



KEMENTERIAN PENDIDIKAN MALAYSIA

HURAIAN SUKATAN PELAJARAN
CURRICULUM SPECIFICATIONS

BAHASA INGGERIS UNTUK SAINS DAN TEKNOLOGI
ENGLISH FOR SCIENCE AND TECHNOLOGY

Tingkatan 4 dan Tingkatan 5
Form 4 and Form 5
2003

RUKUN NEGARA

BAHAWASANYA negara kita Malaysia mendukung cita-cita hendak mencapai perpaduan yang lebih erat di kalangan seluruh masyarakatnya; memelihara satu cara hidup demokratik; mencipta masyarakat yang adil di mana kemakmuran negara akan dapat dinikmati bersama secara adil dan saksama; menjamin satu cara yang liberal terhadap tradisi-tradisi kebudayaan yang kaya dan berbagai-bagai corak; membina satu masyarakat progresif yang akan menggunakan sains dan teknologi moden;

MAKA KAMI, rakyat Malaysia, berikrar akan menumpukan seluruh tenaga dan usaha kami untuk mencapai cita-cita tersebut berdasarkan prinsip-prinsip berikut:

KEPERCAYAAN KEPADA TUHAN

KESETIAAN KEPADA RAJA DAN NEGARA

KELUHURAN PERLEMBAGAAN

KEDAULATAN UNDANG-UNDANG

KESOPANAN DAN KESUSILAANS

FALSAFAH PENDIDIKAN KEBANGSAAN

Pendidikan di Malaysia adalah suatu usaha berterusan ke arah memperkembangkan lagi potensi individu secara menyeluruh dan bersepadu untuk mewujudkan insan yang seimbang dan harmonis dari segi intelek, rohani, emosi dan jasmani berdasarkan kepercayaan kepada Tuhan. Usaha ini adalah bagi melahirkan rakyat Malaysia yang berilmu pengetahuan, berketrampilan, berakhlak mulia, bertanggungjawab dan berkeupayaan mencapai kesejahteraan diri serta memberi sumbangan terhadap keharmonian dan kemakmuran masyarakat dan negara.

Kata Pengantar

Huraian Sukatan Pelajaran ialah dokumen yang memperincikan Sukatan Pelajaran yang bertujuan untuk memenuhi cita-cita murni dan semangat Falsafah Pendidikan Kebangsaan, dan menyediakan murid menghadapi arus globalisasi serta ekonomi berasaskan pengetahuan pada abad ke-21.

Dokumen ini menyarankan strategi pengajaran dan pembelajaran yang merangkumi pelbagai aktiviti dan penggunaan sumber. Guru digalakkan menggunakan kreativiti untuk memilih, menyusun dan mengolah aktiviti mengikut kesesuaian murid. Huraian ini diharapkan dapat membantu guru merancang dan melaksanakan pengajaran dan pembelajaran secara berkesan.

Dalam melakukan aktiviti pengajaran dan pembelajaran, guru diharapkan dapat memberikan penekanan pada unsur bernilai tambah, iaitu kemahiran berfikir, kemahiran teknologi maklumat dan komunikasi, kemahiran belajar cara belajar, kajian masa depan, kecerdasan pelbagai, pembelajaran kontekstual, dan pembelajaran konstruktivisme. Di samping itu, nilai murni dan semangat patriotik dan kewarganegaraan tetap diutamakan. Semua elemen ini diharapkan dapat memberikan keyakinan kepada murid dan boleh diaplikasikan dalam kehidupan harian dan dunia pekerjaan.

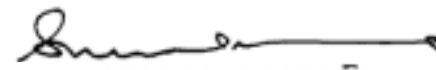
Huraian Sukatan Pelajaran ini menjelaskan hasil pembelajaran yang perlu dikuasai oleh murid berasaskan pendekatan masteri. Hasil pembelajaran tersebut dinyatakan secara eksplisit mengikut tahap kesukaran isi kandungan dan tahap keupayaan murid. Hasil pembelajaran diperingkatkan kepada

tiga aras, iaitu Aras 1 (aras asas), Aras 2 (aras sederhana), dan Aras 3 (aras cemerlang).

Kandungan Huraian Sukatan Pelajaran *English for Science and Technology* menggariskan hasil pembelajaran yang perlu dikuasai oleh murid. Pernyataan dalam Huraian 'Hasil Pembelajaran' memberikan cabaran yang sesuai dengan murid pada tahap tertinggi dalam pendidikan sekolah menengah. Huraian ini seharusnya dapat membantu guru merancang dan melaksanakan pengajaran dan pembelajaran yang berkesan.

Dalam menyediakan Huraian Sukatan Pelajaran ini banyak pihak yang terlibat terutama guru, pensyarah maktab dan universiti, pegawai Kementerian Pendidikan, dan individu yang mewakili badan-badan tertentu.

Kepada semua pihak yang telah memberikan sumbangan kepakaran, masa, dan tenaga sehingga terhasilnya Huraian Sukatan Pelajaran ini, Kementerian Pendidikan merakamkan setinggi-tinggi penghargaan dan ucapan terima kasih.



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Pengarah
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INTRODUCTION

English is taught as a second language in all Malaysian primary and secondary schools in line with its status as a second language. Students are taught the English language to enable them to use the language in everyday life, to further their studies and for work purposes.

To this end, a general English language syllabus has been developed in line with the way English is used in everyday life. Students are taught to use the language for interpersonal purposes, for informational purposes and for aesthetic purposes.

With globalization, Malaysians will need to be proficient in English as a medium for communicating with people from other countries. The use of English in ICT has also been included to enable students to access knowledge on the Internet and to network with people both locally and overseas.

The continuing emphasis on science and technology has made it essential for students to access information on science and technology in English. This requires them to listen to, read and present the information orally and in writing in the medium of English. To this end, an English for Science and Technology Syllabus has been developed.

AIMS

The English for Science and Technology Syllabus aims to provide students with the language basis to access and

understand materials on science and technology and to express ideas and concepts in English.

OBJECTIVES

As emphasis is placed on accessing content, hence the ability to read and comprehend materials in English is the main priority.

The English for Science and Technology curriculum enables learners to:

- i. Obtain information by reading and understanding different text types in science and technology in English;
- ii. Obtain information by listening to and viewing texts on science and technology in English from audio-visual and electronic sources such as talks and television programmes;
- iii. Access and understand information on the Internet and other electronic media;
- iv. Present information on science and technology at an appropriate level in both the written and spoken form; and
- v. Think critically and give their points of view on issues pertaining to science and technology.

THE SYLLABUS

The English for Science and Technology Syllabus specifies the curriculum content to be taught over a period of two years. The curriculum is organised in a manner that reflects the way ideas and information on science and technology are obtained and made known to others in everyday life.

The **Curriculum Content** of the syllabus outlines three main sections, namely, the Learning Outcomes to be achieved by learners, the Language Content to be incorporated into the lessons, and the Educational Emphases to be woven into materials and activities.

The **Learning Outcomes** of the syllabus specify the skills to be achieved by learners in terms of obtaining information on science and technology, processing that information and presenting the information. Learners are required to obtain ideas and information about science and technology by listening to talks and lectures, viewing TV multimedia resources, and most importantly, by reading a variety of science and technology materials in English. In demonstrating understanding of these texts, students are required to read, write, and speak about the topic.

The **Language Content** outlines the special areas of grammar that are most relevant and appropriate to science and technology texts. It is assumed that the other areas of grammar have been taken into account in the general English syllabus.

Educational Emphases incorporates worldwide developments in education such as thinking skills, ICT skills and the theory of Multiple Intelligences.

CURRICULUM SPECIFICATIONS

The English for Science and Technology Syllabus is detailed out in the Curriculum Specifications. These have been prepared as separate documents for each year of teaching and learning in the secondary school. Each document serves as a guide to teachers with regard to the skills to be achieved, the topics or themes to be dealt with and the grammar items to be learnt.

This document is the Curriculum Specifications for Form 4. There are two sections to this document. Section 1 outlines the Learning Outcomes and Specifications, and Section 11 outlines the Language Content.

Section I: Learning Outcomes and Specifications

Section I forms the main focus of the document because it contains the Learning Outcomes to be achieved by the end of Form 5. The elaboration in the columns are as follows:

- the first column contains final Learning Outcomes related to skills to be achieved by learners by the end of Form 5;
- the second column sets out the skills to be achieved in Form 4 and Form 5. This second column attempts to break down these larger outcomes into more manageable skills and sub-skills for teaching and learning. These have been set out at three levels ranging from the more basic to the more advanced. Level 1 outlines the basic skills to be achieved by all learners. After having completed the specific tasks in Level 1 successfully, learners then progress to Level 2, and subsequently to Level 3.

- the third column is entitled *Examples /Activities /Notes*. These are directed at teachers and they include teaching points, examples of activities and explanations for the attainment of the Learning Outcomes. Teachers need to use their initiative, imagination and creativity to extend the experiences of their learners, to reinforce what has been learnt and to create challenging language tasks.

Learning Outcomes

The Learning Outcomes comprise three broad areas namely, Obtaining Information, Processing Information and Presenting Information.

In obtaining information, students are not only required to listen for ideas and information as expressed in talks and lectures but also to read and understand ideas and information in a range of materials. These include for example, popular science articles and extracts from textbooks and encyclopaedias. Topics can range from descriptions of experiments and processes to descriptions of principles and theories or applications of these in real life. In respect of the latter, one such example is the principle of motion as applied to roller coasters.

In processing that information students are required to identify main ideas and relevant facts to the issue at hand, perhaps to compare and contrast information and finally to draw their conclusions supported with reasons.

In presenting that information, students are required to write descriptions and reports in simple language as well as present

these orally to their peers. Where possible the use of diagrams and charts are encouraged to make presentations clearer to the audience.

By the end of the year, learners should be able to use the English language for these purposes.

Language Skills

In the syllabus, reading skills are given the main priority. However, the four language skills of listening, speaking, reading and writing are employed to enable students to better understand the topic at hand. These language skills do not appear in their pure form as Learning Outcomes but are integrated in the process of achieving the learning outcomes. Thus, when learners read interesting topics, they are encouraged to talk about it, ask questions, share the information with others and perhaps even research further into the topic.

Learning Content

In teaching learners the vocabulary and register for science and technology, the content or topic of the lesson can be sourced from various areas such as nature and the environment, technology and communications, energy and matter, man and living organisms, the universe, nutrition and the human body. Some themes and topics have been suggested as examples to help teachers decide upon their own themes and topics that are suitable for their class.

SECTION II: LANGUAGE CONTENT

Grammar

In this section, grammar items have been selected from the list in the syllabus and these are to be taught within the context of the topics for study.

Word List

Vocabulary to be taught is very much dependant on the topic under study. However, the emphasis is on the words and phrases that are common in the register of science and technology. The emphasis is not on technical jargon but on semi-technical vocabulary that a layman can understand if properly defined.

EDUCATIONAL EMPHASES

As with the other subjects in the curriculum, educational emphases given below outline current developments in education that will help learners prepare for academia and the world of work.

Thinking Skills

Critical and creative thinking skills are incorporated in the learning outcomes to enable learners to analyse information, make decisions, solve problems, and express themselves accurately and creatively in the target language.

Learning How to Learn Skills

Learning How to Learn skills are also integrated with the learning outcomes and aim to enable learners to take responsibility for their own learning. These skills incorporate information skills, library skills and study skills to enable learners to access sources of information more efficiently and help them become independent life-long learners.

Information and Communications Technology (ICT) Skills

In line with globalization and the ICT Age, skills relating to ICT are incorporated in the learning outcomes. These skills have been added to cater for schools that have ICT facilities. These skills include the use of multimedia resources such as TV documentaries and Internet resources as well as the utilization of computer-related activities such as e-mail activities, networking and interacting with electronic courseware.

Values and Citizenship

It is hoped that students will read and understand articles and extracts which will enable them to develop positive and informed values and attitudes towards themselves, towards others and towards science and technology.

Multiple Intelligences

The learning outcomes also reflect the incorporation of the theory of Multiple Intelligences. This is illustrated, for example,

in the use of logico-spatial intelligence in the interpretation of diagrams and graphs.

Knowledge Acquisition

Learning outcomes utilise subject matter disciplines such as science and geography, and incorporate educational emphases such as environmental studies and consumerism to provide contexts for language use.

Preparation for the Real World

The learning outcomes prepare learners to meet the challenges of academia and the world of work when students are required to read up references in English or keep up with developments in the field of science and technology.

IMPORTANT CONSIDERATIONS FOR TEACHING

The following considerations should be taken into account in teaching the curriculum specifications.

Planning and Organisation of Lessons

The Learning Outcomes must be organised in a manageable form for teaching, taking into account the time allocated for English in the time-table. The three areas of language use, taken singly or in combination, are usually planned around a topic.

Integration

The principle of integration can help teachers cover a cluster of skills in several lessons. Once a topic is selected, teachers can plan tasks and activities that seek to integrate skills.

In all of these lessons, moral values should be infused. This can be done through the appropriate selection of materials or through discussions that seek to emphasise that science and technology should be employed for the betterment of mankind. Discussion around controversial topics such as cloning or genetically modified foods can serve to make students aware of implications and effects.

Repetition, Reinforcement and Consolidation

Language skills, vocabulary, and grammar items must be repeated often to maximize learning and bring about retention. To this end, teachers should set a variety of tasks and activities that will enable learners to use the language items repeatedly so that items are reinforced. Repetition should be carried out using new material to avoid boredom.

Teaching-Learning Activities

In order to bring about effective learning, learners must be given every opportunity to engage in real or simulated activities that require them to use the language i.e. lessons should be activity-based and learner-centred and revolve around real-life tasks to ensure relevance.

Texts for Study

Although, the syllabus encourages the use of authentic material for reading, these may prove too difficult for weaker students. Teachers are encouraged to modify and adapt these materials to a level suited to the language proficiency of their students so that they are not deterred from the outset.

Classroom Evaluation

Evaluation is part and parcel of the teaching-learning process. Continuous feedback is essential if learners are to keep track of their progress. Teachers are encouraged to assess their set of learners through simple questioning techniques or other tasks after every lesson.

This document only lists a number of essential activities for students to be familiar with the register of science and technology in English. Teachers need to use their initiative to extend the experiences of their learners and to reinforce what has been learnt.

THEMES AND TOPICS

The themes listed below relate directly to the science and technology curricula as taught in the secondary school. Students will learn to be familiar with the main scientific concepts and ideas of science in English as well as the register and related vocabulary.

Topics and themes act as vehicles for instruction and incorporate basic concepts and ideas. These topics and themes are kept as simple as possible, referring wherever possible, to everyday examples. The use of authentic materials is greatly encouraged so that students become familiar with the register of science.

Nature and Environment : e.g. how the weather affects the lives of people

Technology and Communications : e.g. how information is stored for later use

Energy/ Matter & Mass/ Force & Motion: e.g. the principle of motion in roller coasters

Man and Living Organisms : e.g. Anthrax as a bioweapon

Natural Resources and Industrial Processes: e.g. Energy from the Wind

The Universe/ Astronomy/ Aerospace : e.g. the Hubble telescope

Nutrition/ Food/ Health/ Human Body : e.g. genetically modified foods

OBJECTIVES

By the end of the year, students should be able to:

- Read and understand texts on a number of science and science-related topics;
- Talk about the topics read especially in relation to the concepts and ideas of science;
- Discuss the ethical issues involved in certain topics;
- Present what is read to peers and others with the help of diagrams and charts;
- Understand semi-technical vocabulary;
- Write summaries and simple explanations of the topic read; and
- Write instructions and simple reports.

SECTION I: LEARNING OUTCOMES AND SPECIFICATIONS

The Learning Outcomes in the first column have been extracted from the syllabus. They represent the skills to be achieved by the end of Form 5. These outcomes have been

translated into specifications for the Forms 4 & 5 programme. Teachers need to be guided by this column when planning lessons for the year.

LEARNING OUTCOMES	SPECIFICATIONS	EXAMPLES / ACTIVITIES?NOTES
<p>By the end of the programme, students should be able to:</p> <p>1.0 OBTAIN INFORMATION by</p> <p>1.1 Reading different text types in science and technology from</p> <p style="padding-left: 20px;">a. popular science articles</p> <p style="padding-left: 20px;">b. extracts from textbooks encyclopaedia.</p> <p>1.2 Listening to spoken texts on science and technology such as</p> <p style="padding-left: 20px;">a. talks</p> <p style="padding-left: 20px;">b. lectures.</p>	<p style="text-align: center;"><u>ALL LEVELS</u></p> <p>1.1.1 Listen to and understand simple talks or reports on science-related topics.</p> <p>1.1.2 Read and understand a variety of simple texts on a variety of topics.</p> <p>1.1.3 Read and follow instructions.</p>	<ul style="list-style-type: none"> • Students can listen to simple talks on certain topics as presented by other students in the class. Examples of these topics include <i>Harnessing Electricity from the Wind, Heredity and Night Blindness, and Retina Detachment</i>. • These talks can be the end-product of research carried out by the group. • For weaker students, teachers should ensure that texts are simplified and adapted for easier understanding. • Instructions can range from what to do in groups to carrying out experiments.

LEARNING OUTCOMES	SPECIFICATIONS	EXAMPLES / ACTIVITIES?NOTES
<p>2.0 PROCESS INFORMATION</p> <p>2.1 Acquiring terminology and expressions in Science and Technology;</p> <p>2.2 Identifying relevant facts and issues;</p> <p>2.3 Comparing and contrasting information;</p> <p>2.4 Drawing conclusions;</p> <p>2.5 Interpreting and analysing data; and</p> <p>2.6 Understanding stages in scientific methods.</p>	<p style="text-align: center;">Level 1</p> <p>2.1.1 Understand the meanings of words: - technical terms - compound words.</p> <p>2.1.2 Understand word origins (the root).</p> <p>2.1.3 Label parts of a diagram.</p> <p>2.1.4 Identify definitions and main ideas.</p> <p>2.1.5 Select supporting details.</p> <p>2.1.6 Read and interpret non-linear texts such as charts, tables and graphs.</p> <p>2.1.7 Understand stages in scientific methods.</p>	<ul style="list-style-type: none"> • Get students to underline and look up difficult words in the text. If there is a diagram, get students to refer to the diagram for table. • <i>E.g. aquaculture</i> aqua= water • Get students to read a text and label the corresponding parts of a diagram. • Get students to underline key words and phrases in a text. They must also know how to look for definitions within commas. • This is an important skill and students need to know how diagrams support the text. • Students must know how to pick out the stages of an experiment in a text that describes the findings of an experiment.

LEARNING OUTCOMES	SPECIFICATIONS	EXAMPLES / ACTIVITIES?NOTES
	<p style="text-align: center;"><u>Level 2</u></p> <p>2.1.8 Classify information.</p> <p>2.1.9 Transfer information from linear texts to tables, charts, graphs.</p> <p>2.1.10 Interpret information in non-linear texts such as tables, charts, or graphs and explain to another.</p> <p>2.1.11 Carry out reference work to explore the topic under study.</p> <p style="text-align: center;"><u>Level 3</u></p> <p>2.1.12 Predict outcomes.</p> <p>2.1.13 Identify differences between fact and opinion.</p> <p>2.1.14 Draw conclusions from facts given.</p>	<ul style="list-style-type: none"> • E.g. classifying information according to criteria such as functions, characteristics, benefits, etc. • This is a form of mind mapping and students must be able to extract the key ideas from texts and transfer information into tables, diagrams, etc. • E.g. Given an annotated flow chart of a process, students must be able to look at it and describe the process. • Students should be able to surf the Internet or look up reference books and the encyclopaedia for more information. • e.g. Information can be selected from the text and students can be asked to predict what will happen if certain things are done or not done. • e.g. Students should be able to look at textual clues indicating someone's opinion such as "I think...." or "I would like to see..."

LEARNING OUTCOMES	SPECIFICATIONS	EXAMPLES / ACTIVITIES?NOTES
<p>3.0 PRESENT INFORMATION By the end of the programme, students should be able to:</p> <p>3.1 Present in clear, simple English;</p> <p>3.2 Report on a variety of Science-related topics; and</p> <p>3.3 Summarize a variety of science-related topics.</p>	<p style="text-align: center;"><u>Level 1</u></p> <p>3.1.1 Expand notes relating to simple descriptions, experiments, etc.</p> <p style="text-align: center;"><u>Level 2</u></p> <p>3.1.2 Write simple experiments using appropriate conventions and grammar</p> <p style="text-align: center;"><u>Level 3</u></p> <p>3.1.3 Write simple reports using appropriate supporting diagrams such as charts, tables, graphs.</p> <p>3.1.4 Present reports and other information using appropriate supporting diagrams such as charts, tables, graphs.</p> <p>3.1.5 Write a summary of a text.</p>	<ul style="list-style-type: none"> • For weak students, they can be asked to complete texts or write based on model texts. • As stimulus, students should be given annotated diagrams and flow charts. It will be a good idea if some oral work is done before writing commences. • For weak students, guidance should be given in the form of completion exercises or model texts that they can emulate. • Get students to present information on topics they have read about or researched on. Encourage the use of diagrams and charts so that listeners can follow the explanations. • Put students through the stages of identifying main ideas, plotting them out on a mind map, and writing out the points in simple language coherently.

SECTION II: GRAMMATICAL ITEMS

Grammar forms part of the language contents in the Curriculum Specifications for EST. Grammar items to be taught are specified under the different grammar categories. To illustrate what is meant by each category and at the same time to specify the scope and depth to be taught, examples are given.

1. Compound Nouns

- Noun + Noun

e.g. light + electric = electric light

- Noun + adjective

e.g. steel + stainless = stainless steel

2. Roots of words (of Latin and Greek origins)

- **Root** - e.g. *aud* (auditory), *bene* (beneficial), etc.
- **Prefixes** - e.g. *a-*, *ab-*, *abs-*, *circum*, etc
- **Suffixes** - e.g. *-able*, *-ation*, *-ition* etc.

3. Modals - To show Certainty

Certain	Fairly certain	Uncertain
Yes, will	will probably	might
	be + likely + verb	may
	be + probable + that	could
No, will not	be + unlikely that	Be possible that

- **Modals to show Possibility** - can & could
4. **Passive construction** - verb to be + past participle
(is, are, be)
e.g. *The liquid was poured into the beaker.*
(contrast with active construction – *He poured the liquid into the beaker.*)
 5. **Imperatives** to make a request or to give a command
e.g. *Protective clothing must be worn.*
 6. **Conditional forms**
e.g. *If the experiment were successful,*
 7. **Connectors**
 - **Logical Connectors** e.g. *however*
 - **Sequence Connectors** e.g. *then, next*
 8. **Relative Clauses**
e.g. *The main chemical was X-blue, a combination of compounds and chlorides, and it was heated to 20 C.*