



Republic of Zambia

**Ministry of Education**

# **INFORMATION AND COMMUNICATION TECHNOLOGY SYLLABUS SECONDARY ORDINARY LEVEL EDUCATION**



Developed by the Curriculum Development Centre  
**LUSAKA**



Republic of Zambia

Ministry of Education  
Directorate of Curriculum Development

The Curriculum Development Centre

# **INFORMATION AND COMMUNICATION TECHNOLOGY SYLLABUS SECONDARY ORDINARY LEVEL EDUCATION**

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FORM 1 TO FORM 4

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## VISION

Quality, lifelong education for all which is accessible, inclusive and relevant to individual, national and global needs and value systems.

# TABLE OF CONTENT

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|  |           |
|--|-----------|
| <b>VISION</b>                                | <b>ii</b> |
| <b>TABLE OF CONTENT</b>                      | <b>i</b>  |
| <b>PREFACE</b>                               | <b>i</b>  |
| <b>ACKNOWLEDGEMENTS</b>                      | <b>ii</b> |
| <b>Introduction</b>                          | <b>1</b>  |
| <b>Structure of the Syllabus</b>             | <b>1</b>  |
| <b>Teaching Methodology</b>                  | <b>1</b>  |
| <b>Time Allocation</b>                       | <b>2</b>  |
| <b>Assessment</b>                            | <b>2</b>  |
| Project Assessments:                         | 2         |
| Problem-Solving Exercises:                   | 2         |
| Class Participation and Collaboration:       | 3         |
| Portfolio Assessment:                        | 3         |
| Final Project Presentation:                  | 3         |
| Written Examinations:                        | 3         |
| <b>Alternative to Practical Examinations</b> | <b>4</b>  |
| Simulation Software:                         | 4         |
| Project-Based Assessments:                   | 4         |
| Oral Examinations:                           | 4         |
| Peer Reviews and Group Work:                 | 4         |
| Use of ICT Labs in Shifts:                   | 5         |
| Portfolio Assessments:                       | 5         |
| <b>Rationale</b>                             | <b>5</b>  |
| <b>Summary of Key Competences</b>            | <b>7</b>  |
| <b>Form 1</b> .....                          | <b>9</b>  |

|   |    |
|---|----|
| Summary of Key Competences Achieved in ICT for Form 1   | 22 |
| <i>Form 2</i> .....                                     | 23 |
| Summary of Key Competences Achieved in ICT for Form 2   | 27 |
| <i>Form 3</i> .....                                     | 27 |
| Summary of Key Competences Achieved in ICT for Form 3   | 29 |
| <i>Form 4</i> .....                                     | 30 |
| Summary of Key Competences                              | 33 |
| <i>APPENDICES</i> .....                                 | 35 |
| Scope and Sequence of ICT Curriculum (Form 1 to Form 4) | 35 |

## PREFACE

It is with great pride and a deep sense of commitment to the future of our nation that I introduce the Information and Communication Technology (ICT) curriculum for our secondary schools. As the Minister of Education, I am acutely aware of the transformative power of technology in today's world. The integration of ICT into our education system is not merely a step forward; it is a leap towards preparing our learners for a future where digital literacy is paramount.

This ICT curriculum has been developed with the objective of equipping every learner with essential skills and knowledge in information and communication technologies. In an era where technology permeates every aspect of our lives, it is crucial that our learners are not only consumers of technology but also informed and proficient users. The curriculum is designed to foster critical thinking, creativity, and problem-solving skills, ensuring that our learners are well-prepared to meet the challenges and opportunities of the digital age.

The compulsory nature of this subject underscores our commitment to ensuring that no learner is left behind in the technological revolution. Every learner, regardless of background or future aspirations, will benefit from a strong foundation in ICT. This curriculum covers a broad range of topics including digital literacy, internet safety, programming, and the ethical use of technology. It is structured to be engaging, relevant, and aligned with the latest advancements in the field.

Our dedicated educators have been provided with comprehensive training and resources to deliver this curriculum effectively. The teaching methods employed are dynamic and interactive, encouraging learners to actively participate and engage with the material. We believe that through this approach, learners will not only gain theoretical knowledge but also practical skills that are applicable in real-world scenarios.

*I am confident that this ICT curriculum will play a pivotal role in shaping the future of our learners and our nation. I encourage learners to embrace this subject with enthusiasm and dedication, and I urge parents and guardians to support their children's journey in the vital field of ICT.*

Yours sincerely,

Joel Kamoko (Mr.)  
Permanent Secretary – Educational Services  
**MINISTRY OF EDUCATION**

## ACKNOWLEDGEMENTS

The development and implementation of the Information and Communication Technology (ICT) curriculum for secondary schools is a testament to the collaborative efforts of many dedicated individuals and organizations. As the Director for Curriculum Development, I am honored to acknowledge and express my deepest gratitude to everyone who has contributed to this significant initiative.

First and foremost, I extend my heartfelt thanks to the Minister of Education for their visionary leadership and unwavering support. Their commitment to advancing our education system and ensuring that our learners are prepared for the digital future has been the driving force behind this project.

I would like to express my sincere appreciation to the members of the Curriculum Development Committee. Their expertise, dedication, and hard work have been instrumental in crafting a curriculum that is both comprehensive and forward-thinking. Their ability to blend theoretical knowledge with practical application has ensured that this curriculum will be both engaging and effective for our learners.

Special thanks are due to our team of educators and ICT specialists who have provided invaluable insights and feedback throughout the development process. Their practical experience and innovative ideas have greatly enriched the curriculum, ensuring that it meets the needs of our diverse learner population.

I am also grateful to our partner institutions and organizations for their collaboration and support. Their contributions have been essential in providing the resources and technology needed to deliver this curriculum effectively in our schools.

Furthermore, I would like to acknowledge the valuable feedback and support from pilot schools and their communities. Their input has been crucial in refining the curriculum and ensuring its relevance and effectiveness.

Finally, I extend my gratitude to the learners, parents, and guardians for their enthusiasm and support. It is your commitment to education and your trust in our system that inspires us to continually strive for excellence.



This ICT curriculum represents a significant step forward in preparing our learners for the future. Together, we are building a foundation of digital literacy and technological proficiency that will empower our learners to succeed in an increasingly digital world.

Thank you all for your invaluable contributions and support.

Sincerely,

Charles Ndakala (Dr.)  
Director – Directorate of Curriculum Development  
**MINISTRY OF EDUCATION**

## Introduction

The Information and Communication Technology (ICT) curriculum for secondary schools has been developed to provide learners with essential digital literacy skills and knowledge. Recognizing the integral role of technology in modern society, this compulsory subject aims to equip all learners with the ability to use ICT effectively and responsibly. The curriculum is designed to foster critical thinking, creativity, and problem-solving skills, preparing learners to navigate and thrive in a technology-driven world. Topics on entrepreneurship and financial education ensures that learners develop financial and entrepreneurial skills while applying ICT.

## Structure of the Syllabus

The syllabus is structured to cover a wide range of ICT topics, ensuring a comprehensive understanding of the field. Key modules include:

**Digital Literacy Skills:** Basics of computer operation, internet use, and software applications.

Programming: Introduction to coding languages and developing problem-solving skills through programming.

Data Management: Understanding data collection, storage, and analysis.

Cybersecurity: Basics of protecting information and systems from digital threats.

Networks and Communication: Principles of computer networks, internet, and communication technologies.

Ethical and Societal Implications: Examining the impact of technology on society and discussing ethical issues.

## Teaching Methodology

The teaching methodology for the ICT curriculum focuses on active learning and practical application. Key approaches include:

Interactive Lessons: Engaging learners through discussions, demonstrations, and multimedia resources.

Hands-on Projects: Providing opportunities for learners to apply concepts through practical projects and exercises.  
Collaborative Learning: Encouraging group work and peer-to-peer learning to enhance teamwork and communication skills.

Blended Learning: Integrating online resources and tools to complement traditional classroom instruction.

Problem-Based Learning: Using real-world problems to develop critical thinking and problem-solving skills.

## Time Allocation

The ICT curriculum is designed to be flexible yet comprehensive, with recommended time allocations as follows:

Weekly Classes: Four periods per week, each lasting 60 minutes.

Practical Sessions: Additional laboratory or computer lab sessions to reinforce hands-on learning.

Project Work: Dedicated time for learners to work on individual and group projects throughout the term.

## Assessment

Assessment shall be done by the Examinations Council of Zambia (ECZ). The ECZ may develop assessment syllabi based on this syllabus. Assessment in the ICT curriculum is designed to evaluate both theoretical understanding and practical skills. Assessment methods include:

### Project Assessments:

Evaluate learners based on the completion and quality of their programming projects.

Consider creativity, functionality, and adherence to best practices.

Assessment of individual and group projects based on creativity, functionality, and presentation.

### Problem-Solving Exercises:

Assess learners' ability to apply computational thinking and problem-solving skills to new challenges. Include open-ended questions that require critical thinking. Regular quizzes, assignments, and class participation.

### **Class Participation and Collaboration:**

Assess engagement in class discussions, collaboration on coding exercises, and willingness to share knowledge with peers.

### **Portfolio Assessment:**

Have learners maintain a portfolio showcasing their coding projects, solutions, and reflections on their learning journey.

### **Final Project Presentation:**

Culminate the course with a final project presentation where learners demonstrate their skills, explain their project choices, and answer questions.

### **Written Examinations:**

Assess theoretical knowledge through written examinations covering topics such as Productivity software, basic networking concepts, and operating systems, basics of cybersecurity, algorithms, data structures, and ICT concepts.

Hands-on tests and exams to evaluate problem-solving skills.

Final Examination: A comprehensive written final examination covering all modules of the syllabus.

## Alternative to Practical Examinations

For schools that may not have adequate computers for all learners, alternative assessment methods shall be employed to ensure that practical skills are still evaluated effectively. These alternatives include:

### **Simulation Software:**

Utilize simulation software that mimics real-world computing environments, allowing learners to practice coding, data management, and other ICT skills on fewer computers or even on personal devices outside of school.

### **Paper-Based Practical Tasks:**

Design paper-based practical tasks where learners outline step-by-step processes for solving problems using ICT tools. These tasks can include writing code snippets, designing network diagrams, or planning data management strategies.

### **Project-Based Assessments:**

Assign project-based assessments where learners work on theoretical projects that require them to plan and design ICT solutions. These projects can be assessed based on their understanding of concepts, problem-solving approaches, and creativity.

### **Oral Examinations:**

Conduct oral examinations where learners explain how they would perform certain practical tasks. This can include describing coding logic, explaining how to secure a network, or detailing steps for data analysis.

### **Peer Reviews and Group Work:**

Encourage peer reviews and group work to leverage collaborative learning. Learners can present their work to classmates, who then provide feedback based on set criteria. This method promotes understanding through teaching and discussion.

### **Use of ICT Labs in Shifts:**

If a limited number of computers are available, organize learners into shifts to ensure each learner gets adequate hands-on time. This can be supplemented with guided instruction during non-computer times.

### **Portfolio Assessments:**

Have learners compile a portfolio of their work throughout the course. This portfolio can include written assignments, project plans, and reflections on their learning process. It provides a comprehensive view of their understanding and progress.

By implementing these alternatives, schools can ensure that all learners are assessed fairly and comprehensively, even in environments with limited resources. These methods aim to maintain the integrity and effectiveness of the ICT curriculum while providing equitable opportunities for all learners.

## **Rationale**

Learning Information and Communication Technology (ICT) at secondary school provides learners with a range of valuable skills and knowledge that are essential in today's digital world. The following are some of the key rationales why learners should learn ICT at this level:

Digital Literacy: ICT education equips learners with the fundamental skills necessary to navigate and thrive in an increasingly digital society. This includes understanding how to use computers, the internet, and various software applications effectively and responsibly.

**Preparation for the Workforce:** In virtually every field, digital skills are becoming indispensable. Whether learners pursue careers in technology, business, healthcare, or the arts, proficiency in ICT is often a prerequisite. Learning ICT in secondary school provides a solid foundation for future employment opportunities.

**Enhanced Learning Experience:** ICT can be integrated across various subjects to enhance teaching and learning experiences. From conducting research online to creating multimedia presentations, ICT offers learners new ways to engage with and understand academic content.

**Critical Thinking and Problem-Solving:** ICT education encourages learners to think critically and solve problems creatively. When faced with technical challenges or tasked with developing digital solutions, learners learn to analyze problems, identify relevant information, and devise effective strategies to address them.

**Communication and Collaboration:** ICT fosters communication and collaboration skills, which are essential for success both in school and beyond. Through online platforms, learners can collaborate with peers on projects, communicate with teachers outside of class, and engage with experts and resources from around the world.

**Preparation for Further Education:** Many tertiary education institutions incorporate ICT into their programs, and proficiency in these skills can be advantageous for learners pursuing higher education. Whether learners are conducting research, participating in online courses, or collaborating with peers, ICT proficiency can facilitate their academic success.

**Empowerment and Participation in Society:** In today's interconnected world, digital literacy is essential for civic engagement and participation. ICT education empowers learners to become active and informed citizens who can critically evaluate information, engage in online discourse, and leverage technology to advocate for causes they believe in.

**Adaptability and Lifelong Learning:** Technology is constantly evolving, and the skills learners learn in ICT classes equip them with the adaptability and resilience needed to thrive in a rapidly changing world. By fostering a mindset of lifelong learning and adaptation, ICT education prepares learners to succeed in whatever future endeavours they pursue.

In summary, learning ICT at secondary school is essential for equipping learners with the skills, knowledge, and mindset needed to thrive in a digital world, both academically and professionally.

The following is the outline of ICT syllabuses at secondary school level.

## Summary of Key Competences

By the end of the 4-year secondary course the learners are expected to have acquired the following key competences in ICT:

| Competencies                      | Descriptors   |
|-----------------------------------|---|
| <b>Analytical</b>                 | Ability to break down complex ICT problems into smaller components, interpret data, and make informed decisions based on evidence.                        |
| <b>Communication</b>              | Use ICT tools and platforms to effectively share information, ideas, and solutions through various digital mediums, ensuring clarity and coherence.       |
| <b>Collaboration</b>              | Work effectively in teams using digital collaboration tools, contributing to shared goals while respecting diverse perspectives.                          |
| <b>Creativity and Innovation</b>  | Develop innovative solutions to real-world problems by leveraging ICT tools, and creatively apply technology to design new products or services.          |
| <b>Critical Thinking</b>          | Evaluate information critically from multiple sources, analyse technological solutions, and assess their impact on society and personal life.             |
| <b>Digital Literacy</b>           | Demonstrate proficiency in using digital devices, software, and the internet responsibly, securely, and ethically for academic and professional purposes. |
| <b>Entrepreneurship</b>           | Use ICT to identify business opportunities, create digital business models, and manage online platforms for entrepreneurial ventures.                     |
| <b>Environment Sustainability</b> | Utilize ICT tools to promote sustainable practices, reduce electronic waste, and advocate for environmentally responsible technology usage.               |



| Competencies                  | Descriptors   |
|-------------------------------|---|
| <b>Financial Education</b>    | Apply ICT in managing personal and business finances, including budgeting, digital banking, and understanding financial tools and risks in online transactions. |
| <b>Problem Solving</b>        | Identify challenges in ICT systems or applications and develop practical, efficient, and innovative solutions using technology.                                 |
| <b>Citizenship</b>            | Demonstrate responsible use of technology as a digital citizen, adhering to ethical standards, online etiquette, and respecting cultural diversity.             |
| <b>Emotional Intelligence</b> | Use ICT to manage emotions and relationships effectively, including tools for self-awareness, empathy, and constructive communication in digital environments.  |

These descriptors ensure that learners not only gain technical knowledge but also develop skills critical for personal, societal, and professional growth in an ICT-driven world.

# Form 1

| Topic                            | Sub-Topic                                | Specific Competences   | Learning Activities  | Expected Standard  |
|----------------------------------|--|--|--|--|
| <b>1.1 Introduction to ICT</b>   | <b>1.1.1 Role of ICT in Daily Life</b>   | 1.1.1.1 Explain the importance of ICT in communication, education, and business. | <ul style="list-style-type: none"> <li>• Discussing real-life examples of ICT use in group activities.</li> <li>• Creating a poster showing ICT applications.</li> </ul> <p>videos demonstrating ICT in various industries.</p> <ul style="list-style-type: none"> <li>• Conduct a class survey on ICT tools used at home.</li> <li>• Writing a short essay about the impact of ICT on education.</li> </ul> | Learners appreciate and articulate the relevance of ICT. |
| <b>Introduction to ICT</b>       | <b>1.1.2 Types of ICT Tools</b>          | 1.1.2.1 Identify various ICT tools and their purposes.                           | <ul style="list-style-type: none"> <li>• Match ICT tools to their respective functions in a worksheet.</li> <li>• Demonstrate the use of basic tools (e.g., email).</li> <li>• Creating a chart categorizing ICT tools into hardware and software.</li> <li>• Visit an ICT store or website to explore modern tools.</li> <li>• Role-play scenarios using different ICT tools.</li> </ul>                    | Learners identify and use ICT tools appropriately.       |
| <b>1.2 Basic Computer Skills</b> | <b>1.2.1 Using Software Applications</b> | 2.2.1 Use basic software like word processors and spreadsheets.                  | <ul style="list-style-type: none"> <li>• Creating a simple document and format it.</li> <li>• Enter data into a spreadsheet and apply basic formatting.</li> </ul>   | Learners navigate and use software tools with ease.      |

| Topic  | Sub-Topic             | Specific Competences  | Learning Activities   | Expected Standard   |
|--|-----------------------|---|---|---|
|  |                       |   | <ul style="list-style-type: none"> <li>• Creating a table to track daily activities in a spreadsheet.</li> <li>• Exploring templates available in office software for specific tasks.</li> <li>• Share a document using email or a cloud platform.</li> </ul>   |   |
| <b>1.3. Types and Components of Computer Systems</b> | <b>1.3.1 Hardware</b> | <p><b>1.3.1.1</b> Identify and name basic hardware components (CPU, RAM, ROM, input/output devices).</p> <p><b>1.3.1.2</b> Describe the role of each component in computer operation.</p> <p><b>1.3.1.3</b> Compare and contrast internal and external hardware components.</p> | <ol style="list-style-type: none"> <li><b>1. Hardware Identification and Labeling</b> <ul style="list-style-type: none"> <li>○ Provide learners with a disassembled computer or images of its components.</li> <li>○ Ask them to identify and label each hardware component, such as the CPU, RAM, ROM, and input/output devices.</li> <li>○ Include a guided worksheet with descriptions and hints for each part to facilitate learning.</li> </ul> </li> <li><b>2. Interactive Digital Simulation</b> <ul style="list-style-type: none"> <li>○ Using an online computer assembly simulator or software to allow learners to virtually explore and assemble a computer.</li> <li>○ Learners can drag and drop components into their appropriate slots and receive feedback on their placement.</li> <li>○ Encourage discussions about the purpose and function of each component.</li> </ul> </li> </ol> | Learners can name, describe, and compare basic hardware components. |

| Topic | Sub-Topic | Specific Competences | Learning Activities   | Expected Standard |
|-------|-----------|----------------------|---|-------------------|
|       |           |                      | <p>3. <b>Scavenger Hunt Activity</b></p> <ul style="list-style-type: none"> <li>○ Creating a classroom scavenger hunt where learners search for hardware components (or images) placed around the room.</li> <li>○ Each station can have a card describing the component's function and importance.</li> <li>○ Learners can record their findings and share them with the group afterward.</li> </ul> <p>4. <b>Group Presentation Task</b></p> <ul style="list-style-type: none"> <li>○ Divide learners into small groups and assign each group a hardware component (e.g., CPU, RAM, ROM, input/output devices).</li> <li>○ Groups research their assigned component and Creating a short presentation with visuals explaining its role in a computer system.</li> <li>○ Presentations can include diagrams, examples, and real-world applications of the component.</li> </ul> <ul style="list-style-type: none"> <li>● Using visual aids to identify and label hardware components.</li> </ul> |                   |

| Topic                                | Sub-Topic                  | Specific Competences   | Learning Activities  | Expected Standard   |
|--------------------------------------|----------------------------|--|--|---|
|                                      |                            |  | <ul style="list-style-type: none"> <li>Performing a hands-on activity where learners open a computer and identify internal components.</li> <li>Watching a video explaining the role of CPU and RAM.</li> <li>Completing a quiz on identifying different hardware components.</li> <li>Discussing the importance of each hardware component in computer operation.</li> </ul>  |   |
| <b>1.4. Input and Output Devices</b> | <b>1.4.1 Input Devices</b> | <p><b>2.4.1.1</b> Identify and name different input devices (keyboard, mouse, scanner, etc.).</p> <p><b>2.4.1.2</b> Explain the function of each input device and its advantages.</p> <p><b>2.4.1.3</b> Demonstrate the use of common input devices in practice.</p> | <ol style="list-style-type: none"> <li><b>Show-and-Tell Session</b> <ul style="list-style-type: none"> <li>Provide learners with real input devices (e.g., keyboard, mouse, scanner, microphone, joystick) or images of these devices.</li> <li>Ask each learner to pick a device, identify its name, and explain its function to the class.</li> <li>This activity encourages hands-on interaction and verbal communication skills.</li> </ul> </li> <li><b>Input Device Matching Game</b> <ul style="list-style-type: none"> <li>Creating cards with pictures of input devices and separate cards with their names.</li> <li>Have learners match the pictures with their correct names.</li> <li>To add variety, include a brief description of the function on the</li> </ul> </li> </ol> | Learners can identify, explain, and demonstrate the use of input devices. |

| Topic | Sub-Topic | Specific Competences | Learning Activities  | Expected Standard |
|-------|-----------|----------------------|--|-------------------|
|       |           |                      | <p>name cards, and learners can match all three components.</p> <p>3. <b>Interactive Presentation or Quiz</b></p> <ul style="list-style-type: none"> <li>Using a digital presentation or educational software to show images or animations of input devices.</li> <li>Include a quiz where learners choose the correct name from a list or type in the name of the device shown on the screen.</li> <li>Gamify the quiz by awarding points for correct answers to make it more engaging.</li> </ul> <p>4. <b>Scavenger Hunt Activity</b></p> <ul style="list-style-type: none"> <li>Arrange a classroom or computer lab scavenger hunt where learners locate and identify different input devices.</li> <li>Provide clues or a checklist to guide them in identifying the devices.</li> <li>Learners can then group together and discuss the function of each device they found.</li> <li>Using a computer to practice typing on a keyboard and scanning documents.</li> </ul> |                   |

| Topic                                | Sub-Topic                   | Specific Competences  | Learning Activities  | Expected Standard  |
|--------------------------------------|-----------------------------|---|--|--|
|                                      |                             |   | <ul style="list-style-type: none"> <li>Observing and discuss the differences in input devices (e.g., touchscreen vs. mouse).</li> <li>Practicing using a scanner to digitize physical documents.</li> <li>Using a voice recognition tool to practice inputting text.</li> <li>Creating a comparison chart of input devices and their uses.</li> </ul>  |  |
| <b>1.4. Input and Output Devices</b> | <b>1.4.2 Output Devices</b> | <p><b>2.4.2.1</b> Identify and name different output devices (keyboard, mouse, scanner, etc.).</p> <p><b>2.4.2.2</b> Explain the function of each output device and its advantages.</p> <p><b>2.4.2.3</b> Demonstrate the use of common output devices in practice.</p> | <ol style="list-style-type: none"> <li><b>Classroom Show-and-Tell</b><br/>Bring various output devices to class (e.g., monitor, printer, speakers) and ask learners to identify and name them as you explain their functions.</li> <li><b>Device Matching Game</b><br/>Preparing cards with pictures of output devices and cards with their names. Let learners match the picture to the correct name in groups or pairs.</li> <li><b>Real-Life Observation</b><br/>Take learners to a computer lab or library and ask them to point out output devices they can see. They can write down the names and functions of each.</li> <li><b>Labelling Diagrams</b><br/>Provide worksheets with images of computers and their connected</li> </ol> | Learners can identify, explain, and demonstrate the use of output devices. |

| Topic                                | Sub-Topic                             | Specific Competences  | Learning Activities   | Expected Standard                                    |
|--------------------------------------|---------------------------------------|---|---|--|
|                                      |                                       |   | <p>devices. Ask learners to label the output devices in the diagram.</p> <p>5. <b>Group Discussions and Presentations</b><br/>           Divide learners into groups, assign each group an output device, and have them research its purpose. They can then present their findings to the class.</p> <ul style="list-style-type: none"> <li>• Using a scanner to practice scanning documents to monitor.</li> <li>• Observe and Discussing the differences in output devices (e.g. monitor, printer).</li> <li>• Practicing using a scanner to digitize physical documents.</li> <li>• Using a voice recognition tool to practice inputting text.</li> <li>• Creating a comparison chart of output devices and their uses.</li> </ul> |  |
| <b>1.4. Input and Output Devices</b> | <b>1.1.3 Introduction to Hardware</b> | 1.1.3.1 Differentiate between input, output, and storage devices. | <ul style="list-style-type: none"> <li>• Labelling parts of a computer system in a diagram.</li> <li>• Visiting a computer lab to identify components.</li> <li>• Building a hardware model using cardboards and labels.</li> </ul>   | Learners categorize hardware components effectively. |



| Topic                                | Sub-Topic                                | Specific Competences   | Learning Activities   | Expected Standard  |
|--------------------------------------|--|--|---|--|
|                                      |  |  | <ul style="list-style-type: none"> <li>Discussing how hardware works together during a task (e.g., printing a document).</li> <li>Watching a documentary about the evolution of computer hardware.</li> </ul>   |  |
| <b>1.4. Input and Output Devices</b> | <b>1.4.2 Role of ICT in Daily Life</b>   | 4.2.1 Explain the importance of ICT in communication, education, and business. | <ul style="list-style-type: none"> <li>Discussing real-life examples of ICT use in group activities.</li> <li>Creating a poster showing ICT applications.</li> <li>Watching videos demonstrating ICT in various industries.</li> <li>Conduct a class survey on ICT tools used at home.</li> <li>Writing a short essay about the impact of ICT on education.</li> </ul>                | Learners appreciate and articulate the relevance of ICT. |
|                                      | <b>1.4.3 Types of ICT Tools</b>          | 4.3.1 Identify various ICT tools and their purposes.                           | <ul style="list-style-type: none"> <li>Matching ICT tools to their respective functions in a worksheet.</li> <li>Demonstrate the use of basic tools (e.g., email).</li> <li>Creating a chart categorizing ICT tools into hardware and software.</li> <li>Visiting an ICT store or website to explore modern tools.</li> <li>Role-play scenarios using different ICT tools.</li> </ul> | Learners identify and use ICT tools appropriately.       |
| <b>1.5 Utility tools</b>             | <b>1.5.1 Using Software Applications</b> | 1.5.1.1 Use basic software like word processors and spreadsheets.              | <ul style="list-style-type: none"> <li>Creating a simple document and format it.</li> </ul>   | Learners navigate and use software tools with ease.      |

| Topic                       | Sub-Topic                              | Specific Competences  | Learning Activities   | Expected Standard  |
|-----------------------------|--|---|---|--|
|                             |  |   | <ul style="list-style-type: none"> <li>• Entering data into a spreadsheet and applying basic formatting.</li> <li>• Creating a table to track daily activities in a spreadsheet.</li> <li>• Exploring templates available in office software for specific tasks.</li> <li>• Share a document using email or a cloud platform.</li> </ul>  |  |
| <b>1.6. File Management</b> | <b>1.6.1 Basics of File Management</b> | <b>1.6.1.1</b> Organize and manage files and folders effectively.<br><b>1.6.1.2</b> Apply appropriate file naming conventions.<br><b>1.6.1.3</b> Demonstrate safe file handling practices (deleting, renaming, moving files). | <ol style="list-style-type: none"> <li><b>1. Creating Folders and Subfolders</b> <ul style="list-style-type: none"> <li>○ Teach learners to create a main folder and organize files into subfolders based on topics, subjects, or file types.</li> <li>○ Example: Create a folder named "Schoolwork" with subfolders like "Math," "Science," and "ICT."</li> </ul> </li> <li><b>2. Naming Files and Folders</b> <ul style="list-style-type: none"> <li>○ Practicing using descriptive and consistent names for files and folders.</li> <li>○ Example: Name a document "ICT_Class_Notes_2025" instead of "Document1."</li> </ul> </li> <li><b>3. File Sorting and Searching</b> <ul style="list-style-type: none"> <li>○ Introduce sorting files by name, date, or size.</li> <li>○ Teach learners how to use the search bar to quickly locate a specific file or folder.</li> </ul> </li> </ol> | Learners can organize and manage files effectively and safely. |

| Topic | Sub-Topic | Specific Competences | Learning Activities   | Expected Standard |
|-------|-----------|----------------------|---|-------------------|
|       |           |                      | <p>4. <b>Copying, Moving, and Deleting Files</b></p> <ul style="list-style-type: none"> <li>○ Demonstrate how to copy files to a different folder, move files into folders, and delete unnecessary files while avoiding accidental deletion of important ones.</li> </ul> <p>5. <b>Backing Up Files</b></p> <ul style="list-style-type: none"> <li>○ Teach learners to back up their files using external storage (e.g., USB drive) or cloud storage services (e.g., Google Drive).</li> <li>○ Discussing the importance of saving files regularly to prevent data loss.</li> </ul> <ul style="list-style-type: none"> <li>● Create folders and subfolders to organize files.</li> <li>● Practicing renaming, copying, moving, and deleting files.</li> <li>● Using cloud storage to upload and organize files.</li> <li>● Discussing and demonstrate file naming best practices.</li> <li>● Practicing organizing files for a class project and share them with a peer.</li> </ul> |                   |

| Topic  | Sub-Topic                                   | Specific Competences   | Learning Activities   | Expected Standard  |
|--|---|--|---|--|
| <b>1.7. Basic Internet and Online Tools</b>  | <b>1.7.1 Introduction to the Internet</b>   | <b>1.7.1.1</b> Understand how the internet works.<br><b>1.7.1.2</b> Use a web browser to search and navigate websites.<br><b>1.7.1.3</b> Apply basic online safety practices.                    | <ul style="list-style-type: none"> <li>Using a web browser to access educational websites and conduct a search.</li> <li>Identifying and Using popular search engines.</li> <li>Discussing the importance of using strong passwords and browsing safely.</li> <li>Practicing using online learning tools (e.g., Google Classroom).</li> <li>Demonstrate navigating websites for academic purposes.</li> </ul>   | Learners can use a browser effectively and practice online safety.       |
| <b>1.8. Introduction to Digital Literacy</b> | <b>1.8.1 Understanding Digital Literacy</b> | <b>1.8.1.1</b> Understand the importance of digital literacy.<br><b>1.8.1.2</b> Identify and use basic digital tools.<br><b>1.8.1.3</b> Practice ethical use of technology in academic settings. | <ol style="list-style-type: none"> <li><b>Exploring Digital Devices</b> <ul style="list-style-type: none"> <li>Activity: Allow learners to interact with various digital devices like computers, tablets, and smartphones. They will identify the main components (e.g., screen, keyboard, mouse) and Discussing their uses in daily life.</li> <li>Objective: Build familiarity with digital devices and their role in communication and productivity.</li> </ul> </li> <li><b>Internet Scavenger Hunt</b> <ul style="list-style-type: none"> <li>Activity: Create a guided scavenger hunt where learners search for specific, age-appropriate information online, such as facts about their favorite animals or school subjects.</li> </ul> </li> </ol> | Learners can demonstrate understanding and ethical use of digital tools. |

| Topic | Sub-Topic | Specific Competences | Learning Activities  | Expected Standard |
|-------|-----------|----------------------|--|-------------------|
|       |           |                      | <ul style="list-style-type: none"> <li>Objective: Teach learners how to find and evaluate reliable information online.</li> <li>3. <b>Email Writing Simulation</b> <ul style="list-style-type: none"> <li>Activity: Simulate an email exchange where learners practice sending, replying to, and organizing emails. Using scenarios like writing to a teacher or sharing ideas with a friend.</li> <li>Objective: Help learners understand the role of digital communication and its proper etiquette.</li> </ul> </li> <li>4. <b>Digital Safety Poster Creation</b> <ul style="list-style-type: none"> <li>Activity: In groups, have learners design a poster on safe online practices, such as protecting passwords, identifying scams, and avoiding inappropriate content.</li> <li>Objective: Introduce the importance of online safety and responsible behaviour.</li> </ul> </li> <li>5. <b>Digital Literacy in Everyday Life Discussion</b> <ul style="list-style-type: none"> <li>Activity: Lead a class discussion on how digital skills are used in careers, education, and daily activities. Learners can brainstorm examples like using computers for</li> </ul> </li> </ul> |                   |

| Topic                                      | Sub-Topic                            | Specific Competences   | Learning Activities   | Expected Standard  |
|--|--------------------------------------|--|---|--|
|  |                                      |  | <p>work, apps for entertainment, or digital platforms for learning.</p> <ul style="list-style-type: none"> <li>○ Objective: Emphasize the real-world significance of digital literacy.</li> <li>• Watching videos on digital literacy.</li> <li>• Complete exercises using word processors, spreadsheets, and presentations.</li> <li>• Discussing responsible and ethical use of technology.</li> <li>• Creating a digital portfolio showcasing their learning tools.</li> <li>• Reflect on the importance of digital literacy in daily life.</li> </ul> |  |
| <b>1.9 Introduction to ICT in Business</b> | <b>1.9.1 Role of ICT in business</b> | <b>1.9.1.1</b> Explaining how ICT is used in financial management, e-commerce, and record-keeping. | <ul style="list-style-type: none"> <li>• Researching case studies of businesses using ICT in finance and entrepreneurship</li> <li>• Discussing the role of ICT in managing business finances</li> <li>• Watching videos on digital finance applications</li> <li>• Interviewing local entrepreneurs on ICT use in business</li> <li>• Presenting findings on ICT's impact on financial management</li> </ul>   | Learners understand the impact of ICT in business and financial management |

## Summary of Key Competences Achieved in ICT for Form 1

| Competence                                    | Descriptor   |
|---|--|
| Understanding Components of Computer Systems  | Learners identify and describe the functions of input, output, storage devices, and the CPU.       |
| Basic File Management Skills                  | Learners create, organize, and manage files and folders effectively.                               |
| Introduction to Operating Systems             | Learners understand the purpose of operating systems and perform basic navigation tasks.           |
| Effective Use of Input and Output Devices     | Learners use devices like keyboards, mice, monitors, and printers appropriately.                   |
| Awareness of Emerging Technologies            | Learners recognize the applications of emerging ICT technologies in various domains.               |
| Basic Networking Concepts                     | Learners identify basic networking components and explain the purpose of networks.                 |
| Introduction to Safety and Security Practices | Learners follow safe practices when using ICT equipment and understand the need for securing data. |
| Understanding ICT Applications                | Learners identify common ICT applications in education, business, and daily life.                  |

## Form 2

| Topic                      | Sub-Topic                             | Specific Competences   | Learning Activities  | Expected Standard  |
|----------------------------|---------------------------------------|--|--|--|
| <b>2.1 File Management</b> | <b>2.1.1 Advanced File Management</b> | <b>2.1.1.1</b> Compress files and folders for efficient storage.<br><b>2.1.1.2</b> Apply encryption to protect sensitive files.<br><b>2.1.1.3</b> Demonstrate the process of backing up and restoring files.   | <ul style="list-style-type: none"> <li>Compress files into a ZIP folder and practice extracting files.</li> <li>Discussing and demonstrate file encryption methods.</li> <li>Practicing transferring large files via email or cloud storage.</li> <li>Creating a backup strategy using external drives or cloud services.</li> <li>Identify and manage file versions for project work.</li> </ul>    | Learners can effectively manage file compression, encryption, and backups. |
| <b>2.2 Layout</b>          | <b>2.2.1 Page Layout Basics</b>       | <b>2.2.1.1</b> Creating documents with customized page layouts (margins, orientation, columns).<br><b>2.2.1.2</b> Insert images and manage their alignment in documents.<br><b>2.2.1.3</b> Design professional-looking layouts for different purposes (reports, flyers). | <ul style="list-style-type: none"> <li>Creating a document with customized margins, columns, and page orientation.</li> <li>Insert images and captions in a layout-friendly manner.</li> <li>Design a flyer with a professional layout for an event.</li> <li>Add headers, footers, and page numbers to the document.</li> <li>Using tables to organize data effectively in the document.</li> </ul> | Learners can design and adjust page layouts for different document types.  |
| <b>2.3 Spreadsheets</b>    | <b>2.3.1 Basic Spreadsheets</b>       | <b>2.3.1.1</b> Create simple spreadsheets and enter data.<br><b>2.3.1.2</b> Use basic functions such as SUM, AVERAGE, and COUNT.<br><b>2.3.1.3</b> Format spreadsheets for   | <ul style="list-style-type: none"> <li>Creating a basic spreadsheet with learner names and grades.</li> <li>Using the SUM and AVERAGE functions to calculate class scores.</li> <li>Creating a simple budget spreadsheet.</li> </ul>   | Learners can create and format simple spreadsheets for data analysis.      |



| Topic                                  | Sub-Topic                                | Specific Competences  | Learning Activities   | Expected Standard  |
|--|--|---|---|--|
|  |  | better readability and presentation.  | <ul style="list-style-type: none"> <li>• Insert data and Practicing sorting it alphabetically or numerically.</li> <li>• Add borders, colors, and bold text to format the spreadsheet for clarity.</li> </ul>   |  |
| <b>2.4 Digital Communication Tools</b> | <b>2.4.1 Email and Instant Messaging</b> | <p><b>2.4.1.1</b> Use email platforms to send, receive, and organize messages.</p> <p><b>2.4.1.2</b> Apply email etiquette in formal and informal communication.</p> <p><b>2.4.1.3</b> Use instant messaging tools for quick communication.</p> | <ul style="list-style-type: none"> <li>• Creating an email account and Practicing sending emails.</li> <li>• Send an email with attachments (files, images).</li> <li>• Discussing email etiquette and respond to emails appropriately.</li> <li>• Practicing using instant messaging apps for academic communication.</li> <li>• Organize emails into folders for easy retrieval.</li> </ul> | Learners can communicate professionally through email and instant messaging. |
| <b>2.5 Database Basics</b>             | <b>2.5.1 Introduction to Databases</b>   | 2.6.1.1 Explain the structure of databases (tables, fields, records).   | <ul style="list-style-type: none"> <li>• Creating a sample database in MS Access or LibreOffice Base.</li> <li>• Enter data into tables and Exploring basic queries.</li> <li>• Discussing real-world examples of databases.</li> <li>• Analysing existing database structures.</li> <li>• Writing a report on the importance of data organization.</li> </ul>                                | Learners understand basic database structure and use.                        |
|  | <b>2.5.2 Data Queries</b>                | 2.6.2.1 Perform simple queries to retrieve information.   | <ul style="list-style-type: none"> <li>• Using SQL commands to retrieve specific data (e.g., SELECT).</li> </ul> <p><b>1. Basic SELECT Queries:</b><br/>Provide a simple table (e.g., "Students")</p>   | Learners retrieve information efficiently from databases.                    |

| Topic | Sub-Topic | Specific Competences | Learning Activities  | Expected Standard |
|-------|-----------|----------------------|--|-------------------|
|       |           |                      | <p>with columns like Name, Age, and Class). Ask the learners to:</p> <ul style="list-style-type: none"> <li>○ Retrieve all the data using <code>SELECT *</code>.</li> <li>○ Retrieve only the names of students using <code>SELECT Name</code>.</li> </ul> <p>2. <b>Filtering with WHERE:</b><br/>Introduce a condition using the <code>WHERE</code> clause. For example:</p> <ul style="list-style-type: none"> <li>○ Retrieve students who are in Class 7 (<code>SELECT * FROM Students WHERE Class = 7</code>).</li> <li>○ Retrieve students older than 13 years (<code>SELECT * FROM Students WHERE Age &gt; 13</code>).</li> </ul> <p>3. <b>Using DISTINCT:</b><br/>Teach learners how to avoid duplicate results:</p> <ul style="list-style-type: none"> <li>○ Retrieve unique classes (<code>SELECT DISTINCT Class FROM Students</code>).</li> <li>○ Retrieve unique age values (<code>SELECT DISTINCT Age FROM Students</code>).</li> </ul> <p>4. <b>Sorting with ORDER BY:</b><br/>Ask learners to organize their results in ascending or descending order:</p> <ul style="list-style-type: none"> <li>○ Retrieve all students and order them by age (<code>SELECT * FROM Students ORDER BY Age ASC</code>).</li> </ul> |                   |

| Topic                              | Sub-Topic   | Specific Competences  | Learning Activities  | Expected Standard   |
|------------------------------------|---|---|--|---|
|                                    |   |   | <ul style="list-style-type: none"> <li>Retrieve all students and order them by name in descending order (<code>SELECT * FROM Students ORDER BY Name DESC</code>).</li> <li><b>5. Combining Columns and Aliases:</b><br/>Show how to use multiple columns and rename them for better understanding:               <ul style="list-style-type: none"> <li>Retrieve names and ages of students (<code>SELECT Name, Age FROM Learners</code>).</li> <li>Retrieve names and classes but rename columns in the output (<code>SELECT Name AS StudentName, Class AS ClassLevel FROM Students</code>).</li> </ul> </li> <li>Design a query to find learners with top scores.</li> </ul> |   |
| <b>2.6 Digital Financial Tools</b> | <b>2.6.1 Online banking, mobile money, financial apps</b> | <b>2.6.1.1</b> Using digital financial tools to manage transactions and budgets | <ul style="list-style-type: none"> <li>Practicing using financial apps like Excel and Google Sheets</li> <li>Simulating online banking and mobile money transactions</li> <li>Comparing different financial management apps</li> <li>Researching trends in digital finance</li> <li>Demonstrating how to budget using financial tools</li> </ul>   | Learners can use digital tools for financial transactions |

## Summary of Key Competences Achieved in ICT for Form 2

| Competence                           | Descriptor  |
|--------------------------------------|---|
| Advanced Computer Systems Components | Learners differentiate between types of memory and explain the role of multitasking in computers.         |
| Programming Basics                   | Learners write simple algorithms, pseudocode, and scripts in Python for arithmetic operations.            |
| Advanced File Management             | Learners demonstrate proficiency in organizing, sharing, and securing files using cloud storage.          |
| Introduction to Networks             | Learners explain types of networks, identify network components, and set up simple peer-to-peer networks. |
| Exploring ICT Applications           | Learners explore the use of ICT in specialized fields like healthcare, education, and business.           |
| ICT Safety Practices                 | Learners implement stronger safety measures, including recognizing potential cybersecurity threats.       |

## Form 3

| Topic                        | Sub-Topic                          | Specific Competences  | Learning Activities   | Expected Standard   |
|------------------------------|------------------------------------|---|---|---|
| <b>3.1 Website Authoring</b> | <b>3.1.1 Basic HTML and CSS</b>    | <b>3.1.1.1</b> Design and create simple web pages using HTML and CSS.<br><b>3.1.1.2</b> Apply basic styling to web pages using CSS.<br><b>3.1.1.3</b> Implement multimedia elements (images, videos, audio) in web pages. | <ul style="list-style-type: none"> <li>• Code a basic webpage with title, headings, paragraphs, and images.</li> <li>• Apply CSS styles to change font, color, and layout.</li> <li>• Embed multimedia elements such as videos and audio.</li> <li>• Creating a navigation menu with links to different sections.</li> <li>• Practicing making the webpage responsive using CSS media queries.</li> </ul> | Learners can design, code, and style basic web pages with multimedia.       |
| <b>3.2 Cloud Computing</b>   | <b>3.2.1 Introduction to Cloud</b> | <b>3.2.1.1</b> Understand and explain the concept of cloud computing.<br><b>3.2.1.2</b> Demonstrate how to store and share files using  | <ul style="list-style-type: none"> <li>• Upload and organize files on a cloud platform (Google Drive, OneDrive).</li> <li>• Share a file with a peer and practice collaborative editing.</li> </ul>   | Learners can effectively use cloud platforms for storage and collaboration. |

| Topic                                  | Sub-Topic                              | Specific Competences  | Learning Activities  | Expected Standard   |
|--|--|---|--|---|
|  |  | cloud platforms.<br><b>3.2.1.3</b> Explain the advantages and disadvantages of cloud storage.   | <ul style="list-style-type: none"> <li>Exploring the collaborative features of Google Docs.</li> <li>Research the advantages of cloud storage over physical storage devices.</li> <li>Using cloud storage for storing and sharing photos, documents, and videos.</li> </ul>  |   |
| <b>3.3 Spreadsheets</b>                | <b>3.3.1 Intermediate Spreadsheets</b> | <b>3.3.1.1</b> Use functions like COUNT, MIN, MAX for data analysis.<br><b>3.3.1.2</b> Create and format charts based on data.<br><b>3.3.1.3</b> Use conditional formatting to highlight data based on specific criteria. | <ul style="list-style-type: none"> <li>Using the COUNT and MIN functions to calculate data.</li> <li>Insert bar or pie charts based on given data.</li> <li>Using conditional formatting to highlight specific data points.</li> <li>Organize a class survey data and analyse results with Excel.</li> <li>Creating a gradebook with formulas to calculate averages and grades.</li> </ul> | Learners can use intermediate functions and create basic charts.          |
| <b>3.4 Introduction to Programming</b> | <b>3.4.1 Basics of Programming</b>     | <b>3.4.1.1</b> Understand basic programming concepts such as variables, loops, and functions.<br><b>3.4.1.2</b> Write simple programs using a beginner-friendly language like Scratch or Python.                          | <ul style="list-style-type: none"> <li>Watching tutorials on the basics of programming.</li> <li>Writing simple code in Scratch (or Python).</li> <li>Practicing creating a "Hello World" program.</li> <li>Creating a program that calculates the area of a rectangle.</li> <li>Implement loops and functions in a simple project.</li> </ul>   | Learners can understand and write basic programs using programming logic. |
| <b>3.5 Digital Security</b>            | <b>3.5.1 Cybersecurity Basics</b>      | <b>3.5.1.1</b> Understand the concept of cybersecurity and common threats (viruses, phishing, etc.).  | <ul style="list-style-type: none"> <li>Discussing common cybersecurity threats and how to avoid them.</li> </ul>   | Learners can identify common security threats and apply                   |

| Topic                                     | Sub-Topic   | Specific Competences  | Learning Activities  | Expected Standard                                  |
|---|---|---|--|--|
|   |   | <b>3.5.1.2</b> Implement basic cybersecurity practices (password management, virus protection). | <ul style="list-style-type: none"> <li>Using antivirus software to scan a computer for malware.</li> <li>Creating strong passwords using password managers.</li> <li>Practicing identifying phishing emails and suspicious links.</li> <li>Exploring the importance of data privacy and encryption.</li> </ul>       | basic protective measures.                         |
| <b>3.5 E-commerce and Online Business</b> | <b>3.5.1 Setting up an online business, digital marketing</b> | 3.5.1.1 Designing and managing an online business platform                                      | <ul style="list-style-type: none"> <li>Creating and managing a simple e-commerce website</li> <li>Practicing social media marketing strategies</li> <li>Researching successful online businesses</li> <li>Simulating online customer transactions</li> <li>Presenting a business plan for an online store</li> </ul> | Learners can create and promote an online business |

## Summary of Key Competences Achieved in ICT for Form 3

| Competence                           | Descriptor  |
|--------------------------------------|---|
| Advanced Networking Concepts         | Learners configure and troubleshoot advanced network setups and explain networking protocols.     |
| Intermediate Programming Skills      | Learners write structured Python programs using control structures, functions, and modules.       |
| Understanding ICT Systems Life Cycle | Learners explain the phases of systems development and design basic ICT systems.                  |
| Advanced ICT Applications            | Learners develop advanced solutions using ICT tools for data analysis and report generation.      |
| Cybersecurity Basics                 | Learners identify cyber threats and apply basic cybersecurity measures, such as secure passwords. |

## Form 4

| Topic                        | Sub-Topic                           | Specific Competences  | Learning Activities  | Expected Standard  |
|------------------------------|-------------------------------------|---|--|--|
| <b>4.1 Website Authoring</b> | <b>4.1.1 Advanced HTML and CSS</b>  | <b>4.1.1.1</b> Create multipage websites with navigation.<br><b>4.1.1.2</b> Use advanced CSS techniques to style websites (animations, transitions).<br><b>4.1.1.3</b> Implement interactive elements (forms, buttons, etc.) in websites. | <ul style="list-style-type: none"> <li>• Design a multipage website with navigation links and forms.</li> <li>• Apply responsive design techniques to optimize the site for mobile.</li> <li>• Using CSS to implement animations and transitions on the webpage.</li> <li>• Add forms for user input and Creating an interactive experience.</li> <li>• Test the website on different browsers and devices.</li> </ul> | Learners can design interactive, responsive multipage webes.                 |
| <b>4.2 File Management</b>   | <b>4.2.1 File Security</b>          | <b>4.2.1.1</b> Implement file security measures such as encryption and password protection.<br><b>4.2.1.2</b> Practice restoring files from backup.<br><b>4.2.1.3</b> Secure sensitive files using file compression and encryption tools. | <ul style="list-style-type: none"> <li>• Practicing password-protecting a document and folder.</li> <li>• Encrypt a file using software like 7-Zip or BitLocker.</li> <li>• Discussing and implement file backup procedures.</li> <li>• Practicing restoring files from a backup.</li> <li>• Creating and manage encrypted archives for sensitive data.</li> </ul>   | Learners can secure files using encryption and other file security measures. |
| <b>4.3 Spreadsheets</b>      | <b>4.3.1 Advanced Data Analysis</b> | <b>4.3.1.1</b> Use advanced spreadsheet functions like VLOOKUP, INDEX, and MATCH.<br><b>4.3.1.2</b> Create pivot tables for data summarization.   | <ul style="list-style-type: none"> <li>• Using VLOOKUP to retrieve data from a separate sheet.</li> <li>• Creating pivot tables to analyse large datasets.</li> <li>• Creating advanced charts like scatter plots and bubble charts.</li> </ul>  | Learners can apply advanced functions for data analysis and visualization.   |

| Topic                                      | Sub-Topic                                   | Specific Competences  | Learning Activities  | Expected Standard  |
|--|---|---|--|--|
|  |   | <b>4.3.1.3</b> Analyse and visualize data using advanced chart types.   | <ul style="list-style-type: none"> <li>Using conditional formatting to highlight data based on complex conditions.</li> <li>Perform trend analysis using different data visualization techniques.</li> </ul>   |  |
| <b>4.4 Advanced Programming Concepts</b>   | <b>4.4.1 Object-Oriented Programming</b>    | <b>4.4.1.1</b> Understand the principles of Object-Oriented Programming (OOP) like classes and objects.<br><b>4.4.1.2</b> Write programs using OOP principles in Python or another language.  | <ul style="list-style-type: none"> <li>Learn the concept of classes and objects with examples.</li> <li>Writing a Python program implementing classes and objects.</li> <li>Practicing inheritance and polymorphism concepts in OOP.</li> <li>Creating a simple project using OOP techniques.</li> <li>Discussing the advantages of using OOP in programming.</li> </ul> | Learners can implement basic Object-Oriented Programming concepts. |
| <b>4.5 Data Analysis and Visualization</b> | <b>4.5.1 Using Python for Data Analysis</b> | <b>4.5.1.1</b> Use Python libraries like Pandas and Matplotlib to analyse and visualize data.<br><b>4.5.1.2</b> Clean and prepare datasets for analysis.<br><b>4.5.1.3</b> Create visualizations (graphs, charts) to represent data findings. | <ul style="list-style-type: none"> <li>Using Pandas to load and clean a dataset.</li> <li>Creating basic plots using Matplotlib.</li> <li>Discussing the importance of data cleaning and pre-processing.</li> <li>Performing basic analysis on a dataset and visualize the results.</li> <li>Creating a report on findings using data analysis techniques.</li> </ul>    | Learners can analyse and visualize data using Python libraries.    |
| <b>4.6 Advanced Networking</b>             | <b>4.6.1 Network Protocols</b>              | <b>4.6.1.1</b> Explain how protocols (e.g., TCP/IP, HTTP) govern data exchange.   | <ul style="list-style-type: none"> <li>Analysing and explaining packet capture using tools like Wireshark.</li> <li>Discussing the roles of protocols in class.</li> <li>Creating a diagram of how data flows using network protocols.</li> <li>Participate in a simulation activity to understand protocol communication.</li> </ul>                                    | Learners demonstrate understanding of key network protocols.       |



| Topic                    | Sub-Topic                           | Specific Competences  | Learning Activities   | Expected Standard   |
|--------------------------|-------------------------------------|---|---|---|
|                          |                                     |   | <ul style="list-style-type: none"> <li>5. Research a real-world example of protocol failure and its impact.</li> </ul>  |   |
|                          | <b>4.6.2 Cloud Computing</b>        | 4.6.2.1. Describe the benefits and challenges of cloud-based systems. | <ul style="list-style-type: none"> <li>Compare cloud services (e.g., Google Drive vs. OneDrive).</li> <li>Discussing data privacy concerns in cloud storage.</li> <li>Conduct a class debate on whether businesses should adopt cloud computing.</li> <li>Creating a personal account on a cloud platform and upload files.</li> <li>Develop a project comparing free and paid cloud services.</li> </ul> | Learners evaluate cloud computing systems critically.               |
| <b>4.7 Cybersecurity</b> | <b>4.7.1 Ethical Hacking Basics</b> | 4.7.1.1. Identify ethical considerations in cybersecurity practices.  | <ul style="list-style-type: none"> <li>Simulate ethical hacking scenarios using virtual environments.</li> <li>Discussing case studies on cybersecurity breaches.</li> <li>Research legal regulations surrounding ethical hacking.</li> <li>Creating a presentation on ethical hacking tools.</li> <li>Writing a report on the importance of cybersecurity in daily life.</li> </ul>                      | Learners differentiate between ethical and malicious hacking.       |
|                          | <b>4.6.4 Malware Analysis</b>       | 4.6.4.1. Explain the types of malware and how they affect systems.    | <ul style="list-style-type: none"> <li>Analyze sample malware behaviors in a sandbox environment.</li> <li>Creating a guide for preventing malware attacks.</li> <li>Role-play as cybersecurity professionals responding to malware threats.</li> </ul>   | Learners identify and propose strategies to mitigate malware risks. |

| Topic                                | Sub-Topic                                      | Specific Competences   | Learning Activities   | Expected Standard  |
|--------------------------------------|--|--|---|--|
|                                      |  |  | <ul style="list-style-type: none"> <li>Watching videos about famous malware cases and discuss them.</li> <li>Develop a checklist for identifying and avoiding malware threats.</li> </ul>   |  |
| <b>4.8 Cybersecurity in Finance</b>  | <b>4.8.1 Online fraud, secure transactions</b> | 4.8.1.1. Identifying risks in digital finance and implementing security measures | <ul style="list-style-type: none"> <li>Analysing case studies of cybersecurity breaches in digital finance</li> <li>Practicing secure password management for financial accounts</li> <li>Simulating phishing and fraud detection scenarios</li> <li>Researching cybersecurity best practices</li> <li>Demonstrating how to secure online transactions</li> </ul> | Learners can secure online transactions and identify fraud risks |
| <b>4.9 Financial Data Management</b> | <b>4.9.1 Using spreadsheets and databases</b>  | 4.9.1.1 Applying ICT tools to record and analyze financial data                  | <ul style="list-style-type: none"> <li>Practicing data entry and financial record-keeping using Excel</li> <li>Designing a budget using spreadsheets</li> <li>Simulating income and expense tracking</li> <li>Researching financial data management in businesses</li> <li>Demonstrating how to analyze financial data using graphs and charts</li> </ul>         | Learners can create and manage financial records using ICT       |

## Summary of Key Competences

| Competence                  | Descriptor   |
|-----------------------------|--|
| Advanced Programming Skills | Learners develop object-oriented programs in Java and Python and integrate APIs into applications. |
| Mobile App Development      | Learners design and deploy functional mobile applications using frameworks like Flutter.           |

| Competence                       | Descriptor   |
|----------------------------------|--|
| Advanced Cybersecurity Practices | Learners analyze and implement advanced data encryption and access control techniques.         |
| Exploring Emerging Technologies  | Learners explore AI, blockchain, and IoT, and discuss their applications and societal impacts. |
| ICT System Integration           | Learners develop and test integrated ICT solutions that address real-world challenges.         |

# APPENDICES

## Scope and Sequence of ICT Curriculum (Form 1 to Form 4)

From Forms 1 to 4 topics have been grouped into **five major themes** and the specific competencies being developed across the forms.

| Major Theme                          | Form 1<br>(Competences)  | Form 2<br>(Competences)  | Form 3<br>(Competences)   | Form 4 (Competences)  |
|--------------------------------------|--|--|---|---|
| <b>1. Foundations of ICT</b>         | <ul style="list-style-type: none"> <li>- Understand basic ICT concepts and its importance in daily life.</li> <li>- Identify and categorize computer components.</li> <li>- Use input/output devices effectively.</li> </ul> | <ul style="list-style-type: none"> <li>- Manage files and folders efficiently.</li> <li>- Understand operating systems and their functions.</li> <li>- Install basic software applications.</li> </ul> | <ul style="list-style-type: none"> <li>- Optimize file storage with compression.</li> <li>- Encrypt files to enhance security.</li> <li>- Apply advanced file organization techniques.</li> </ul> | <ul style="list-style-type: none"> <li>- Implement system troubleshooting techniques.</li> <li>- Install and configure advanced operating systems.</li> <li>- Ensure system security and efficiency.</li> </ul> |
| <b>2. Productivity Tools</b>         | <ul style="list-style-type: none"> <li>- Create and edit simple documents.</li> <li>- Use basic formatting features (text, tables, bullets).</li> </ul>  | <ul style="list-style-type: none"> <li>- Customize document layouts (margins, columns).</li> <li>- Integrate multimedia (images, tables, charts) into documents.</li> </ul>                            | <ul style="list-style-type: none"> <li>- Design professional reports, flyers, and newsletters.</li> <li>- Using advanced spreadsheet functions (SUMIF, VLOOKUP).</li> </ul>                       | <ul style="list-style-type: none"> <li>- Automate document processes using macros.</li> <li>- Analyze complex datasets using advanced spreadsheet tools.</li> </ul>   |
| <b>3. Programming and Algorithms</b> | <ul style="list-style-type: none"> <li>- Understand basic programming concepts.</li> <li>- Write simple algorithms in pseudocode and flowcharts.</li> <li>- Create basic programs using Scratch or similar tools.</li> </ul> | <ul style="list-style-type: none"> <li>- Use structured programming concepts (loops, conditionals) in high-level languages (e.g., Python).</li> <li>- Debug simple programs.</li> </ul>                | <ul style="list-style-type: none"> <li>- Develop intermediate-level programs using languages like Python or Java.</li> <li>- Apply data structures (arrays, lists).</li> </ul>                    | <ul style="list-style-type: none"> <li>- Create advanced software solutions for real-world problems.</li> <li>- Use object-oriented programming concepts.</li> </ul>  |

| Major Theme                            | Form 1<br>(Competences)   | Form 2<br>(Competences)   | Form 3<br>(Competences)   | Form 4 (Competences)   |
|--|---|---|---|--|
| <b>4. Communication and Networking</b> | <ul style="list-style-type: none"> <li>- Use email and messaging platforms responsibly.</li> <li>- Understand the basics of the internet and web browsing.</li> </ul> | <ul style="list-style-type: none"> <li>- Apply email etiquette.</li> <li>- Use collaborative tools like Google Workspace for communication and file sharing.</li> </ul>       | <ul style="list-style-type: none"> <li>- Explain networking concepts (LAN, WAN, IP).</li> <li>- Demonstrate network troubleshooting.-</li> <li>- Configure basic networks.</li> </ul>               | <ul style="list-style-type: none"> <li>- Design and manage complex network systems.</li> <li>- Apply cybersecurity principles to ensure safe network operations.</li> </ul>  |
| <b>5. Emerging Technologies</b>        | <ul style="list-style-type: none"> <li>- Explore basic concepts of mobile computing and cloud storage.</li> <li>- Identify current trends in ICT.</li> </ul>          | <ul style="list-style-type: none"> <li>- Demonstrate the use of mobile apps and services for education and communication.</li> <li>- Understand cloud-based tools.</li> </ul> | <ul style="list-style-type: none"> <li>- Analyze the impact of emerging technologies like AI and IoT in real-life applications.</li> <li>- Exploring advanced mobile computing concepts.</li> </ul> | <ul style="list-style-type: none"> <li>- Develop solutions using emerging technologies.</li> <li>- Demonstrate practical applications of AI, IoT, and blockchain.</li> </ul> |

### Key Notes:

#### 1. Progression of Competencies:

- Each major theme builds on previous knowledge, progressively developing deeper understanding and more advanced practical skills.

#### 2. Integration Across Themes:

- Themes like "Emerging Technologies" are interwoven with programming, productivity tools, and networking to enhance real-world applications.

## Suggested Programming Languages

| Topic                           | Programming Language  |
|---------------------------------|---|
| Specialization Track            | <ul style="list-style-type: none"> <li>- Scratch: For learning programming concepts such as sequences, loops, conditionals, and events. It uses blocks to create code.</li> <li>- For Text-Based Programming choose Python: IDLE (Integrated Development and Learning Environment), Thonny, or Repl.it. Simple projects like calculators, interactive stories, and basic games can be created.</li> <li>- For dynamic web content development, choose JavaScript: Visual Studio Code (VS Code), Repl.it, or CodePen.</li> <li>- For deeper understanding of programming choose Java or C++</li> <li>- Mobile App Software: Kotlin (for Android) or Swift (for iOS), Thunkable, MIT App Inventor, Kodular,</li> <li>- Distributed Systems: Java or Python</li> </ul> |
| AI and Robotics                 | <p><b>Predictive Text Software: Android Keyboard Apps:</b> Gboard, SwiftKey. <b>iOS Keyboard:</b> Built-in predictive text on iPhone.</p> <p><b>Voice Assistance Software: Google Assistant, Siri, Amazon Alexa, Microsoft Cortana</b> etc.</p>   |
| Capstone Project                | <ul style="list-style-type: none"> <li>- Choose based on the specialization: Example for complex Apps development choose MIT App Inventor</li> <li>-For advanced Mobile App Development choose Kodular</li> <li>-For a Professional App Development Environment use Android Studio with Kotlin or Java</li> <li>- Java for Distributed Systems,</li> </ul>  |
| Basic Mobile App Development    | <ul style="list-style-type: none"> <li>- For beginners, choose Thunkable. It allows users to build apps for both Android and iOS devices using a drag-and-drop interface</li> </ul>   |
| Complex Mobile App Development  | <ul style="list-style-type: none"> <li>- Choose MIT App Inventor. It is a web-based integrated development environment (IDE) that allows users to create applications for Android devices using a graphical user interface (GUI)</li> </ul>   |
| Advanced Mobile App Development | <ul style="list-style-type: none"> <li>- Choose Kodular <b>it offers</b> more advanced features</li> </ul>  |

| Topic                               | Programming Language   |
|-------------------------------------|--|
| Professional Mobile App Development | - Choose <b>Android Studio with Kotlin or Java.</b> : It is the official IDE for Android development, offering a more professional and robust platform |

| Hardware   | Recommendations  |
|--|--|
| Laptop, Smartphone, Tablets , Headphones and Microphones (Processor) | <ul style="list-style-type: none"> <li>• Minimum: 4 cores (Core i3 and above), 1.6 Gigahertz (GHz) or faster, 64-bit.</li> <li>• Recommended: (8 cores or more), 2 GHz or higher, 64-bit.</li> </ul> |
| RAM and Speed  | <ul style="list-style-type: none"> <li>• Recommended: 8 GB and above.</li> <li>• Recommended: 2GB or higher for Smart phones</li> <li>• Speed 1.6HGhz or Higher</li> </ul>                           |
| Hard disk space/ SSD   | <ul style="list-style-type: none"> <li>• Minimum: 120 GB and above.</li> <li>• Minimum 16 GB for Smart phones</li> </ul>   |

## Reserved Words in selected Programming Languages

Reserved words in programming (also known as keywords) are predefined words in a programming language that have special meanings and are part of the language's syntax. These words are "reserved," meaning they cannot be used for variable names, function names, or other identifiers because the language uses them for specific purposes. The following table shows some reserved words in different programming languages.

| Python:                     |  |
|-----------------------------|--|
| Type                        | Reserved Words                                 |
| Control Flow                | if, else, else if, while, for, break, continue |
| Data Types                  | int, float, str, bool, complex                 |
| Function                    | def, return, async, await                      |
| Object-Oriented Programming | class, self, super                             |

|                    |                            |
|--------------------|----------------------------|
| Exception Handling | try, except, raise, assert |
| Others             | import, from, as, with     |

| <b>Java:</b>                |  |
|-----------------------------|--|
| <b>Type</b>                 | <b>Reserved Words</b>  |
|                             |  |
| Control Flow                | if, else, switch, case, default, while, for, break, continue           |
| Data Types                  | int, float, char, Boolean, long  |
| Function                    | Function: void, return   |
| Object-Oriented Programming | class, extends, implements, interface, this, get, set, static, virtual |
| Exception Handling          | try, catch, finally, throws  |
| Others                      | package, import, synchronized  |

| <b>JavaScript:</b>          |                                       |
|-----------------------------|---------------------------------------|
| <b>Type</b>                 | <b>Reserved Words</b>                 |
| Control Flow                | if, else, while, for, break, continue |
| Data Types                  | var, let, const                       |
| Function                    | function, =>, async, await            |
| Object-Oriented Programming | class                                 |
| Exception Handling          | try, catch                            |
| Others                      | import, export                        |

| <b>C++:</b>                  |  |
|------------------------------|--|
| <b>Type</b>                  | <b>Reserved Words</b>                              |
| Control Flow:                | if, else, while, for, break, continue              |
| Data Types:                  | int, float, char, double                           |
| Function:                    | void, return                                       |
| Object-Oriented Programming: | class, public, private, protected, friend, virtual |
| Exception Handling:          | try, catch, throw, noexcept                        |



| <b>C++:</b> |                                    |
|-------------|------------------------------------|
| <b>Type</b> | <b>Reserved Words</b>              |
| Others:     | include, namespace, using, typedef |

Please note that this list is not exhaustive, and each language has additional reserved words and keywords beyond those listed here.

## Mathematical symbols

The following table shows Mathematical symbols used in programming languages:

| <b>Mathematical Meaning</b> | <b>Symbol</b> | <b>Example</b>                            |
|-----------------------------|---------------|---|
| Addition                    | +             | $2 + 3 = 5$                               |
| Addition assignment         | +=            | <code>a = 3; a += 2; (a is now 5)</code>  |
| Decrement                   | --            | <code>a = 3; a -= 2; (a is now 1)</code>  |
| Division                    | /             | $8 / 4 = 2$                               |
| Division assignment         | /=            | <code>d = 10; d /= 2; (d is now 5)</code> |
| Equality                    | ==            | <code>5 == 5 (true)</code>                |
| Exponentiation              | *             | $2 ** 3 = 8$                              |
| Greater than                | >             | <code>8 &gt; 5 (true)</code>              |
| Greater than or equal to    | >=            | <code>9 &gt;= 10 (false)</code>           |
| Increment                   | ++            | <code>x = 5; x++ = 6 (after)</code>       |
| Inequality                  | !=            | <code>4 != 7 (true)</code>                |
| Less than                   | <             | <code>3 &lt; 6 (true)</code>              |
| Less than or equal to       | <=            | <code>2 &lt;= 2 (true)</code>             |
| Modulus                     | %             | $10 \% 3 = 1$ (remainder)                 |
| Modulus assignment          | %=            | <code>e = 9; e %= 4; (e is now 1)</code>  |
| Multiplication              | *             | $4 * 3 = 12$                              |
| Multiplication assignment   | *=            | <code>c = 4; c *= 3; (c is now 12)</code> |

| Mathematical Meaning   | Symbol          | Example                                  |
|------------------------|-----------------|--|
| Subtraction            | -               | $7 - 4 = 3$                              |
| Subtraction assignment | <code>-=</code> | <code>b = 7; b -= 4; (b is now 3)</code> |

## Visual Studio in Software Development

This section introduces Visual Studio, a powerful integrated development environment (IDE) widely used in software development. Visual Studio supports various programming languages and provides a range of tools for coding, debugging, and project management.

Example: Creating a Console Application in Visual Studio

### Objective:

Demonstrate the basic steps of creating a simple console application using Visual Studio.

Steps:

1. Opening Visual Studio:

- Launch Visual Studio on your computer.

2. Creating a New Project:

- Go to the "File" menu and select "New" > "Project."
- Choose the type of project you want to create. For this example, select "Console App" under the appropriate programming language (e.g., C).

C).

- Provide a name for your project and choose a location to save it.

3. Writing Code:

- Once the project is created, open the main code file (e.g., `Program.cs``) in the code editor.

- Write a simple "Hello, World!" program in csharp:

```
class Program
{
    static void Main()
    {
        Console.WriteLine("Hello, World!");
    }
}
```

#### 4. Building and Running:

- Click on the "Build" menu and select "Build Solution" to compile the code.
- Press the "Start" button or use the "F5" key to run the application.

#### 5. Debugging:

- Set a breakpoint by clicking in the left margin next to the line `Console.WriteLine("Hello, World!");`
- Press "F5" to start debugging. The program will stop at the breakpoint, allowing you to inspect variables and step through the code.

This example provides a hands-on introduction to Visual Studio by guiding learning through the process of creating, coding, building, and debugging a simple console application. These fundamental skills will serve as a foundation for more complex software development projects using Visual Studio.

Including practical examples like this can help readers apply theoretical knowledge, making the learning experience more engaging and effective.