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COMPUTER SCIENCE SYLLABUS
FOR ORDINARY SECONDARY EDUCATION
FORM I-IV
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Abbreviations and Acronyms

CA	Continuous Assessment
CSS	Cascading Style Sheets
HTML	Hypertext Mark-up Language
ICT	Information and Communication Technology
IS	Information System
IT	Information Technology
TIE	Tanzania Institute of Education
TIPS	Thin - Ink- Pair Share
TSL	Tanzania Sign Language
TV	Television
URT	United Republic of Tanzania

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Dr Aneth A. Komba
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1.0 Introduction

Computer Science for Ordinary Secondary Education is a compulsory subject for the student who choose to join the Information and Communication Technology (ICT) stream in the General Education pathway. It is also an elective subject for the student in Ordinary Secondary Education who wishes to build a foundation in Computer Science and its related careers. The purpose of learning Computer Science is to deepen the student's knowledge, abilities, and capabilities in applying Computer Science skills to solve real life problems. It also builds student's strong understanding of concepts and principles of computer Science, and principles of data management in solving real-world problems.

The Computer Science syllabus for Ordinary Secondary Education is designed to guide the teaching and learning of Computer Science for Form I-IV in the United Republic of Tanzania(URT). The syllabus interprets the competences indicated in 2023 Ordinary Secondary Education curriculum. It provides information that will enable the teachers to effectively plan the teaching process. It also provides teaching and learning opportunities that guide teachers to apply different methods and strategies while emphasises a hands-on activity for the entire teaching and learning process and develop 21st Century skills which include creativity, communication, collaboration, critical thinking, and problem solving.

2.0 Main Objectives of Education in Tanzania

The main objectives of education in Tanzania are to enable every Tanzanian to:

(a) Develop and improve his or her personality so that he or she values himself or herself and develops self-confidence;

(b) Respect the culture, traditions and customs of Tanzania; cultural differences; dignity; human rights; attitudes and inclusive actions;

(c) Advance knowledge and apply science and technology, creativity, critical thinking, innovation, cooperation, communication and positive attitudes for his or her own development and the sustainable development of the nation and the world at large;

(d) Understand and protect national values, including dignity, patriotism, integrity, unity, transparency, honesty, accountability and the national language;

(e) Develop life and work-related skills to increase efficiency in everyday life;

(f) Develop a habit of loving and valuing work to increase productivity and efficiency in production and service provision;

(g) Identify and consider cross-cutting issues, including the health and well-being of society, gender equality, as well as the management and sustainable conservation of the environment; and

(h) Develop national and international cooperation, peace, and justice per the constitution of the United Republic of Tanzania and international conventions.

3.0 Objectives of Ordinary Secondary Education

The objectives of Ordinary Secondary Education – General Education are to:

(a) Strengthen, broaden, and develop a deeper understanding of the knowledge, skills, and attitudes developed at the Primary Education level;

(b) Safeguard customs and traditions, national unity, national values, democracy, respect for human and civil rights, duties and responsibilities associated with such rights;

(c) Develop self-confidence and the ability to learn in various fields, including science and technology as well as theoretical and technical knowledge;

(d) Improve communication using Tanzanian Sign Language (TSL), tactile communication, Kiswahili, and English. The student should be encouraged to develop competence in at least one other foreign language, depending on the school situation;

(e) Strengthen accountability for cross-cutting issues, including health, security, gender equality, and sustainable environmental conservation;

(f) Develop competence and various skills which will enable the student to employ himself or herself, to be employed and to manage his or her life by exploiting his or her environment well; and

(g) Develop readiness to continue to advanced secondary and tertiary education.

4.0 General Competences for Ordinary Secondary Education

The general competences for Ordinary Secondary Education are to:

(a) Use the knowledge and skills acquired in the Primary Education to strengthen and expand academic understanding;

(b) Value citizenship and national customs;

(c) Demonstrate confidence in learning various professions including Science and Technology, theoretical and practical knowledge;

(d) Use language skills including Tanzania Sign Language (TSL), tactile communication, Kiswahili, language, English, and at least one other foreign language to communicate;

(e) Use knowledge of cross-cutting issues to manage the environment around them; and

(f) Use knowledge and skills to enable a student to be self-employed, employed, and manage life and the environment.

5.0 Main Competences and Specific Competences

The main and specific competences to be developed are presented in Table 1.

Table 1: *Main and Specific Competences for Form I-IV*

Main competences	Specific competences
1. Demonstrate mastery of the basic Concepts of Computer Science	1.1 Demonstrate an understanding the field of Computer Science and its related fields 1.2 Demonstrate an understanding of computer systems 1.3 Demonstrate mastery of maintenance and troubleshooting of computer systems 1.4 Demonstrate mastery of basics of system administration 1.5 Demonstrate mastery of the Internet, and basics of cyber security

Main competences	Specific competences
2. Demonstrate mastery of the basic principles of Computer Science	2.1 Demonstrate mastery of the basic principles of problem solving (concept of problem solving, steps of problem solving, concept of algorithms) 2.2 Demonstrate an understanding of basic principles of computer programming (using an appropriate structured programming language such as C, python, etc) 2.3 Demonstrate an understanding of the basic principles of computer architecture. 2.4 Demonstrate an understanding of the basics of computer networks 2.5 Demonstrate mastery of basic principles of web development (HTML, CSS, and JavaScript) 2.6 Demonstrate mastery of basic principles of mobile App
3. Demonstrate mastery of the basic principles of data management	3.1 Demonstrate the mastery of basic principles of databases and database management systems. 3.2 Demonstrate the mastery of the basic principles of data analysis (data collection, pre-processing, processing, visualization, interpretation)

6.0 Role of Teachers, Students and Parents in Teaching and Learning

A good relationship between a teacher, student, and a parent or guardian is fundamental to ensuring successful learning. This section outlines the roles of each participant in facilitating effective teaching and learning of Computer Science.

6.1 The teacher

The teacher is expected to:

(a) Help the student to learn and acquire the intended competences in Computer Science;
(b) Use teaching and learning approaches that will allow students with different needs and abilities to:
    i. Develops the competencies needed in the 21st century;
    ii. Actively participate in the teaching and learning process;

(c) Use student centred instructional strategies that make the student a centre of learning which allow them to think, reflect and search for information from various sources;

(d) Create a friendly teaching and learning environment;
(e) Prepare and improvise teaching and learning resources;

(f) Conduct formative assessment regularly by using tools and methods which assess theory and practice;

(g) Treat all the students equally irrespective of their differences;

(h) Protect the student while he or she is at school;

(i) Keep track of the student's daily progress;

(j) Identify individual student's needs and provide the right solution;

(k) Involve parents/guardians and the society at large in the student's learning process;
(l) Integrate cross-cutting issues and ICT in the teaching and learning process; and

(m) Teach in such a way that the student develops the competences needed in the 21st century.

6.2 The student

The student is expected to:

(a) Develop the intended competences by participating actively in various learning activities inside and outside the classroom; and

(b) Participate in the search for knowledge from various sources, including textbooks, reference books, and other publications in online libraries.

6.3 The parent

The parent/guardian is expected to:

(a) Monitor the child's academic progress in school;

(b) Where possible, provide the child with the needed academic support;

(c) Provide the child with a safe and friendly home environment which is conducive for learning;

(d) Keep track of the child's progress in behaviour;

(e) Provide the child with any necessary materials required in the learning process; and

(f) Instil in a child a sense commitment and positive value towards education and work.

7.0 Teaching and Learning Methods

The teaching and learning methods are instrumental in developing student's competences. This syllabus suggests teaching and learning methods for each activity which includes but not limited to discussions, presentations, field visits, practical work, research,

scientific experiments, and project works. However, a teacher is advised to plan and use other appropriate methods based on the environment or context. All the teaching and learning methods should be integrated with the everyday lives of students.

8.0 Teaching and Learning Resources

The process of teaching and learning requires different resources. In that regard, both the teacher and students should work together to collect or improvise alternative resources available in the school and home environment when needed. The teacher and the students are expected to constantly seek for information from various sources to effectively facilitate teaching and learning processes. The list of approved textbooks and reference books shall be provided by the TIE.

9.0 Assessment

Assessment is important in teaching and learning of Computer Science subject. It is divided into formative and summative assessments. Formative assessment informs both the teacher and students on the progress of teaching and learning, and in making decisions on improving the teaching and learning process. Teachers are, therefore, expected to apply a wide range of formative assessment methods which include but not limited to discussions, presentations, oral questions, brainstorming, experiments, observations, practical and projects.

Summative assessment, on the other hand, will focus on determining student's achievement of learning. Teachers are expected to use a variety of summative assessments including mid-term tests, terminal, mock examinations and projects. The scores obtained from these assessments will be used as Continuous Assessment (CA). Therefore, the continuous assessments shall contribute 30% and the National Form IV Examination shall be 70% of the student's final achievement, as indicated in Table 2.

Table 2: *Contribution of Continuous Assessment and National Examination in the final score*

Assessment Measure	Weight (%)
Form II National Assessment	10
Form III Terminal Examinations	5
Form III Annual Examinations	5
Project conducted at the end of Form Three	5
Form IV Mock Examination	5
Form IV National Examination	70
Total	**100**

10.0 Number of Periods

The Computer Science for Ordinary Secondary Education provides estimates of the time that will be spent in teaching and learning taking into consideration the complexity of the specific competences and learning activities. Two periods of 40 minutes each have been allocated for this subject per week.

11.0 Teaching and Learning Contents

The Teaching and Learning contents of this syllabus are presented in matrix form with seven columns which include Main Competence, Specific Competence, Learning Activities, Suggested Teaching and Learning Methods, Assessment Criteria, Resources, and Number of Periods as presented in Tables 3 - 6.

Form I

Table 3: *Detailed Content for Form I*

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
1.0 Demonstrate mastery of the basic Concepts of Computer Science	1.1 Demonstrate an understanding of the concept of Computer Science	(a) Describe the concept of Computer Science (*meaning, importance, application*)	**Brainstorming** and **Think-Ink-Pair Share (TIPS):** Through brainstorming and Think-Ink-Pair Share (TIPS) guide students to describe the concept of Computer Science	Confidently describe the concept of Computer Science field	Handouts with contents of Computer Science concepts	8
		(b) Describe fields related to Computer Science (*IT, ICT, IS, Computer Engineering*)	**Question and answer, guest speaker; and/or case study**: Use question and answer, guest speaker; and case study to guide students to describe fields related to Computer Science	Confidently describe fields related to Computer Science		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
	1.2 Demonstrate an understanding of computer systems	(a) Describe computer systems (*Meaning, types, functions, and significance*)	**Questions and answers**: Through questions and answers guide students to describe computer system	Clearly describe computer systems	Computer, Hand-out, Flip board and digital podium, electronic blackboard	28
		(b) Describe computer hardware (*meaning, components, functions, computer generation*)	**Small groups:** Guide students in small groups to describe computer hardware. **Demonstration:** Use demonstration to show different components of computer hardware **practical work:** Guide students through practical work to connect different parts of computer system	Realise parts of computer hardware and their functions	Computer, printer, scaner, camera, projector, flashdisk, hard disk memory card, smart phone, tablets and motherboard	

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Describe computer software (*meaning, types, functions*)	**TIPS and Demonstration:** Using TIPS and demonstration to guide students to describe computer software	Realise types of computer software and their functions		
		(d) Describe and observe principles of computer system handling (safety measures, management, cleanliness, data backup and utilities)	**Group discussion:** Though group discussion students to describe principles of computer handling. **Demonstration:** Teacher to demonstrate on how to perform computer handling technique **Practical work:** Students through practical work to practice on computer handling	Clearly observe principles of handling the computer system	Computer, printer, scaner, projector, flashdisk, memory card, smart phone, tablets and hard disk	

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
	1.3 Demonstrate mastery of maintenance and troubleshooting of computer system	(a) Install simple computer software	**Demonstration Practical Work:** Through demonstration guide students to install simple software and students to do Practical work on installation of software	Can install computer software	Computer, CDs with different software, hand out and dard disk	6
		(b) Organise computer files in different operating systems (*windows, Linux, etc*)	**Demonstration Practical Work:** Through demonstration guide students to organise computer files and students to do practical work to organise computer files	Can use operating systems to organise computer files	Computer installed with recommended OSs, hand out, simulated steps videos and smart phone	
2.0 Demonstrate mastery of the basic principles of Computer Science	2.1 Demonstrate mastery of the basic principles in problem solving	(a) Describe the steps in solving a problem using computers	**Brainstorming:** Through brainstorming guide students to describe	Clearly describe the steps of solving a problem	Computer, smart phone, hand outs of of the basic principles	30

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
	(concept of problem solving, steps of problem solving, concept of algorithms)		the steps of solving a problem using computer	using computer	in problem solving and tablets	
		(b) Demonstrate an understanding of basic principle of algorithms	**Brainstorming and Demonstration:** Through brainstorming and demonstration guide students to describe the concept of an algorithm	Clearly explain how the algorithm can be used to address problems		
		(c) Design and present a single algorithm using flow charts and pseudocode	**Demonstration:** Guide students through demonstration on how to present algorithms using flow charts and pseudocode	Confidently can apply algorithms to present new ways to address problems		

Form II

Table 4: *Detailed Content for Form II*

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
1.0 Demonstrate mastery of the basic Concepts of Computer Science	1.5 Demonstrate mastery of the Internet, and basics of cyber security	(a) Describe the concept of internet and cyber security (*ethics, security, and privacy*)	**Group discussion and Case study:** Through group discussion and case study guide students to describe the concept of cyber security	Clearly explain the concept of cyber security	Projector, computer, Hand-out, TV, Smart board, digital podium, Internet connectivity	20
		(b) Use Internet services (*searching information, www, electronic mail*)	**Practical work:** Through practical work guide students to use Internet service	Confidently can use Internet service	Computer with internet connectivity	

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Understand cyber security threats and related counter measures	**TIPS:** Through TIPS guide students to elaborate security threats and related counter measures **Case Study:** Use case study for example to demonstrate threats and counter measures	Clearly Elaborate security threats and related measures		
		(d) Evaluate ethical issues, related principles, and practices of cyber security	**Case study:** Using case study guide students to evaluate ethical issues	Clearly evaluates issues and related policies governing		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
			and related principles and practices of cyber security	ethics, security and privacy maintenance and troubleshooting of computer system		
		(e) Apply basic cyber security measures (*passwords, safe browsing, netiquette*)	**Case study:** Using case studies to guide students to apply basic cyber security measures. **Practical work:** Students to do practical work to set password	Confidently basic cyber security measures	Projectors, computers, Internet connectivity	

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
2.0 Demonstrate mastery of the basic principles of Computer Science	2.2 Demonstrate an understanding of basic principles of computer programming (*using an appropriate structured programming language such as C, python, etc.*)	(a) Describe concept of programming language (*categories, paradigm, generic structures*)	**TIPS, question and answer, and group discussion:** Through TIPS, question and answer, and group discussion guide students to describe computer programming language	Clearly explain the concept of programming language	Computer installed with appropriate programming tools	50
		(b) Describe programming tools (*compiler/ interpreter, text editor, IDE, Debugger*)	**Group discussion:** Through group discussion guide students to describe programming tools	Clearly can describe programming tools		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Install and configure the selected programming language (*compiler/ interpreter, text editor, IDE, Debugger*)	**Demonstration and Practical work:** Through demonstration and practical work teacher to guide students to install and configure the selected programming language tools	Mastering the environment of the selected program Can install and configure programming tools		
		(d) Use programming tools of selected programming language to write a program (*compile/run and debug a simple program*)	**Practical work:** Through practical work teacher to guide student to use program tools of selected programming language to write a simple program	Mastering the of use programming tools of selected programming language		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(e) Use variables, constants, and data types of a selected programming language in a program (*operators and expressions*)	**Practical work:** Through practical work teacher to guide students to use variables and data types of a selected programming language	Can use variable and data type in programming language		
		(f) Use syntax and constructs of the selected programming language to write programs branching	**Practical work:** Through practical work teacher to guide students to write a program employing branching	Can use syntax and various constructs to write programs		
		(g) Debugging computer programs	**Demonstration:** Guide students through demonstration to debug a program	Confidently debug the program		

Form III

Table 5: *Detailed Contents for Form III*

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
2.0 Demonstrate mastery of the basic principles of Computer Science	2.3 Demonstrate an understanding of the basic principles of computer architecture	(a) Describe the concept of data representation (*digital data, number systems, data type, character coding (UNICODE and ASCII*)	**Question-and-answer, TIPS, and small group discussion:** Through question-and-answer, TIPS, and/or small group discussion guide students to describe the concept of digital data representation	Explicitly explain the concept of digital data representation	Hand outs standard codes	10
		(b) Represent numbers in different number systems (*binary, octal, decimal, and hexadecimal*)	**Demonstration:** Through demonstration guide students to represent numbers in different number systems	Confidently represent numbers in different number systems		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Convert numbers from one system to another (*binary, decimal, and hexadecimal*)	**Demonstration:** Through demonstration guide students to convert numbers from one system to another	Competently convert numbers from one system to another		
		(d) Perform arithmetic operations (*addition and subtraction*) using binary numbers	**Demonstration:** Through demonstration to guide students to perform arithmetic operations	Capability to perform arithmetic operations		
	2.2 Demonstrate an understanding of basic principles of computer programming	(a) Use the syntax and constructs of selected programming language to write program	**Demonstration:** Guide students through demonstration to use iteration and functions in a program	Confidently use iteration and functions in a program	Computer installed with appropriate programming tools	30

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
	(*using an appropriate structured programming language such as C, python, etc.*)	(*iteration, functions, array, and string*)				
		(b) Use scope of variable in a program	**Demonstration:** Guide students though demonstration to use scope of variables	Confidently describe and use the concept of scope of variable		
		(c) Text and Debug computer program that employs iteration, array, string, branching and functions	**Demonstration:** Guide students through demonstration to text and debug computer program that employs iteration and functions branching and functions	Confidently debug computer program that employs iteration and functions branching and functions		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(d) Appraise the utility of the developed program	**Questions and answer:** Through questions and answer guide students to appraise the utility of the developed applications	Clearly evaluate the efficacy of the developed application		
	2.4 Demonstrate an understanding of the basics of computer networks	(a) Describe the concept of computer network) (*meaning, mode, media, components, etc.*)	**Demonstration:** Through brainstorming guide students to describe the concept of computer network	Can clarify the concept computer network	Computer with installed internet, network cables and network card	10

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Design a simple computer network involving a typical topology	**Demonstration:** Through demonstration guide students to design a simple network	Can design a simple computer network of a given topology		
		(c) Create a computer network involving typical topology	**Demonstration:** Teacher to demonstrate on how to create a computer network involving typical topology and data transmission mode and media **Practical work:** Students through practical work to create a computer network	Confidently can use topology, data transmission mode and media to set computer network		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
3.0 Demonstrate mastery of the basic principles of data management	3.1 Demonstrate the mastery of basic principles of databases and database management systems	(a) Describe the concept of data and information	**Brainstorming:** Through brainstorming to guide students to describe concepts of data and information	Cleary describe the concepts of data and information	Computer installed with appropriate tools for managing data	20
		(b) Manage simple data (*create, store, retrieve, check data quality*)	**TIPS:** Use TIPS to guide students to describe the relationship between data and information	Successfully manage simple data		
		(c) Describe the concept of database and database management system	**Brainstorming:** Through brainstorming to describe the concepts database and database management system	Explicitly elaborate the concept of database and database management system		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(d) Design a database	**Demonstration:** Through demonstration teacher to guide students to design a database **Practical work:** students through practical work to design a database	Clearly explain the concept of database	Computer installed with appropriate tools for database design	
		(e) Create a database using selected software (*e.g., MS – Access*)	**Practical work:** Through practical work teacher to guide students to create a database using selected software	Clearly identify steps of designing and developing a database and step by step create a database		

Form IV

Table 6: *Detailed Contents for Form IV*

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
1.0 Demonstrate mastery of the basic Concepts of Computer Science	1.4 Demonstrate mastery of systems administration	(a) Maintain computer systems – desktop, laptop, tablets, mobile (*create, delete/ disable user account, create, modify, and reset password, user support, peripherals*)	**TIPS:** Through TIPS guide students to explain the roles of system administrator. **Practical work:** Through practical work students to maintain a computer system	confidently maintain the computer system	Projector, Computer (*desktop, laptop, tablets, mobile*), Internet connectivity	10
		(b) Apply troubleshooting tools and techniques	**Demonstration:** Through demonstration guide student to apply troubleshooting and maintenance tools	Clearly identify the roles of system administrator and responsibly troubleshoot a system		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Use selected OS to Perform system administration tasks	**Demonstration:** Through demonstration guide student to use selected OS to perform system administration duty	Responsibly administer and maintain a system		
2.0 Demonstrate mastery of the basic principles of Computer Science	2.5 Demonstrate mastery of basic principles of web development (HTML, CSS, and JavaScript)	(a) Describe the background of HTML and selected programming languages (*CSS, JavaScript*)	**Brainstorming or TIPS:** Guide student through brainstorming or TIPS to describe the background of HTML and selected programming languages	Clearly explain the background of HTML, CSS, and JavaScript	Computer installed with appropriate programming tools	30

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Install and configure the CSS and JavaScript interpreter (*e.g., a web browser*)	**Demonstration:** Guide student through demonstration to install and configure the CSS and JavaScript interpreter	Mastery the installation and configuration of CSS and JavaScript interpreter		
		(c) Create webpages using HTML and CSS, JavaScript	**Demonstration:** Guide students through demonstration to create webpages using HTML, CSS, and JavaScript	Successfully create static webpage using HTML, CSS, and JavaScript		
		(d) Publish website	**Demonstration:** Guide student through demonstration to publish a website	Successfully publish the website		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(e) Appraise the published website	**Demonstration:** Through questions and answer to guide student to appraise the published website	Can point out the use of developed website		
	2.6 Demonstrate mastery of basic principles of mobile App	(a) Create mobile App using the syntax of the selected program	**Demonstration:** Guide student through demonstration to create mobile app using the syntax of the selected program	Can read, write, test, and modify JavaScript languages upon creating a mobile App	Computer installed with appropriate programming tools for mobole Apps	20
		(b) Publish Mobile Apps	**Demonstration:** Guide students through demonstration to publish Mobile Apps	Can publish a mobile App		

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(c) Appraise the efficacy of the published Mobile Apps	**Questions and answer:** Through questions and answer to guide students to appraise the efficacy of the published Mobile Apps	Can point out the use of developed mobile App		
3.0 Demonstrate mastery of the basic principles of data management	3.2 Demonstrate the mastery of the basic principles of data analysis	(a) Describe principles of data analysis (*data collection, pre-processing, processing, visualization, interpretation*)	**Questions and answer:** Through question and answer to guide students to describe principles of data analysis	Can point out the principles of data analysis	Computer installed with data analysis tools, projector	10

Main competences	Specific competences	Learning activities	Suggested teaching & learning methods	Assessment criteria	Suggested resources	Number of periods
		(b) Analysis simple data using selected tools (*e.g., SPSS, Excel, etc.*)	**Practical work:** Through practical work teacher to guide students to analysis simple data using selected tools	Successfully analysis simple data using selected tools		

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