FOREWORD

The Ministry of Education is pleased to authorise the publication of this senior secondary syllabus which marks a watershed in the development of the public education system in Botswana and signals another milestone of progress in fulfilment of the goals set by the Revised National Policy on Education, Government Paper No. 2 of 1994.

In this era of widespread and rapid technological change and an increasingly inter- dependent global economy, it is essential that all countries foster human resources by preparing children adequately for their future. Survival in the coming millennium will depend on the ability to accommodate change and to adapt to environmental needs and emerging socio-economic trends. It is the wish of government to prepare Batswana for future growth and adaptation to ongoing change in the socio-economic context; specifically the transition from an agro-based economy to the more broadly based industrial economy which we are aiming at.

The senior secondary programme builds on the Ten Year Basic Education programme and seeks to provide quality learning experiences. It aims to prepare our students for the world of work, further education and lifelong learning. However, secondary education must also pay attention to the all round

development of the individual. It should provide not only for the acquisition of those skills needed for economic, scientific and technological advancement. It should also provide for the development of cultural and national identity and the inculcation of attitudes and values which nurture respect for one's self and for others.

Critical to the success of our secondary education programme is the recognition of individual talents, needs and learning styles. Hence, the role of the teacher in the classroom has changed. S/he must be a proficient manager and facilitator; a director of learning activities. S/he should be conscious of students' needs to take on board a measure of accountability and responsibility for their own learning. S/he must also take into account the widening range of ability of the student body and the different levels of achievement which they aspire to. This means active participation for all and the creation of rich and diverse learning environments.

It is important then that we value the students' own experiences, build upon what they know and reward them for positive achievement. At the same time, we must be prepared to offer them guidance and counselling at all levels; assisting them to make the best decisions in keeping with their own interests,

career prospects and preferences. In that way we shall prevail in nurturing at the roots of our system, the national ideals of democracy, development, self-reliance, unity and social harmony.

This syllabus document is the outcome of a great deal of professional consultation and collaboration. On behalf of the Ministry, I wish to record my appreciation and thank sincerely those who contributed to and were involved in the production of this syllabus.

P. T. Ramatsui
Permanent Secretary
Ministry of Education

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The Curriculum Development Division wishes to express its gratitude to all colleagues who contributed in different ways to the planning, developing and production of this senior secondary Computer Studies syllabus.

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This Computer Studies syllabus document reflects the outcome of a genuinely collaborative work across a broad educational spectrum and CDD would like to re-iterate its thanks to all individuals and organisations who contributed in anyway to produce this syllabus. The Department would also like to extend its sincere gratitude to all teachers who attended the consultation workshop for their valuable contributions.

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A. INTRODUCTION

The development of this computer studies syllabus for senior secondary schools was prompted by recommendations made in the Revised National Policy on Education Paper No.2 of 1994. Tomorrow's world is an ICT one where information-handling skills will be needed to improve the standard of learning and living. The world is becoming connected electronically by the Internet, the world-wide network through which we can all share information. As is clearly stated in Vision 2016 it is the intention of Botswana to become a commercial centre within Southern Africa as part of a global network and its populace will require the necessary ICT skills to enable this goal to be achieved.

The syllabus is geared towards students who are in senior secondary school and is designed to equip them with knowledge of computer skills, the applied use in the world of work, and a background for further training. It includes theoretical and practical content in hardware, software, communication and data processing.

The course is recommended to take two (2) years. On successful completion of a project, a practical exam and a written examination students will achieve a BGCSE in computer studies.

B. RATIONALE

Increasingly in the modern world acquisition of computer skills is becoming necessary for employment, educational development and leisure. Computer Studies intends to furnish students with a broad knowledge of the nature of information processing and how Information and Communications Technology (ICT) is used today. The syllabus concentrates on the current use of computer skills but in addition students will be equipped to appreciate future developments in technology and it's application.

The Education Policy of Botswana aims to prepare Botswana for a transition from a traditional agro-based to an industrial economy. In a fast growing economical environment, entrepreneurship is a major vehicle for both development and job creation and students will be encouraged to explore how the use of computers can benefit society as a whole. The industrial economy world-wide is driven by ICT, which uses computers to process, analyse and communicate information in an increasingly efficient and effective way. Thus any developing industrial society must have a high level of computer literacy within its workforce who would then be capable of fully exploiting the opportunities made possible by ICT.

The course will foster an interest in, enjoyment of, and confidence about the use of computers that will encourage the development of problem solving, analytical and research skills. On completion of the course, students will have the ability to use computer skills and techniques as a problem-solving tool.

C AIMS OF THE SENIOR SECONDARY PROGRAMME

On completion of the two-year Senior Secondary Programme learners should have:

1. **acquired knowledge, developed confidence and ability to assess their personal strengths and weaknesses and be realistic in choosing appropriate career/employment opportunities and or further education and training.**
2. **developed skills to assist them in solving technical and technological problems as they relate to day-to-day life situations.**
3. **developed desirable attitudes and behavioural patterns in interacting with the environment in a manner that is protective, preserving and nurturing.**
4. **acquired attitudes and values, developed basic skills and understanding to allow for execution of rights and responsibilities as good citizens of Botswana and the world.**
5. **developed information technology skills as well as an understanding and appreciation of their influence in the day-to-day activities.**
6. **acquired knowledge, attitudes and practices that will ensure good family and health practices including awareness and management of epidemics (such as HIV/AIDS) that prepare them for productive life.**

7. **developed pre-vocational knowledge and manipulative skills that will enable them to apply content learnt and attitudes and values developed to practical life situations in the world of work.**
8. **developed an understanding of and acquired skills in business, everyday commercial transactions and entrepreneurship.**
9 **developed foundation skills such as problem solving, critical thinking, communication, inquiring, team work/interpersonal to help them to be productive and adaptive and to survive in a changing environment.**
10. **developed study skills required for further study and training.**

D AIMS OF THE SENIOR SECONDARY SCHOOL COMPUTER STUDIES SYLLABUS

On completion of the two-year Computer Studies course students should have:

- **developed skills on the use of computers in research.**
- **developed skills in using computers to process data.**
- **acquired knowledge and understanding about how computer systems work.**
- **developed an awareness of how computers are used in business, home and industry.**

- **developed life long learning skills to be able to apply their ICT knowledge to solve real life problems.**
- **a clear understanding of a range of techniques and knowledge required in the use of computers.**
- **developed an awareness and appreciation of social and economic implications in computing.**
- **developed critical and logical thinking, self-reliance and initiative, which will serve as the basis for further training and positive work habits in the use of computers.**

E RECOMMENDED TEACHING METHODS

The syllabus encourages a learner-centred approach to learning and teaching as emphasised in the Curriculum Blueprint. In such an approach, the learner is at the centre of most activities and the teacher provides an enabling environment for learning to take place. This means the teacher should use a variety of action oriented methods, such as project work, visits to commercial houses and other Information Technology institutions. Learners should be made to participate actively in the learning and teaching processes through a lot of hands-on activities. The teacher is required to keep up to date with new information Technology developments around the world in order to bring the latest developments in the computer industry into the classroom.

The syllabus is not intended to be taught sequentially from the beginning to end but all topics must be covered.

F ASSESSMENT OBJECTIVES

Computer Studies in the curriculum should aim at providing learners with experiences, which cover the following domains: knowledge, understanding, application, analysis, evaluation, judgement and decision-making.

1 Knowledge and understanding

Learners should be able to:

- **Demonstrate appropriate knowledge of facts, concepts, principles and techniques in Computer Studies.**

2 Information Handling and Problem Solving

Learners should be able to:

- **Apply their knowledge and understanding to situations and problems related to computers.**
- **Distinguish between facts and opinion and evaluate data in order to make an informed judgement.**

- **Study a problem situation and be able to design a computer-based system to solve the problem.**
- **Identify issues in the computer world in order to present reasoned explanation, understand implications, make reasoned judgement and communicate them in an informed manner.**

3 Investigation and Experimentation

Learners should be able to:

- **Set objectives, plan and carry out an investigation of a particular system.**
- **Select, analyse, interpret and evaluate data from a variety of sources using computers.**
- **Present the results of an investigation appropriately.**

4 Attitudes

Learners should be able to:

- **Develop an appreciation of the use of computers.**

- **Recognise the usefulness of computers and their limitations.**
- **Show awareness of the social implications of the use of computers.**

G ASSESSMENT

The Botswana Senior Secondary Computer Studies syllabus will be assessed using a variety of assessment instruments in order to ensure that learners attain the set aims and objectives of the programme. School based assessment in the form of tests, assignments and practical exercises will be used throughout the teaching of the course. The outcome of the assessment methods will be used to improve instruction.

At the end of the two years of Senior Secondary programme students will sit for a final examination. Coursework in the form of a project will contribute to the certification. Assessment guidelines will be developed by the examining body to provide guidance to teachers on the proper examination procedures.

H ORGANISATION OF THE SYLLABUS

The syllabus is organised around broad content areas called Sections. The Sections are subdivided into topics. Each topic consists of general objectives, which give rise to specific objectives. The specific objectives describe what learners are expected to do.

SECTION 1

COMPUTER HARDWARE AND SOFTWARE

TOPIC	GENERAL OBJECTIVE	SPECIFIC OBJECTIVE
	Students should be able to:	***Students should be able to:***
Software	– **acquire knowledge on the different types of software.**	– **define the term software.** – **identify different categories of software.** – **compare different categories of software.**
	– **understand the functions of systems software.**	– **define functions of systems software.** – **distinguish between the different user interfaces.**
	– **demonstrate knowledge of**	– **identify a range of uses for application software.**

	application software.	– **identify main features of application software.** – **describe the tasks for which application software are best used.** – **describe advantages and disadvantages of different application packages.**

	– **demonstrate knowledge of a range of data processing packages.**	– **utilise basic features of a word processing application to create documents. (font type/size/style, page setup, text alignment, editing features, headers and footers, page numbers, proofing tools, text wrap, graphics, mail merge)** – **create documents using basic features of a spread sheet application.** – **utilise basic mathematical functions of a spread sheet (sum, count, average, maximum, minimum, what if analysis).** – **create and interpret graphs using a spread sheet.** – **utilise basic features of a database application to store and retrieve information.** – **manipulate information in a data base (add/delete/amend records, sort, query, import data, simple**

Hardware	– **acquire knowledge and understanding of hardware concepts.**	– **define the term hardware.** – **identify the hardware components of the computer system.**
	– **demonstrate an understanding of the microprocessor.**	– **state the components of the Central Processing Unit (CPU).** – **state the functions of components of CPU.**
	– **be familiar with the different categories of computers.**	– **list different categories of computers.** – **compare and contrast different categories of computers.** – **state the area of use for the each category of computers.**
	– **demonstrate knowledge of input devices.**	– **describe the use of input devices.** – **identify the uses of input devices.** – **describe the use of specialised input**

		devices.
	– **demonstrate knowledge of output devices.**	– **describe the use of output devices.** – **identify the uses of output devices.** – **compare different types of printers suitable for specific situations.** – **compare the suitability of display devices for specific situations.** – **identify the suitability of output devices to specific situations.**
	– **demonstrate knowledge of storage devices.**	– **describe data storage units.** – **describe the difference between primary storage and secondary storage.** – **differentiate between types of memory.** – **identify different types of secondary storage devices with their associated media.**

		– **identify the suitability of storage devices for specific situations.**
	– **demonstrate proper care and maintenance of computer Equipment.**	– **take good care of computer equipment.** – **identify effects of negligence to equipment.** – **describe the effects of negligence to equipment.**

SECTION 2

COMPUTER APPLICATIONS

TOPIC	GENERAL OBJECTIVES	SPECIFIC OBJECTIVES
	Students should be able to:	***Students should be able to:***
General and Commercial use	– **demonstrate an understanding of the use of computers in different situations.**	– **state the areas in which computers are used.** – **identify a range of commercial and general data processing packages.** – **describe how data processing is used in organisations.** – **identify the use of computers in a range of scientific, technical and industrial applications.**

Monitoring and control systems	– **show understanding of different monitoring and control systems.**	– **list examples of monitoring and control systems.** – **identify the implications of monitoring and control systems.** – **identify how microprocessors are used in domestic appliances.** – **discuss how automation is used in day to day life.** – **identify how microprocessors are used in industrial processes.** – **discuss how robotics is used in day to day life.**
Artificial Intelligence (AI)	– **appreciate the use of AI in different situations.**	– **state the different features of an expert system.** – **list a range of AI applications.** – **describe how organisations can use AI to make decisions.**
Other applications	– **be aware of the**	– **describe and use Computer Aided**

	use of computers in education and entertainment.	**Instruction (CAI).** – **describe and use Computer Aided Learning (CAL).** – **describe how computers are used in entertainment.**

Computer System security and data protection.	– **appreciate the need for data protection.**	– **identify the need for data protection.** – **describe the ways in which data can be protected.** – **choose an appropriate method of security for specific applications.** – **outline the content of data protection legislation.** – **state the implications of failing to comply with data protection legislation.**

	– **appreciate the need for computer systems security.**	– **identify different types of computer crime.** – **describe reasons why computer crime exists.** – **state how data protection legislation fights against computer crime.** – **identify physical system security methods.** – **explain the need for physical security systems.** – **choose an appropriate security system.**

	– appreciate the need for backing up data.	– identify the need for backup procedures. – describe the methods used in backing up data. – choose an appropriate backup procedure for different applications. – demonstrate the use of backup procedures.
	– acquire knowledge of computer viruses.	– identify the effects of viruses. – identify ways of infection. – describe methods of eradication. – describe methods of protection against viruses.
Communications and information systems (C&I)	– demonstrate knowledge and understanding of a range of C&I systems.	– list a number of C&I systems. – describe a number of C&I systems. – state the purposes for which C&I systems are used. – use a range of C&I systems.

	– **demonstrate an understanding of communication services.**	– **describe the various communication services available.** – **describe the internet.** – **describe the most common uses of the internet.** – **identify required resources to access the internet.** – **compare the intranet and internet.** – **discuss the implications of using the internet.**

SECTION 3

SOCIAL AND ECONOMIC IMPLICATIONS OF THE USE OF COMPUTERS

TOPIC	GENERAL OBJECTIVES	SPECIFIC OBJECTIVES
	Students should be able to:	***Students should be able to:***
Social Implications of the use of Computers	– **be familiar with the positive and negative effects of computers on people.**	– **identify health risks associated using computers** – **practice proper safety precautions when using computers** – **describe effects of computers on people.** – **analyse the positive and negative effects on people.**

Economic implications	– **be familiar with the positive and negative effects of computers on organisations.**	– **describe positive effects of using computers in organisations.** – **analyse positive effects of using computers in organisations.** – **describe the negative effects of using computers in organisations.** – **analyse negative effects of using computers in organisations.** – **describe the needs for skills upgrading.** – **outline the ways in which skills upgrading can be achieved.**

SECTION 4

SYSTEMS DEVELOPMENT LIFE CYCLE

TOPIC	GENERAL OBJECTIVE	SPECIFIC OBJECTIVE
	Students should be able to:	***Students should be able to:***
System Development Life Cycle	– **acquire knowledge on conducting an initial study**	– **identify the problem.** – **list system objectives.** – **state consequences of identified problems.**
	– **be familiar with components of a feasibility study report.**	– **identify and compare alternative solutions.** – **identify costs and benefits.** – **determine whether a solution is acceptable.** – **determine whether a solution is technically feasible.**

		– **propose a recommended solution.**
	– **acquire knowledge and skills of analysing an existing system.**	– **describe data gathering techniques.** – **establish current data processing used.** – **identify existing output.** – **identify existing input used.** – **identify current information storage facilities.** – **describe the current system.** – **state the strengths and weakness of current system.**
	– **acquire knowledge to design an information system.**	– **list output requirement for recommended system.** – **list input requirement for recommended system.** – **formulate file structure for the recommended system.** – **determine storage requirement for**

		recommended system. – **describe processing for recommended system.** – **identify system backup requirement.** – **describe required validation and verification techniques.** – **identify hardware required.** – **identify software required.** – **identify an appropriate user interface.**

	– acquire knowledge and skills of creating an information system.	– create a workable solution based on the recommended system. – test the system for accuracy of input and output. – produce the user documentation for the system. – collate technical documentation for the system.
	– acquire knowledge of various implementation strategies.	– describe the various implementation strategies. – identify an implementation strategy for the system. – identify user training needs.
	– show an understanding of how to evaluate and maintain an	– review the system against initial objectives. – update documentation in line with usage.

	information system.	– **identify future development of the system.** – **determine user support needs.**

SECTION 5

PROGRAMMING CONCEPTS

TOPIC	GENERAL OBJECTIVE	SPECIFIC OBJECTIVE
	Students should be able to:	***Students should be able to:***
Programming Concepts	– **demonstrate knowledge of programming techniques.**	– **describe structured programming techniques.** – **state the advantages of using structured programming techniques.**
	– **apply algorithm tools in solving problems.**	– **draw program flowcharts.** – **represent algorithms using pseudo code.** – **check algorithm logic using trace table.** – **describe the use of procedures/subroutines.**

		– **outline the importance of program annotations.** – **use annotation in pseudo code.**
	– **show understanding of different programming languages.**	– **state the differences between low level language and high level language.**
	– **show understanding of program translators.**	– **differentiate between program translators.** – **state the benefits of using different program translators.**

SECTION 6

DATA AND FILE MANAGEMENT

TOPIC	GENERAL OBJECTIVE	SPECIFIC OBJECTIVE
	Students should be able to:	***Students should be able to:***
Data and information	– **demonstrate knowledge of the data concepts.**	– **distinguish between analogue data and digital data.** – **identify the need for data converters.** – **describe how data is represented in the computer.** – **differentiate between data types** – **suggest uses for different data types**
	– **demonstrate knowledge of data entry techniques.**	– **describe methods of data collection.** – **describe methods of data capture.** – **state the reasons for using codes.**

		– **state advantages and disadvantages of different data entry methods.** – **identify suitable data entry methods for specific situations.**
	– **appreciate the use of data entry checks.**	– **distinguish between verification and validation.** – **state the importance of data entry checks.** – **perform validation checks.**
	– **understand the relationship between data and information.**	– **differentiate between data and information.** – **identify different ways presenting information.**
File organisation	– **show understanding of files.**	– **distinguish between different file components.** – **describe different types of file access with regard tapes and discs.** – **describe different type of files.**

SECTION 7

SYSTEMS AND COMMUNICATIONS

TOPIC	GENERAL OBJECTIVE	SPECIFIC OBJECTIVE
	Students should be able to:	*Students should be able to:*
Data communication	– acquire knowledge and understanding of network concepts.	– define the network concepts. – state the reasons for having networks. – list the disadvantages of having networks. – identify the differences between LAN and WAN.
	– show understanding of the use of communication	– describe the uses of communication hardware. – describe communication media. – compare the suitability of data

	hardware.	**transmission methods for specific situations.**
	– **show understanding of network protocols.**	– **define the term protocol.** – **describe the need for network protocol.**
	– **acquire knowledge of network topologies.**	– **describe with the aid of diagrams types of network topology.** – **state advantages and disadvantage of network topologies.**
Systems	– **be familiar with the different types of operating systems.**	– **distinguish between the different types of operating systems.** – **describe characteristics of real time system.** – **identify applications suitable for real time system.** – **state what a single user system is.** – **state what a multi-user system is.**

		– **explain how a multi-user system works.** – **identify application suitable for multi-user systems.** – **identify uses of data logging.** – **describe a control system.** – **identify the common features of a control system.** – **identify areas of application of control systems.** – **describe the minimum specification of a multimedia system.** – **describe areas of application of multimedia systems.**

SECTION 8

PROJECT

Projects should be problem solving ideas of practical life applications. The solution should be computer based. Teachers should be able to give necessary guidance and supervision to students in the choice and development of the project through all stages. The project may be divided into the following areas:-

1. The Problem: – this is where the student studies a situation to gather information about the problem.

- **Knowledge and understanding of the problem**
- **Analysis of the problem**
- **Evaluation of solutions to the problem**

2. The Candidate's Solution: - this is when the student actually develops a solution to the problem.

- **The candidate's solution of the problem**
- **Communication**

- **Analysis by the candidate**
- **Realisation**
- **User documentation**
- **Technical documentation**
- **Evaluation**
- **Technical Skill**

It is important for all schools to conduct some internal moderation of the project work to ensure that all candidates are assessed to a common standard. More information on the project will provided in the project guide.