

Federal Democratic Republic of Ethiopia
Ministry of Education

Physics Syllabus, Grades 9 and 10

2009

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Introduction

Improvement of science education is a significant need that has received considerable attention throughout the world... The challenges are greater in the developing world where well-trained teachers, effective materials and even the most basic scientific equipment and supplies are often in short supply.

Grades 9 and 10 are categorized as the first cycle of the secondary education. This is due to the fact that the students will be streamed after finishing Grade 10, which is a terminal point. This fact is given a due consideration in preparing this curriculum guide. Every effort has been made to make the citizens which completes the first cycle of the secondary education knowledgeable of the most general basic laws of physics which they will apply in their daily lives. These syllabuses are prepared based on the new curriculum framework which adopts competency based approach to education and on the feedbacks obtained from the fields. In preparing these syllabuses we have attempted so as to organize and present the materials to provide considerable flexibility with respect to flow of contents, level of presentation, and students' background in mathematics. We have also endeavored to retain a distinct technology perspective throughout the syllabuses. In dealing with the topics emphasis is laid more on the fundamental principles than on minute details. In physics the ability to apply principles to numerical problems is of utmost importance. Physics cannot be learned passively: there is absolutely no substitute for tackling problems. Here is where the students gain the sense of satisfaction and involvement produced by a genuine understanding of the principle of physics.

The expectations in science courses call for an active, experimental approach to learning, with all students participating regularly in practical activities. Practical activities can reinforce the learning of scientific concepts and promote the development of the skills of scientific investigation and communication. Where opportunity allows, students might be required, as part of their laboratory activities, to design and research a real scientific problem for which the results are unknown.

The goal of relating science to technology, society, and the environment is an important new feature of this curriculum. In order to attain this goal, connections between science and technology and between science and the world beyond the school must be integrated into students' learning of

scientific concepts and skills. Where possible, concepts should be introduced in the context of real-world problems and issues.

The new curriculum framework has clearly indicated that continuous assessment should be part of the teaching learning process and be done using oral, written and practical work. Therefore, this syllabus expects teachers to conduct continuous assessment throughout each term in the form of classroom exercises (written or oral), tests, homework, assignments, assessment of practical and field works, reports of project activities and personal inventories. In this syllabus, at the end of each unit, are given assessment descriptions, based on competencies, in order to help teachers focus their continuous assessments around them and make sure whether the ones set as standard competencies are achieved or not. In the assessment, the statement "minimum requirement level" should not be misleading and should be understood as the "standard level". Students working at the standard level are expected to achieve the competencies set for the grade level successfully. Teachers should give special considerations for those who are working above and below the standard levels by encouraging the ones that work above the standard and by giving extra attention for those who work below the standard.

This syllabus is not the only curriculum material for physics. It is preceded by the flow chart and the minimum learning competencies (MLC) and is expected to be succeeded by the student's text book, students' workbook, teachers' guide, and practical activities manual. **The flow chart** is a document that presents the contents listed in a sequence that gives a guideline on the topics to be taught and arranging them in such a way that they build on each other in a spiral progression. The flow chart begets the MLC. **The MLC** is a document that indicates the minimum that a student must learn in each grade level in terms of contents and skills and it builds on the themes or competency areas identified for the subject. The MLC begets the syllabus. **The syllabus** is a document that is pre-planned, preordained, pre-sequenced, inventory of specifications that serves as a roadmap to teachers, students, and textbook writers. It is made up of unit outcomes, competencies, contents, and hints for teaching assessment. The syllabus begets the students' text book and workbook and to the teacher guide and practical activities manual. **The text book** is a standard book used in schools for a given subject and grade levels and which serves as a primary learning instrument for students. **The workbook** is a booklet used

by a student in which answers and workings may be entered besides questions and exercises. The booklet is designed in such a way that it has enough space for solving problems or recording activities. **The teacher's guide** is a book for the teacher that consists of written instructions for the teacher giving specific directions for teaching the various parts of a lesson. **The practical activities manual** is a manual for the teacher giving instructions on the 'how to' of conducting experiments and simple activities inside and outside the classroom, preparing equipments and chemicals, arranging and performing field trips and visits, making teaching aids and constructing models.

Grade -9 physics encompasses: physics and measurement, vectors, motion in a straight line, force and Newton's laws of motion; work, energy and power, simple machines, fluid static; heat, temperature and thermal expansion, wave motion and sound.

Grade-10 physics includes: motion in two dimensions, electrostatics, current electricity, electromagnetism, electronics, electromagnetic waves and geometrical optics

The new curriculum framework for Ethiopian schools has allotted 3 periods per week for physics in grade 9 and 10. Though the academic calendar is made of 40 weeks, the syllabuses are prepared for 34 weeks (102 periods). The distribution of periods for each unit of each grade level is also indicated in the syllabuses

This document of Grades 9 and 10 physics syllabuses was reviewed, discussed, and finalized by a national workshop held at the general

framework development department of the MOE (TIR 1-MIazia 30) and at which 12 federal, regional, and international curriculum experts, teachers participated. It was finalized by the following team of experts:

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**Allotment of Periods
for Units and Sub-units of Physics
Grades 9 and 10**

Grade	Unit	Sub-unit	Number of Periods	
			Sub-unit	Total
9	Unit 1: Vectors	1.1. Representation of vectors 1.2. Addition and subtraction of vectors 1.3. Some applications of vectors	2 5 2	9
	Unit 2: Motion in a straight line	2.1. Uniform motion 2.2. Uniformly accelerated motion 2.3. Graphical description of uniformly accelerated motion 2.4. Equations of uniformly accelerated motion 2.5. Relative velocity in one dimension	2 2 2 4 2	12
	Unit 3: Force and Newton's laws of motion	3.1. Forces in nature 3.2. Newton's 2 nd law 3.3. Frictional force 3.4. Newton's 3 rd law 3.5. Conservation of linear momentum 3.6. Collisions 3.7. The first condition of equilibrium	2 2 3 4 3 2 3	19
	Unit 4: Work, energy, and power	4.1. Mechanical work 4.2. Work-energy theorem 4.3. Conservation of energy 4.4. Mechanical power	2 2 6 1	11
	Unit 5: Simple machines	5.1. Purposes of machines 5.2. Inclined plane, wedge, and screw 5.3. Levers	1 5 5	11
	Unit 6: Fluid statics	6.1. Air pressure 6.2. Fluid pressure	5 7	12
	Unit 7: Temperature and heat	7.1. Temperature and heat energy 7.2. Expansion of solids, liquids and gases 7.3. Quantity of heat, specific heat capacity, and heat capacity 7.4. Change of state	2 3 3 4	12
	Unit 8: Wave motion and sound	8.1. Wave propagation	4	

Physics: Grades 9 and 10

Grade	Unit	Sub-unit	Number of Periods	
			Sub-unit	Total
		8.2. Mechanical waves 8.3. Properties of waves 8.4. Sound waves	4 4 4	16
10	Unit 1: Motion in two dimensions	1.1. Projectile motion 1.2. 1.2. Rotational kinematics 1.3. Rotational dynamics 1.4. Newton's law of universal gravitation	5 5 7 5	22
	Unit 2: Electrostatics	2.1. Electric charges 2.2. Electric forces and fields 2.3. Electric potential 2.4. Capacitors and capacitance	6 5 4 4	19
	Unit 3: Current electricity	3.1. Electric current 3.2. Ohm's law and electrical resistance 3.3. Combinations of resistors 3.4. Emf and internal resistance of a cell 3.5. Electric energy and power 3.6. Electric installation and safety rules	2 3 3 3 2 1	14
	Unit 4: Electromagnetism	4.1. Magnetism 4.2. Concepts of magnetic field 4.3. Magnetic force 4.4. Electromagnetic induction	4 3 6 7	20
	Unit 5: Electronics	5.1. Vacuum tube devices 5.2. Conductors, semiconductors and insulators 5.3. Semiconductors 5.4. Transistors	3 1 4 3	20
	Unit 6: Electromagnetic waves and geometrical optics	6.1. Electromagnetic waves 6.2. Reflection of light 6.3. Refraction of light	3 6 7	16