Start time] – [End time]
	Mobile	**E-Mail:**	
TA	**Name**	**E-Mail:**	

Course Goal (Learning outcome)	By the end of this course the student will able to: • Develop knowledge and skills in basic measurement and uncertainty. • Understand the basic concepts of physics and the relations between them (Laws). • Describe and explain natural phenomena using the basic concepts and laws. • Apply the basic concepts and laws to practical situations. • Develop the algebraic skills needed to solve theoretical and practical problems. • Appreciate the applicability of physics to a wide range of disciplines.
Course Description	This algebra based course provides science students with the basic concepts of physics that enable them to understand describe and explain natural phenomena. Emphasis is laid on general principles and fundamental concepts in measurements, mechanical and thermal interactions, fluid mechanics, electromagnetism, oscillations and waves with applications of physics in various fields of science. The course is organized into 7 chapters. The chapters on mechanics introduces the principles and laws governing the motion of objects and the interaction between them as well as conservation laws. The chapter on heat and temperature discusses the interaction between systems through energy transfer and describes some basic thermal properties of such systems. The chapters on oscillations, waves and optics provide basic concepts of periodic motions, how waves transfer energy from one place to the other, and use the concepts of light rays to explain image formation by mirrors and lenses. Electromagnetism and

		electronics introduces the basic electric and magnetic phenomena using the concept of field and treats elementary concepts of semiconductors. Cross-cutting applications of physics explain the roles of physics in Agriculture, Industries, Medicine, Archeology, Power Generation, Earth and Space Sciences.		
Grade Distribution	Attendance and Class Participation			Students must attend above 80% of the lecture classes and 100% of Lab/Demonstration.
	Demonstration/Lab work	15%		
	Quizzes/Assignments	5%		
	Mid Exam	30%		Department academic council will decide on missed Mid Exams.
	Final Exam	50%		
	Neither late assignments nor late projects are allowed			
Teaching Methods	Lecture, Tutorial, Seminar /Demonstration …			

2. Lesson Sequence Plan

Chapter	Title	Detailed Content	Week
1	**Preliminaries (2 hrs)**	➢ Physical Quantities and Units of Measurement ➢ Uncertainty in Measurement and Significant Digits ➢ Vectors: composition and resolution ➢ Unit Vectors	1
2	**Kinematics and Dynamics of Particle (13 Hrs)**	➢ **Kinematics in One and Two Dimensions (4 hrs)** o Displacement, Velocity and Acceleration in 1D and 2D o Motion with Constant Acceleration o Free Fall Motion o Projectile motion ➢ **Particle Dynamics and Planetary Motion (6hrs)** o The Concept of Force as a Measure of Interaction o Types of forces o Newton's Laws of Motion and Applications o Circular Motion o Newton's Law of Universal Gravitation and Examples o Kepler's laws, satellites motion and weightlessness ➢ **Work, Energy and Linear Momentum (3 hrs)** o Work and Energy o Linear Momentum o Conservation of Energy and Linear Momentum / Collisions o Power o The Concept of Center of Mass	2-5

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3	**Fluids Mechanics** **(4 hrs)**	➢ Properties of Bulk Matter /Stress, Strain/ ➢ Density and Pressure in Static Fluids ➢ Buoyant Forces, Archimedes' principle ➢ Moving Fluids and Bernoulli's Equation	6-7
	Mid Exam		8
4	**Heat and Thermodynamics (5Hr)**	➢ The Concept of Temperature: Zeroth Law of Thermodynamics ➢ The Concept Heat and Work ➢ Specific Heat and Latent Heat ➢ Heat Transfer Mechanism ➢ Thermal Expansion ➢ Energy Conservation: First Law of Thermodynamics	9-10
5	**Oscillations, Waves and Optics (5 hrs)**	➢ Simple Harmonic Motion ➢ The Simple Pendulum ➢ Wave and Its Characteristics ➢ Resonance ➢ Doppler Effect ➢ Image formation by thin lenses and mirrors	10-12
6	**Electromagnetism and Electronics (6 hrs)**	➢ Coulomb's Law and Electric Fields ➢ Electric Potential ➢ Current, Resistance and Ohm's Law ➢ Electrical Power ➢ Equivalent Resistance and Kirchhoff's Law ➢ Magnetic Field and Magnetic Flux ➢ Electromagnetic Induction ➢ Insulators, Conductors, Semiconductors ➢ Diodes / Characteristics Curve ➢ Transistors	12-13

7	**Cross Cutting Applications of Physics (4 hrs)**	➢ Application in Agriculture
		     o Energy balance concept, energy balance in soils, moisture content, soil densities, soil moisture characteristics,
		 ➢ Physics and Industries
		     o Principle of Motor and generator
		 ➢ Physics in Health Sciences and Medical Imaging
		     o Radiation and its biological effect, x-ray, MRI, Ultrasound
		 ➢ Physics and Archeology
		     o Radioactive Dating
		 ➢ Application in Earth and Space Sciences
		     o Geothermal Energy, Seismometer, Radio and TV communications
		 ➢ Application in Power Generation
		     o Solar and Wind Energy, Nuclear Power Plants, Hydroelectric power
			14

	Final Exam		15-16

3. References

- Serway, R. A. and Vuille, C., 2018, College Physics, 11th ed., Cengage Learning, Boston, USA
- University Physics with Modern Physics by Young, freedman and Lewis Ford
- Physics for Scientists and Engineers with Modern Physics by Douglas C. Giancoli
- Fundamentals of physics by David Halliday, Robert Resnick and Gearl Walker
- College Physics by Hugh D. Young Sears Zemansky, 9th edition
- Herman Cember and Thomas A. Johnson, Introduction to Health Physics, 4th ed., (2008).
- William R. Hendee and E. Russell Ritenour, Medical Imaging Physics, 4th ed., (2002).
- Tayal D.C. *Basic Electronics*. 2nd ed. Himalaya Publishing House Mumbai, (1998).
- Theraja B.L., R.S. Sedha. *Principles of Electronic Devices and Circuits*, S.Chand and Company Ltd, New Delhi, (2004).
- Introduction to Space Physics, M. G. Kivelson and C. T. Russell, Cambridge University Press, 1995.
- Stacey, Frank D.: Physics of the earth. 2nd Ed.,Wiley, 1977.
- **https://sites.google.com/site/apphysics1online/home**
- **https://phys.libretexts.org/**

Participant Universities

1. Dr Mesfin Tadesse (Addis Ababa University)
2. Assistant Prof Wondimagegn Anjulo (Arba Minch University)
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