



The Republic of Uganda

Ministry of Education and Sports

PHYSICS TEACHING SYLLABUS

Uganda Certificate of Education

Senior 1 - 4

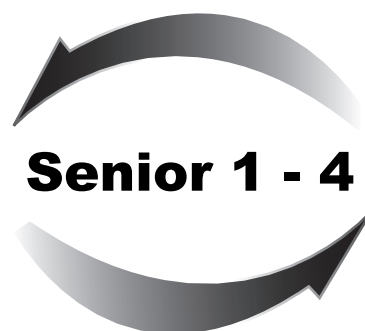


National Curriculum Development Centre
P.O. Box 7002
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2008

PHYSICS TEACHING SYLLABUS

UGANDA CERTIFICATE OF EDUCATION



National Curriculum Development Centre

Physics Teaching Syllabus, National Curriculum Development Centre.

NATIONAL CURRICULUM DEVELOPMENT CENTRE (NCDC) UGANDA - 2008.

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The National Curriculum Development Centre (NCDC) takes responsibility for any shortcomings that might be identified in the publication and welcomes suggestions for effectively addressing the inadequacies.



Connie Kateeba
DIRECTOR,
National Curriculum Development Centre



FOREWORD

The educational experiences one goes through have a lot of bearing on the knowledge and skills acquired, attitudes developed and consequently what one is able to do in achieving quality and successful life.

The teaching syllabuses for O-Level subjects will go a long way in achieving the government aims and objectives of education for all. For a long time each school has been developing its own teaching syllabuses. However, there has been need to standardise the various teaching syllabuses, in terms of scope and depth of the content in the various subjects for every school. This will provide detailed guidance to the teacher for scheming and lesson preparations. The syllabuses still leave room for the teacher to use his/her own creativity. These standardised syllabuses will guide the teaching/learning process.

I appeal to all stakeholders to join hands and make the implementation of this educational process a success.

Dr. John Mbabazi
Director of Education
Ministry of Education and Sports

SECTION I

INTRODUCTION

The Uganda Certificate of Education (UCE) Physics syllabus has for a long time remained in a format which is difficult to translate into pedagogical sequence by teachers. The result of this was that teachers most often adopted the sequence in text books to teach the subject without paying attention to levels of difficulties of the topics and competences.

This syllabus has simply sequenced the content of the present Physics syllabus in a systematic pedagogical hierarchy to cater for each of the four years of UCE study. The syllabus further amplified the scope of each topic and sub-topic at each level to help teachers plan the depth of treatment of the subject content.

The specific objectives against each sub-topic are to assist teachers in planning the strategies of teaching the sub-topics. Teachers should however be encouraged to go beyond and specify more refined objectives and teaching /learning strategies for some aspects of the sub-topics.

PURPOSE OF THE TEACHING SYLLABUS

This teaching syllabus is meant to help teachers cover the syllabus content adequately up to appropriate depth at each level of study. This has been done by arranging the content in a sequence that presents topics, sub-topics, concepts and procedures in a hierarchy of what should be learnt first for others to be built on, extended or to be applied. The arrangement of the topics is based on pre-requisite topics or sub-topics.

The design of this syllabus is to emphasize the teaching approaches to be used for each sub-topic from among the general approaches given by the syllabus to achieve the general objectives of the syllabus. The periods allocated should guide teachers to make effective plans so that they can complete the syllabus within the recommended period. The recommended methods must all be based on experiments and experiential-investigative approaches where learners can participate individually or in groups.

BROAD AIMS OF EDUCATION

- (i) To promote understanding and appreciation of the value of national unity, patriotism and cultural heritage, with due consideration of internal relations and beneficial inter-dependence;
- (ii) To inculcate moral, ethical and spiritual values in the individual and to develop self-discipline, integrity, tolerance and human fellowship;

- (iii) To inculcate a sense of service, duty and leadership for participation in civic, social and national affairs through group activities in educational institutions and the community;
- (iv) To promote scientific, technical and cultural knowledge, skills and attitudes needed to promote development;
- (v) To eradicate illiteracy and to equip the individual with basic skills and knowledge to exploit the environment for self-development as well as national development, for better health, nutrition and family life, and the capability for continued learning; and
- (vi) To contribute to the building of an integrated, self-sustaining and independent national economy.

AIMS AND OBJECTIVES OF SECONDARY EDUCATION

- (i) Instilling and promoting national unity and an understanding of social and civic responsibilities; strong love and care for others and respect for public property, as well as an appreciation of international relations and beneficial international co-operation.
- (ii) Promoting an appreciation and understanding of the cultural heritage of Uganda including its languages;
- (iii) Imparting and promoting a sense of self-discipline, ethical and spiritual values and personal and collective responsibility and initiative;
- (iv) Enabling individuals to acquire and develop knowledge and an understanding of emerging needs of society and the economy;
- (v) Providing up-to-date and comprehensive knowledge in theoretical and practical aspects of innovative production, modern management methods in the field of commerce and industry their application in the content of socio-economic development of Uganda;
- (vi) Enabling individual to develop basic scientific, technological, technical, agricultural and commercial skills required for self-employment;
- (vii) Enabling individuals to develop personal skills of problem-solving, information gathering and interpretation, independent reading and writing, self-improvement through learning and develop of social, physical and leadership skills such as are obtained through games, sports, societies and clubs;
- (viii) Laying the foundation for further education;
- (ix) Enabling the individual to apply acquired skills in solving problems of the community, and to develop in him a strong sense of constructive and beneficial belonging to that community;
- (x) Instilling positive attitudes towards productive work and strong respect for the dignity of labour and those who engage in productive labour activities.

AIMS OF TEACHING PHYSICS

The general objectives of teaching Physics:

- a) Making of a society that knows about Physics and appreciates the importance of Physics.
- b) Making of a society that understands everyday phenomena, natural and artificial and their explanations.
- c) Producing of individuals capable of harnessing natural resources scientifically and technically in an innovative way for the service of the society.
- d) Producing an effective team of Physicists working in Physics for the advancement of knowledge.

TARGET

This teaching syllabus is aimed at enriching the teaching strategies employed by qualified Physics teachers in schools.

SCOPE & DEPTH

The syllabus has been divided into seven broad topics, namely:

1. Mechanics and Properties of Matter
2. Heat
3. Light
4. Waves
5. Electricity
6. Magnetism
7. Modern Physics

Against each topic the relevant sub-topics per class per term have been indicated for consistency and uniformity in all schools in Uganda. The notes sections are not exhaustive but to remind teachers of essential elements they should consider with respect to each sub-topic and to clarify the scope.

TEACHING SEQUENCE

SENIOR I

Topic	Sub-topics	Number of Periods
1. Mechanics and Properties of Matter (41 periods)	Measurements	18
	Density	08
	States of matter	07
	Introduction to forces	08
2. Heat (18 periods)	Thermometry	09
	Heat transfer	09
3. Light (18 periods)	Rectilinear propagation of light	08
	Reflection of light at plane surfaces	10
4. Electricity (9 Periods)	Introduction to Electricity (Part I0	09
5. Magnetism (9 Periods)	Magnets	09

Note: An orientation week has been included in the Senior One Syllabus. The teacher should use this week to stimulate interest in learning Physics. This week should also be used to orient learners to proper laboratory use.

SENIOR II

TOPIC	SUB-TOPICS	NUMBER OF PERIODS
1. Mechanics and properties of Matter (58 periods)	Turning effect of forces and centre of gravity	09
	Machines	09
	Work, energy and power	09
	Pressure	14
	Properties of Matter	17
2. Light (9 periods)	Reflection of light at curved surfaces	09
3. Waves (30 periods)	Wave motion (Progressive waves)	04
	Properties of waves	10
	Stationary waves	03
	Sound waves	04
	Properties of sound waves	09
4. Electricity (6 Periods)	Introduction to Electricity (part 2)	06
5. Magnetism (6 Periods)	Magnetic effect of an electric current	06

SENIOR III

TOPIC	SUB-TOPICS	NUMBER OF PERIODS
1. Mechanics and Properties of Matter (51 periods)	Motion	11
	Vector and scalar quantities	03
	Linear momentum	06
	Newton's Laws of motion	08
	Friction between solids	04
	Mechanical energy	04
	Archimedes principle	06
	Fluid flow	06
	Properties of materials under stress and structures	03
2. Heat (22 periods)	Quantity of heat	08
	Latent heat	08
	Vapours	03
	Expansion of solids and liquids	03
3. Light (24 periods)	Refraction of light at a plan surface	10
	Dispersion of light	04
	Lenses and optical instruments	10
4. Electricity (11 periods)	Electrostatics	11

SENIOR IV

TOPIC	SUB-TOPICS	NUMBER OF PERIODS
1. Heat (15 periods)	Gas Laws	15
2. Electricity (40 periods)	Potential difference electromotive force	03
	Electric cells	06
	Electric current, resistance and ohm's law	12
	Electric circuits	06
	Ammeters, voltmeters and galvanometers	03
	Electrical energy	03
	Domestic electricity	05
	Distribution of electrical energy	02
3. Magnetism (11 periods)	Principle of the electric motor	05
	Electromagnetic induction	06
4. Modern Physics (19 periods)	Electrons	06
	X-rays	04
	Atomic and nuclear structures	05
	Radioactivity	04

TIME ALLOCATION

The allocation of periods for each sub-topic and for each term assumes that there will be ten (12) weeks of effective teaching available per term for four years except for 3rd term of senior four. It is also assumed that there will be three (3) periods, each of 40 minutes of teaching per week for Physics on the school time table.

Schools will be expected to allocate at least one double period in the 3rd and 4th year of study every week for students to do supervised individual laboratory experiments.

HOW TO USE THE SYLLABUS

The Physics Teaching Syllabus is aimed at providing the teacher with guidance required to teach Physics at ordinary level classes. It is not meant to substitute the creativity of the classroom teacher. The Physics Teaching Syllabus has the following features:

a) General objectives

This is a statement of the general learning outcome expected of the learner at the end of the topic.

b) Specific Objectives

These have been provided to help the teacher clarify content and scope. The teacher should use the specific objectives to plan his/her teaching strategies. Specific objectives also guide in evaluation at the end of learning process.

c) Content

Items in the content column have been simply listed but should be handled together with the specific objectives and the notes on the sub-topic.

d) Teaching / learning strategies

These provide the teacher with guidance for example, the methodology, experiments and strategies which the teacher may use.

e) Notes

These further clarify the scope and depth.

f) Number of periods per sub-topic

The number of periods suggested for each sub-topic is only to be used as a guide to enable the teacher cover the work in each sub-topic adequately.

MODE OF ASSESSMENT

Assessment is a process of finding out how much a learner has achieved during and after the teaching and learning process. It should be part and parcel of the teaching / learning process. Assessment will take two forms;

a) Continuous Assessment

It is recommended that teachers carry out continuous assessment basing on each sub-topic. The questions in the assessment should reflect acquisition of the following testable competences.

(The assessment strategies include: tests, work activities given to learners, simple research in library, excursion activities, projects, experiments, reports, quizzes, assignments).

Knowledge:

- i. Knowledge of terminology.
- ii. Knowledge of specific facts.
- iii. Familiarity with experiments suggested in the syllabus.
- iv. Knowledge of common principles and generalization identified in the syllabus.

Comprehension: ability to:-

- i. Explain standard phenomena from laws and models and to describe standard experiments met with before.
- ii. Translate between various forms of information presentation.
- iii. Use standard methods to solve familiar numerical types of problems.
- iv. Draw conclusion from experiments of a straight forward type.

Application and higher abilities: ability to:-

- i. Analyze presented information
- ii. Synthesis ideas from presented analyses and otherwise.
- iii. Apply laws and generalizations already learnt to new situations.
- iv. Devise experiments to test hypotheses and statements of models
- v. Exercise evaluative judgment on suitability and results of scientific procedures.

Practical abilities:

The written tests will demand knowledge of, and familiarity with experiments in Physics relevant at this level. The practical component of the assessment will further test acquisition of the following abilities:

- i. Application of knowledge to practical situations.
- ii. Manipulation of the apparatus and performing experiments.
- iii. Making and recording observations accurately.
- iv. Presentation of data in an appropriate form.
- v. Drawing conclusions from observations made.
- vi. Assessing suitability of procedure, experiment and observations made in support of the conclusion.

b) Summative Assessment

Uganda National Examinations (UNEB) will administer a Physics examination at the end of the 4th year of study.

Examination Format:

There will be three papers.

Paper 1: (2¼ hours)

It will consist of two sections, A and B. Section A will contain forty (40) objective test items and section B will contain ten (10) structured short answer questions set on any part of the syllabus. All questions will be compulsory.

(80 marks)

Paper 2: (2¼ hours)

It will consist of eight (8) semi-structured/essay type questions drawn evenly from the whole syllabus. Candidates will be required to answer five (5) questions.

(80 marks)

Paper 3: (2¼ hours)

It will consist of three (3) questions. Question 1 will be compulsory. In addition, candidates will be required to answer one of the questions 2 or 3.

(40 marks)