

**REPUBLIC OF CAMEROON**  
**PEACE – WORK – FATHERLAND**

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**MINISTRY OF SECONDARY EDUCATION**

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**INSPECTORATE GENERAL OF EDUCATION**

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**INSPECTORATE OF PEDAGOGY IN CHARGE OF  
THE TEACHING OF COMPUTER SCIENCE**

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**Teacher's Guide**  
**to the**  
**High School ICT Syllabus**

**August 2020**



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# 1 INTRODUCTION

Information and Communication Technology (ICT), also known as Information Technology (IT), is the driving force in technological development. Its role in boosting economies of nations, industrial productivity, socio-cultural integration, development of professions, education and research, medicine, politics, communication, private households, and entertainment etc., has been enormous and popularized. There is therefore the need, to guide the Cameroonian youth into developing competencies in this domain thereby providing solutions to real-life challenges. Such competencies developed at this level, are to build a solid framework for students who will continue with this domain of study, or other related disciplines, at the University level, those who will start their professional activities after High School, and those who just require digital literacy for solving commonly encountered personal problems.

This syllabus is designed to mould candidates into acquiring or developing a range of IT skills in the context of a sound understanding of the technical foundation of current computer systems and to promote the knowledge and use of a wide range of current computer applications, particularly from the point of view of their design and implementation. It highlights issues related to societal implications of the use of ICTs. It extends to the design of simple software and basic digital circuits, thus equipping the learner with preliminary skills in Information system design. The emphasis is on fundamental principles that underlie ICTs rather than on the current state of the art, so that the knowledge acquired remains relevant even after significant technological evolution.

## 2 ORGANIZATION OF THE SYLLABUS

### 2.1 COURSE DESCRIPTION AND DURATION

The Information and Communication Technology (ICT) program is a 2-year rigorous university entry level preparatory course that equips learners on the identification, fundamental concepts of architecture, acquisition and proper use of ICT in solving basic needs.

Furthermore, even though this syllabus is oriented towards standard syllabuses used for computing and Information Technology at the advanced or equivalent levels and comparable to similar curricula across the world, it focuses more on development of competencies rather than just acquisition of knowledge

The total learning time for all the modules on the High School ICT curriculum within two years is 426 hours( periods) with about half the time used in the first year(A period is an average of fifty minutes.)

The time spent in each module, depends on the content and nature of lesson in that module. However, a minimum of 8 periods has been attributed to be the total learning time per week in schools.

The following Table shows a summary of the teaching hours and the coefficient of ICT in second cycle.

CLASS	WEEKLY TEACHING LOAD (PERIODS)	WEEKLY PRACTICAL LOAD (PERIODS)	ANNUAL TEACHING LOAD (PERIODS)	COEFFICIENTS
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LOWER SIXTH	04	04	272	05
UPPER SIXTH	04	04	154	05

## 2.2 PREREQUISITE FOR LEARNING ICT IN SECOND CYCLE

- Students willing to study this high school course require no specific or formal qualification but must have basic computer literacy skills (e.g. typing, switching on and off etc.), understanding for skills acquisition, civic education and responsible social behavior.
- Students with a working knowledge of ordinary level Mathematics and Computer Science/ICT will find the subject easier than those without.
- Students should have a mastery of ordinary level English language.

## 2.3 MODULES AND EXPECTED COMPETENCIES

The ICT syllabus is split up into 5 modules, which are carefully structured to take the learner from the introduction of the system through to the practical applications or using of it. The methodology for bringing this through is crafted with the proposal of mini projects at the end of most real-life situations. The projects enable the learner to demonstrate competency after the acquisition and use of required skills for such competency. The modules are as follows:

CLASS	MODULES
LOWER SIXTH	<b>Module 1:</b> Computing Environment and Components
	<b>Module II:</b> Impacting society with digital technology
	<b>Module III:</b> Building ICT systems
UPPER SIXTH	<b>Module IV:</b> Communication, resource sharing and information security
	<b>Module V:</b> Practical problem solving in the digital world

### Reasons for the structuring into five modules

The successful acquisition and use of a computing or ICT system generally may go through 5 stages which represent what you need to go through in order to qualify as being able to efficiently use an Information System. These stages have been coined here, into 5 modules. The paradigm behind the development of each of the five modules is as follows:

1. Understanding what a computing environment looks like and how it works (i.e. Module 1)
2. Identifying what it can be used for and how its existence affects the user and the environment(i.e. Module 2)
3. Building the computing environment and configuring it to solve various problems (i.e. Module 3)
4. Linking or interconnecting multiple computing environments for the purpose of sharing resources(i.e. Module 4)
5. Solving real-life problems using the already built computing environment (i.e. Module 5)

A successful navigation through the 5 modules adequately prepares the learner to demonstrate competencies in solving most real-life situations that can be handled with the use of ICTs. Thus, the first three (03) modules are taught in Lower Sixth and the last two (02) in Upper Sixth.

### **Module 1: Computing systems and Components**

This module introduces learners to what a computing environment looks like, and prepares them to demonstrate competency in identifying, selecting and installing preferable hardware and software components of a computer system, while implementing solutions to problems encountered in the course of working with them.

### **Module 2: Impacting society with digital technology**

This module leads the learner into finding out the positive and negative changes, which the use of computers has brought or will bring into society, while proposing instruments for promoting its positive use and preventing negative use. It also looks at how computers and IS can be used to solve daily problems that need IT solutions. Learners here are prepared to demonstrate competency in using some common IS, identifying and proposing digital solutions to a variety of real-life problems, and also to cause positive change in society through the use of ICTs while preventing negative change.

### **Module 3: Building ICT systems**

This module introduces learners into how some hardware and software components of an IS are built, and enables them to demonstrate competency in designing IS, writing programs to solve some common problems, coupling of electronic circuits and implementation of these systems.

### **Module 4: Communication, resource sharing and information security**

This module leads the learner through various communication methods for data/information, and how such communication systems are configured to realize desired goals for data in use. Learners here are prepared to demonstrate competency in identifying, selecting, configuring and using communication systems to share resources such as data/information, hardware and software.

### **Module 5: Practical Problem solving in the digital world.**

This module leads the learner into practically configuring and using the computer system to solve daily problems, through mini-projects that are carried out. Learners here are prepared to demonstrate competency in identifying real-life problems and providing digital solutions to them.

The contents of each module are further arranged into three main headings and eight sub-headings as follows:

**I. CONTEXTUAL FRAMEWORK:** This gives a global picture of the life situation from which lesson inspirations are drawn. This is further broken down into:

**A) Family of Real-life situation:** This presents an umbrella statement that groups related real-life situations

**B) Examples of Real-life situations:** This column better situates the lesson by bringing practical examples of life situations

**II. COMPETENCIES:** Competencies refer to the ability to do something successfully and efficiently. The competences to be attained here refer to the abilities the learner is expected to build in the course of the lesson. This is subdivided into:

- **A) Categories of Actions:** These group the examples of related actions learners are expected to be able to carry out in the course of the lesson piloted by the teacher. These may serve as topics or sub-topics from where lessons are derived.
- **B) Examples of Actions:** These refer to the actions or activities the learner is expected to carry out successfully and efficiently as indicators of having built specific abilities in the course of the lesson. These examples of actions may also serve as lessons.

**NB:** there is misinterpretation with the word “ACTION” as used in the French language. According to the French syllabus, they have “*agir* competence and *traitement* competence” which when looked at implies “acted competency and process competency” respectively. These words do not make sense, so we have coined these two terms to mean demonstrated competency, i.e. competency which is a process rather than an end result. This is why **Core knowledge** and **skills (competency indicators)** have been classified under resources. These resources are used to demonstrate competency.

**III. RESOURCES:** This refers to the necessary tools required to ensure a successful lesson. This is further broken down into:

**A) Core knowledge:** These are keywords that can facilitate research.

**B) Skills:** These are the activities of the learner, what they are supposed to do during the lesson

**C) Attitudes:** These are the behavioral changes expected to be employed by the learner during and/or after learning

**D) Other Resources:** These are material resources and equipment required to facilitate teaching/learning

**E) Duration:** This is the expected time interval during which teaching/learning is supposed to take place.

## **3 OBJECTIVES ENVISAGED BY THE SYLLABUS**

### **3.1 SECOND CYCLE LEARNER PROFILE IN ICT**

Mindful of the fact that society is fast developing, with rapid changes in knowledge, it is but pivotal to study the fundamental basis of how such knowledge is produced, acquired and used in a computer age as this. Learners in second cycle of high school level, therefore need to have a fundamental understanding of the role of ICT in the acquisition and use of this evolving knowledge in various fields such as entertainment, education, utility, communication and solving problems requiring digital solutions.

The learner profile of the second cycle of secondary school is summarized in the following components:

1. Demonstrate understanding and choice of career paths that lead to IT and computer-focused employment including computer management, programming, IT services, and systems development.
2. Exhibit proof of a thoroughly trained citizenry and a better equipped workforce for an information society or an emergent knowledge society.
3. Acquire and show essential preparedness for, or exemptions from requirements in, higher-level studies in ICT and related disciplines; and
  4. Understand and apply pre-requisite knowledge for, and exemptions from, computing-related requirements in vocational and tertiary educational programs.
5. Make informed decisions on when and where to use ICT, and should also be aware of the implications of the use of ICTs in the home, at the job site, and in society at large.

### **3.2 THE AIM OF TEACHING ICT IN SECOND CYCLE OF HIGH SCHOOL**

The aims of this syllabus are:

1. To enhance development of skills and provide a foundation for advanced competencies in the following:
  - a. Information processing.
  - b. Information and Communications Technology.
  - c. Computer programming.
2. To explore the impact of computers on people both as individuals in society and as integral parts of an organization and make contributions towards positive impact.



## 4 METHODOLOGY

### 4.1 METHODES OF TEACHING ICT

The teaching method here describes the means used by the teacher to facilitate learning and attain set pedagogic objectives.

The fundamental teaching approach here is the use of the Competency Based Approach (CBA) which helps the teacher to adopt diverse teaching/learning methods. The CBA method of teaching/learning favors learner centered teaching/learning, with an entry and/or exit through real-life situations.

Amongst the numerous pedagogic methods, the most adapted for the teaching of ICT following the CBA, are given below:

#### 4.1.1 PROBLEM BASED LEARNING METHOD

The Problem Based Learning approach is one in which the student /learner is presented with ill structured real-life problems and they play the role of active problem solvers, while the teacher assumes the role of a coach.

The learners are presented with the problem, they study the problem or carryout research on it, organize their ideas, discourse on their relative knowledge concerning the problem, and attempt to define its scope. In the course of their discussions, the learners ask questions concerning aspects of the problem which they don't understand. The learners are continually encouraged to show forth what they know and what they don't know.

Learners in a group identify and classify, which of the questions asked, are to be solved by the group and which are to be answered by individuals. They discourse with their teacher about what resources would be needed to solve the problems and where exactly to obtain such resources.

After sometime of research, the learners come back together in the group to integrate their new knowledge obtained from research, into the context of the problem. Learners could continue to ask questions in the course of discussions to resolve the problem. This continues until a satisfactory final solution is obtained. Learning is a continuous process and there would always be new questions to ask, in the course of the learning.

The teacher must guide, encourage and support the learners' initiative.

#### 4.1.2 PROJECT METHOD

The Project approach which is constructivist pedagogy, involves the presentation of a real-life situation in the form of a mini project; thereby provoking inquiry based learning and computational thinking, in which large problems are broken down into small tasks. These helps foster students' life- long learning.

This project (which should not be artificial but one that has value in real-life), is often assigned to a group of learners. Group project is often encouraged as it is an ideal booster to the development of several competences. The project (especially in a group) method helps the learner to:

- Learn by using a project as a vehicle for achieving new competencies
- Work effectively in a group while gaining experience from others in the group
- Analyze his work in a reflexive manner
- Research and use information from different experts and appropriate sources (e.g. CD, Web, multimedia)
- Synthesize and communicate the results of the work done, with others.

The carrying out of a project is often done so in four phases: Research, Planning, Execution and Evaluation.

#### 4.1.3 EXPOSITORY METHOD

The expository method is one in which the teacher masters the contents of a structured lesson and then presents it to the learners in the form of an exposé. In this context of the CBA, this method is only recommended when the teacher is in an effort to present the external resources necessary for the acquisition of a competence.

#### 4.1.4 DEMONSTRATIVE METHOD

The demonstrative method is one in which the teacher shows how to do something by doing it, and then guides the learner to do same, while evaluating the degree of learner understanding. This method has the following elements:

- Show (demonstrate)
- Make do (Experimentation)
- Make say (Formulation)

#### 4.1.5 INTERROGATORY METHOD

In this method, the learner is considered to have some knowledge on what is to be acquired or an idea of its contents. Through an appropriate question given by the teacher, the learner constructs his own knowledge, based on his own understanding, or tries to link and give some sense to the disjointed ideas he possesses. This method is often used when the teacher is set out to diagnose the level of knowledge in learners.

#### 4.1.6 DISCOVERY METHOD

With the discovery method, the teacher creates a pedagogic scenario where he uses appropriate materials to allow the learners use trial and error method for learning. The teacher exploits his personal experience or those of the learners in a group, to solve a given problem, using the means available to them. Intra cognitive and collaborative work here is highly utilized. This method has the following elements:

- Make the learner do
- Make the learner say
- The teacher corrects

This method must be used with care as it is expensive and time consuming.

## 4.2 PHASES IN LESSON DELIVERY

All teaching/learning activity is carried out in three essential phases: the planning phase, the execution phase and the follow-up/evaluation phase.

### 4.2.1 PLANING PHASE

The planning phase consists of putting in place preparatory documents for the teaching/learning activity, the acquisition of pedagogic resources and the identifying of how evaluation will be done. The planning phase helps the teacher to have a foresight of how the lesson would look like. Planning also helps to economize time and energy by avoiding redundancy and unnecessary work, while enhancing quality lesson presentation. During the planning phase, all the actions of the teaching/learning process are previewed such as to develop competencies in the learner. To achieve this, we focus on three elements:

- Essential components of the CBA: knowledge, skill and competence
- Integration activities
- Evaluation (usually formative)

#### 4.2.2 EXECUTION PHASE

During a lesson presentation, the teacher may apply one or more of the methods stated above, that help realize the purpose of his lesson. The teacher may allow individual or collective (or group) learning. A group situation could be one in which group members communicate, organize themselves and learn from each other. Whether the teacher allows individual or collective learning, the essence should always be to solve a real-life problem in a disciplined manner.

#### 4.2.3 FOLLOW UP AND EVALUATION PHASE

This is the phase during which the teacher carries out an analysis of his teaching practice or activities in order to continuously improve. Keeping a diary of remarks and suggestions from each teaching session, can be a useful practice in helping the teacher to correct himself. This practice also helps the teacher develop creative ideas that will enable him effectively reach out to all category of learners.

On the other hand, the teacher evaluates the learner (usually through formative evaluation). We can only evaluate a competence by proposing to the learners, a problem which is new to them. The problems given out must not necessarily reveal the resources needed to solve them. The problem should also require resources that the learner can actually acquire and be able to use (even though, it is incumbent on the learner to acquire and use his resources). Errors committed during the learning process should not be considered as entirely negative but should be used as a positive means to get to the right thing.

### 4.3 LESSON PREPARATION

A prepared lesson is what is used by a teacher to train his learners. A good lesson delivery is as a result of a good lesson preparation.

To select and teach a lesson from the syllabus:

- Choose the **Family of Life Situation** to explore.
- Pick out an **Example of Life Situation**. A number of them could be grouped to form a **Category of Life Situation** (which could also be considered as a Topic)
- Under each **Category of Life Situation**, select an **Example of Action** (which could serve as a Lesson and in some situations more **than one example of action may constitute a lesson.**);
- ). An **Example of Action** could be selected in any order but it is advisable to start with the first and move chronologically to the last in that group of actions.
- Put in place the necessary didactic material.
- Produce your lesson plan.
- Guide the learner into carrying out the actions stated in the Example of Action. A successful completion of each action is a mastery or achievement of a skill.
- Identify the Examples of Action that can be executed as a project, and carry it out using any of the teaching methods given above.
- A group of these actions completely treated, is equivalent to a competency developed or achieved.

In the course of teaching, you can enter your lesson presentation through a real-life situation or leave through a real-life situation.

**When preparing lessons the teacher should take note of the column 'Explanatory Notes' in the guide. Specificities required for some lessons have been spelled out in this column.**

#### 4.3.1 Tools for preparation

Tools used for the teaching of ICT in this syllabus include:

- Online learning resources selected from trusted educative websites or guided search from popular websites such as [www.youtube.com](http://www.youtube.com) or [www.google.com](http://www.google.com) .(e.g. video, audio, picture or any multimedia related to the lesson being taught)
- Current and reliable textbook and laboratory manual;
- Relevant software specified as didactic materials;
- Sylcheme of work and lesson notes;
- The official syllabus, syllabus guide, pedagogic statement sheet, lesson plan,
- Audio-visual media (e.g. TV, DVDs, and Computers) and other multimedia resources
- Chalk, board etc.
- In the case of web and database designs, HTML 5 and CSS or newer versions, Java Scripting language and PHP can be used.

## 5 ACTORS AND THEIR ROLES

### 5.1 The teacher's role

The role of the teacher is to create the learning requirements, situations and environments that favor the development of the competency in view. These activities take into consideration the individual characteristics of the learner (such as fast learner, slow learner, handicapped etc.).

The teacher should prepare lessons following the recommendations in the CBA approach (some of which have been discoursed already).

The teacher follows up what the learner is doing and may have to intervene at one moment or the other to guide or correct work in progress.

The teacher is also required to end every lesson or at least a group of lessons with assignments that consist of mini-projects that provide the opportunity for learners to develop their skills in problem solving.

The teacher is expected to obtain and use any material from sources, which will facilitate the development of the desired competency in the learner. The use of projectors and multimedia platforms in the display of information is strongly recommended, as it helps in attracting learner interest and facilitating easier and shorter explanations.

### 5.2 The learner's role

Learners are introduced into problems in real-life, which require the exhibition of their creative, innovative and entrepreneurial abilities to solve the problems. With the aid of the teacher, the learner acquires the necessary resources that are needed to exercise the expected competency.

The learner spends time carrying out research on projects given out by the teacher.

## 6 ASSESSMENT

The primary purpose of assessment and evaluation is to improve student learning. Information gathered through assessment helps teachers to determine students' strengths and weaknesses in the achievement of the curriculum expectations in each module.

This course uses three types of assessments: Formative assessment  
Summative assessment and School-Based Assessment.

### Achievement Chart

The achievement chart that follows identifies the grading of knowledge and skills in ICT. The achievement chart is a standard guide to be used by teachers to make judgments about students' work.

Assessment criteria	Total weight
Theory written exam	50%
MCQ	20%
Practical lab exam	25%
School-based project assessment	5%

### Grading policy

For this subject, it is recommended that continuous assessment be used and grades, instead of marks, awarded. This is because written examination may not be the most suitable means of assessment. The seven-point scale that follows provides a record of the learning skills demonstrated by the learner in every module of the course through independent work, teamwork, organization, work habits, and initiative.

Remark	Honor Roll	Excellent	Good	Satisfactory	Needs improvement	Failed	Ungraded
% Score	90 and above	80 to 89	70 to 79	60 to 69	50 to 59	40 to 50	< 40
Grade	A	B	C	D	E	F	U

### 6.1 FORMATIVE ASSESSMENT

Formative assessment to check for understanding after teaching each sub-topic, topic or module in the form of assignments and quizzes; multiple choices questions, fill-in-the-blank, simple test questions or assignments in the form of roving conference.

## 6.2 SUMMATIVE ASSESSMENT

Summative examination at the end of a sequence, a term, a year or end of course evaluation to find out if the objectives set are attained. These examinations are multiple choice questions, essay questions, case study questions and practical examinations to assess students' ability in applying the concepts covered in the course.

It is recommended that the questions set (provided they are not MCQ), should assess the learner in terms of knowledge, skill and competency. If the set question is to be on a scale of 100, then the following percentages should apply for each part tested:

Knowledge-30%, Skill-20% and Competency-50%.

## 6.3 SCHOOL –BASED PRACTICAL ASSESSMENT

School-Based Assessment of Computer Science project at the end of the high school course which challenges students to research, investigate, and solve problems. The project is assessed based on submitted formal project reports in form of a presentation or demonstration, which provides teachers an opportunity to appreciate the extent of a student's knowledge and understanding of the subject matter including the extent of their written communication skills and their ability to reflect on what they have learnt.

As part of assessment, teachers are required to provide students with descriptive feedback that guides their efforts towards improvement. Classroom teachers are advised to focus on setting practical tests that relate to scientific and daily life situations in order to test students' reasoning and technical skills.

## 7 SYLLABUS OUTLINES

### 7.1 TABLE OF MAIN COMPONENTS OF MODULE 1: COMPUTING SYSTEMS AND COMPONENTS

This module would enable the learner to:

- Describe computing trends
- Choose a computer based on processor
- Design the workplace to reduce health related hazards.
- Choose an operating system
- Work with files and folders.

Category of actions	Examples of actions	Core knowledge	Skills	Explanatory Notes
Description of computing trends	<ul style="list-style-type: none"><li>• Identify generations of computers</li><li>• Describe main technology for each period</li><li>• Explain stored program concept</li></ul>	<ul style="list-style-type: none"><li>• Vacuum Tubes</li><li>• Transistors</li><li>• Integrated circuits</li><li>Artificial intelligence</li></ul>	<ul style="list-style-type: none"><li>• Compare characteristics: size, processing capabilities, price .... of different generations</li><li>• Differentiate technologies used in different generations of</li></ul>	<ul style="list-style-type: none"><li>• The concept of stored program must be taught for the Von Neumann architecture</li></ul>

			computers	
Categorization of components	<ul style="list-style-type: none"> <li>Classify peripheral devices</li> <li>State performance characteristics of storage devices</li> <li>Describe functioning of data capture devices</li> <li>Describe memory types and functions</li> <li>Describe storage types and functions</li> <li>Illustrate with a diagram storage hierarchy based on speed and size.</li> <li>Describe the types of RAM (SIMM, DIMM)</li> </ul>	<ul style="list-style-type: none"> <li>input,</li> <li>output,</li> <li>storage</li> <li>MICR, OCR, OMR, Barcode Reader, ...</li> <li>RAM, ROM, Cache, registers</li> <li>USB key, HDD, CD DVD,</li> <li>Primary storage</li> <li>Secondary storage (optical , magnetic, flash)</li> </ul>	<ul style="list-style-type: none"> <li>Choose appropriate device for a given situation (MICR, OCR, OMR, Barcode Reader ...).</li> <li>State characteristics (volatility, storage capacity, access speed)</li> <li>Compare memory types (access speed, cost, storage capacity)</li> <li>State characteristics (storage capacity, access speed)</li> <li>Compare storage types (access speed, cost, storage capacity)</li> <li>differentiate technology characteristics in optical readers (CD-R, DVD-R, CD-RW, DVD-RW)</li> <li>choose the type of RAM for a given computer</li> </ul> <p><i>Replace, add the RAM of a microcomputer.</i></p>	<ul style="list-style-type: none"> <li>Emphasis should be made on the functioning area of data capture by the teacher</li> <li>Compare memory types in respect to their access speed, cost and storage capacity</li> </ul> <p>A practical lesson must be conducted by the teacher to show the learner how a RAM can be removed or added into a computer system</p>
Selecting hardware/software for different category of users	<ul style="list-style-type: none"> <li>Identify different category of computer users and their impairments (visual, physical, etc.)</li> <li>Describe assistive technologies (braille keyboard and audio devices, ASR,)</li> </ul>	Assistive technology	<ul style="list-style-type: none"> <li>Suggest appropriate assistive technology for a given impairment</li> </ul>	The term <b>impairments</b> should be used instead of disability

## 7.2 TABLE OF MAIN COMPONENTS OF MODULE 2: IMPACTING SOCIETY WITH DIGITAL TECHNOLOGY

This module has as goals to encourage the learner to:

Discuss types of productivity tools (Word processor, Spread sheet, Presentation etc),

Use advanced functions of productivity tools,

Identify characteristics of an algorithm,

Exploit software development tools to implement simple algorithms.

Category of actions	Examples of actions	Core knowledge	Skills	Explanatory Notes
Describing systems for solving industrial, technical and scientific problems.	<ul style="list-style-type: none"> <li>Describe industrial, technical and scientific uses of computer systems.</li> <li>Describe how industrial, technical, and scientific systems work.</li> <li><b>Visit institutions using systems for solving industrial, technical or scientific problems, and appraise their functioning</b></li> </ul>	<ul style="list-style-type: none"> <li>Application of computer systems in sciences and industries (weather forecasting, CAD and CAM, image processing, industrial inspection systems, simulation and modelling)</li> </ul>	<ul style="list-style-type: none"> <li>Illustrate with examples industrial, technical and scientific uses of computer systems.</li> <li>Evaluate the level of automation and technological tools used in a manufacturing or scientific organisation in the learner's environment</li> </ul>	<ul style="list-style-type: none"> <li>Teachers should either organise field trips or guide learners to do it by themselves</li> </ul>
Exploring automation, control systems, monitoring systems embedded systems and running robots for different tasks.	<ul style="list-style-type: none"> <li>State examples of automation, control systems, monitoring systems, embedded systems and robotic systems</li> <li>Explain how monitoring systems work</li> <li>Explain how control systems work</li> <li>Explain how automated systems work.</li> </ul>	<ul style="list-style-type: none"> <li>Monitoring and control systems (patient monitoring systems, chemical process control, traffic control)</li> <li>Automated systems (domestic equipment, automatic navigation systems )</li> </ul>	<ul style="list-style-type: none"> <li>Determine a real-life application of control systems, automated systems and monitoring systems.</li> <li><i>Install and configure a control system</i></li> <li><i>Install and configure a monitoring system</i></li> <li>Compare the functioning of automated, control and monitoring systems.</li> </ul>	<ul style="list-style-type: none"> <li>Teachers are expected to practically perform monitoring and control activities with the learners (install a network monitoring and control software, install an internet modem and use it to control the activities of users connected to it...)</li> </ul>
Producing arts and media with computer systems	<ul style="list-style-type: none"> <li>Describe the applications of computers in arts and media</li> <li><i>exploit computer systems for art and media</i></li> </ul>	<ul style="list-style-type: none"> <li>Computer applications in art and media (music, graphic design and animation for television and film, production of newspapers)</li> </ul>	<ul style="list-style-type: none"> <li>Explain how computer systems are used in: music production, desktop publishing ...)</li> <li><i>Create beats using music production software</i></li> <li><i>Edit songs using music production software.</i></li> <li><i>Produce photographs.</i></li> <li><i>Edit images</i></li> <li><i>produce and edit motion pictures (or movies)</i></li> <li><i>design a magazine using publication software to</i></li> </ul>	<ul style="list-style-type: none"> <li>Teachers should carry out practical lessons on how computer systems are used in the production of arts and media</li> </ul>



### 7.3 TABLE OF MAIN COMPONENTS OF MODULE 3: BUILDING ICT SYSTEMS

The module is expected to lead the learner to identify and explore underlying concepts in building computer systems. The learner will develop competencies in building information systems and other computer applications. They also develop an understanding in the building of basic digital electronic circuits which facilitate the understanding of low level programming

Category of actions	Examples of actions	Core knowledge	Skills	Explanatory Notes
Using features of high level languages	<ul style="list-style-type: none"> <li>Explain stack mechanism for procedure calling and parameter passing.</li> <li>Explain characteristics of a good program</li> </ul>	<ul style="list-style-type: none"> <li>Data values (variables, constants, locations, scoping)</li> <li>I/O operations</li> <li>Procedures and functions</li> <li>Local and global variables</li> <li>File handling operations</li> <li>Program clarity</li> <li>Program Efficiency</li> <li>Program Reliability</li> </ul>	<ul style="list-style-type: none"> <li>Apply features of high-level language in programming</li> <li>Write programs using data structures (file, ...)</li> </ul>	<ul style="list-style-type: none"> <li>In the computer laboratory, learners must make out the features of a given high-level language before writing programs in that environment</li> </ul>

### 7.4 TABLE OF MAIN COMPONENTS OF MODULE 4: COMMUNICATION, RESOURCE SHARING AND INFORMATION SECURITY

This module would lead the learner to:

Describe principles on which the internet operates

Setup basic networks with different network topologies,

Build websites using different web technologies.

Category of actions	Examples of actions	Core knowledge	Skills	Explanatory Notes
Selection of network components (equipment)	<ul style="list-style-type: none"> <li>Explain the role of network components</li> <li>Set up a computer Network</li> </ul>	<ul style="list-style-type: none"> <li>Network components (Modem, Hub, Switch, Router, Bridge, Gateway, NOS, Multiplexers, Network Cards, Repeaters)</li> </ul>	<ul style="list-style-type: none"> <li>Select equipment to set up a network for an organisation (school, ...)</li> <li>Set up a computer Network (peer to peer)</li> </ul>	<ul style="list-style-type: none"> <li>It is important for teachers to effectively show learners these network equipment in the computer laboratory and also teach them on how to build a simple network using cabling cables, eight ports</li> </ul>
Classification of transmission media	<ul style="list-style-type: none"> <li>describe guided (wired) transmission mediums</li> <li>Describe</li> </ul>	Copper Wire, Coaxial Cables, Twisted Pair	<ul style="list-style-type: none"> <li>Classify the various physical media used in the transmission of</li> </ul>	<ul style="list-style-type: none"> <li>Precision should be made to the learners on the context of</li> </ul>

	<p>unguided(wireless) transmission mediums</p> <ul style="list-style-type: none"> <li>Describe the properties of different transmission media</li> </ul>	<p>Cables, Optical Fiber ...</p> <p>Bluetooth, Microwave, Radio waves, Infra-red, Wi-Fi , Wimax, Satellite Links</p>	<p>signals.</p> <ul style="list-style-type: none"> <li>Choose appropriate transmission medium in a given context</li> </ul>	<p>unguided media. For example use of phones in school ...</p>
Determining the structure of the internet	<ul style="list-style-type: none"> <li>Identify the role of internet service providers (ISP)</li> <li>Identify the technology for connecting to ISPs</li> <li>Identify requirements for connectivity to the internet</li> <li>Identify the role of internet protocols</li> </ul>	<ul style="list-style-type: none"> <li>ISP</li> <li>Telephone line</li> <li>ISDN,</li> <li>XDL,</li> <li>leased lines</li> <li>web servers</li> <li>Network card</li> <li>Modems, ...</li> <li>IP v4</li> <li>IPv6</li> <li>FTP, IP, TCP, HTTP</li> </ul>	<ul style="list-style-type: none"> <li>Determine global and local ISPs</li> <li>Determine the technologies (Telephone line, ISDN, XDL, leased lines, web servers, Network card, Modems, etc) used by ISP to ensure internet connection</li> <li>Explain the role played by protocols (IP v4, IPv6, FTP, IP, TCP, HTTP) to facilitate internet connection</li> </ul>	<ul style="list-style-type: none"> <li>Teachers are expected to emphasised to the learners the types of ISP found at the international level like in the USA for example and those found at the local level only in Cameroon</li> </ul>
Using the internet	<ul style="list-style-type: none"> <li>describe internet services</li> <li>Use communication services</li> <li>use information retrieval services</li> <li>use web services</li> <li>use the internet for teleworking</li> </ul>	<ul style="list-style-type: none"> <li>communication services (E-mail services, TELNET, newsgroups Internet telephony (VoIP), Instant messaging etc)</li> <li>information retrieval services (FTP, Browser, Search Engine,)</li> <li>teleworking (Videoconferencing, telecommuting)</li> <li>URL, History, Cookies</li> <li>research methods using search engines</li> <li>Google or Bing</li> </ul>	<ul style="list-style-type: none"> <li>Create an email account</li> <li>Attach a file to a mail and send.</li> <li>Research information on a particular topic using a search engine.</li> <li>Chat using instant messaging platform</li> <li>Set up a teleconferencing platform.</li> <li>Participate in a teleconference</li> </ul>	<ul style="list-style-type: none"> <li>Teachers are expected to conduct effective practical lessons in the computer laboratory with students to train them on how the internet functions</li> </ul>
Develop simple web pages	<ul style="list-style-type: none"> <li>Implement html tags</li> </ul>	<ul style="list-style-type: none"> <li>web pages</li> <li>Tags and</li> <li>Attributes</li> </ul>	<ul style="list-style-type: none"> <li>Create simple web Pages using HTML.</li> </ul>	<ul style="list-style-type: none"> <li>The web design lessons should be conducted only in the computer laboratory with the learners for an objective understanding of the lessons</li> </ul>
Apply common technologies, for web development	<ul style="list-style-type: none"> <li>Use cascading styles sheets to improve look-and-feel.</li> <li>use of JavaScript</li> </ul>	<ul style="list-style-type: none"> <li>JavaScript, HTML, PHP CSS</li> <li>web design packages</li> <li>WordPress or Joomla, ...</li> </ul>	<ul style="list-style-type: none"> <li>Write CSS code to change color, font size, padding, ...</li> <li>Write java script code to process client-side data and form data.</li> </ul>	
Host a website	<ul style="list-style-type: none"> <li>Exploit Content Management Systems</li> </ul>	<ul style="list-style-type: none"> <li>Domain name(public IP)</li> <li>DNS ...</li> </ul>	<ul style="list-style-type: none"> <li>Publish a website on the internet.</li> </ul>	

## 7.5 TABLE OF MAIN COMPONENTS OF MODULE 5: PRACTICAL PROBLEM SOLVING IN THE DIGITAL WORLD.

This module would lead the learner to:

Build applications using object-oriented programming

Tailor spreadsheets to solve various accounting, statistical, analytic and mathematical problems

Build and deploy websites using different web technologies

Category of actions	Examples of actions	Core knowledge	Skills	Explanatory Notes
Implementing programming concept  Using IDEs for building applications that run on the .NET framework or applications that run on the Java runtime.	<ul style="list-style-type: none"> <li>• Select an appropriate IDE.</li> <li>• Identify relative advantages and disadvantages of an IDE</li> <li>• Select an appropriate programming language to solve a real-life problem</li> <li>• Build applications that provide solutions to identified real-life problems</li> </ul>	<ul style="list-style-type: none"> <li>• .NET framework</li> <li>• Java runtime</li> <li>• Concepts of functions, parameter passing,</li> <li>• object oriented programming</li> <li>• Concepts of classes, objects, inheritance, polymorphism used in finance, agriculture, education, culture.</li> </ul>		These areas are too challenging to the teachers as it is too vague. Meaning that areas to carry out the project should be specified.

**NB: for this pedagogic document to be appraised, the following remarks should be taken into consideration:**

- Texts in green are simply to indicate that the lesson should be a practical one. Though practical approach is recommended for most lessons to gain time and for better understanding of concepts.
- It will be good that ethical debates should be conducted by teachers for each module to give the learner a better orientation for each module.
- At the end of some modules, we may have some mini projects which the learners may realized under the supervision of their teachers. But at the end of all the modules, the learner should be able to realized a major project which will help to materialized the module on project management.