Information and Communication Technology

Syllabus

Grade 11

To be implemented from 2016

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1. Introduction

The Information and Communication Technology sector is acknowledged worldwide as a tool that could be used to increase the productivity, efficiency and effectiveness of work. However, in Sri Lanka, the level of ICT skills of the majority of the students is not adequate to meet the current requirements of business and industry. This is mainly due to the lack of opportunities for students to study ICT related subjects in the school curriculum.. The student should learn at school a wide variety of competencies for different needs of life in the changing world. They should develop their own views and different ways to continue their studies and proceed for employment.

ICT education for the schools in Sri Lanka is still in the stage of introducing it to the lower grades. Therefore the present syllabus does not demand any ICT knowledge as an entry requirement. Therefore, this syllabus is intended to introduce ICT as a technical subject to be offered at the G.C.E (O/L)Examination. The main objective of this syllabus is to develop the competencies to use ICT tools and to build a basic theoretical base for students to pursue higher studies in ICT.

The syllabus of Grade 11 has been thoroughly revised especially in the area of programming. The dependence on a software tool has been removed and greater emphasis is placed on logical thinking which is a transferable skill to programming in any computer language. Certain subject areas have also been reorganized to meet current developments in the world of ICT.

2. Aims of the Information and Communication Technology Curriculum

Such a surge in the growth, development and application of Information Communication Technology as today has never been experienced before. The importance and relevance of ICT to almost all walks of life today has made it all the more important that knowledge and expertise, both practical and theoretical, of its application should begin at the very grassroots level of education.

Aims to be achieved through the course are as follows:

- Inculcate basic computer literacy and develop a base for further pursuit of Information Technology and Communication Technology studies.
- Develop understanding of the use and resultant outcomes of the use of different types of ICT applications.
- Develop concepts and principles related to ICT.
- Improve skills required for the development of ICT based solutions for real world problems.
- Provide awareness of benefits and problems of ICT use to participants

Syllabus of G.C.E. (O/L) ICT: Grade 11

Subject Content and Duration in terms of Competencies and Competency Levels

Competency	Competency Level	Content	Learning outcomes	Periods
10. Writes programs to solve problems	10.1.Analyzes the problem	• Identification of inputs and outputs • Identification of possible alternate process steps	• Identifies inputs and outputs • Explores solution space	2
	10.2 Uses control structures in developing algorithms to solve problems.	• Introduction to algorithms: purpose • Control structures for developing algorithms o Sequence o Selection o Iteration (Repetition)	• Explains purpose of algorithms • Describes control structures • Applies control structures to develop algorithms	2
	10.3 Uses different tools to present algorithms.	• Tools for developing algorithms o Flow charts o Pseudo codes o Conversion of flowcharts into pseudo codes	• Identifies symbols of flow charts • Explains structure of pseudo code • Draws flow charts to represent algorithms • Converts flow charts to pseudo code	4

Competency	Competency Level	Content	Learning outcomes	Periods

	10.4 Uses data types in programming.	- Identifiers, reserved words and key words in a computer programming language
		- Variables and constants in computer programming
		- Description of data types
		  o Purpose of data types
		  o Use of meaningful names for identifiers
		
		- Basic Data Types:
		  o Numeric (integer, floating point)
		  o Character
		  o Logical
			- Declares identifiers using correct data types
			- Uses variables effectively in programs
				4

	10.5 Uses operators in programming	- Purpose of operators
		- Basic operators
		  o Arithmetic operators
		  o Comparison operators
		  o Logical operators: AND, OR, NOT
		- Operator precedence
		- Expressions
			- Selects correct operators in computations
			- Applies operators effectively in programs
			- Evaluate results of expressions
				4

Competency	Competency Level	Content	Learning outcomes	Periods
	10.6 Develops programs involving selection control structure	• IF-EndIf and If-Else-EndIf statement • Use of switch/case when single variable has multiple conditions • Conversion of flow charts into pseudo codes and subsequent coding into a programming language	• Identifies correct selection control structure. • Identifies correct selection condition. • Uses selection control structure in programs. • Combines selection control structures to meet programming needs.	5

	10.7 Develops programs involving basic iterations.	• Use of iterations (repetitions) in:
		  • Cases where the number of iterations are known
		  • Cases where the number of iterations are unknown
		• Checking of the condition for iterations
		  o Beginning of the iteration
		  o End of the iteration
			• Identifies correct iteration structure.
			• Applies correct condition to control iterations.
			• Uses iteration control structure in programs.
				7

Competency	Competency Level	Content	Learning outcomes	Periods
		• Conversion of flow charts into pseudo codes and subsequent coding using a programming language		
	10.8 Develops programs with nested control structures	• The purpose of using nested control structures • Use of control structures within another control structure o Selection within selection o Iteration within iteration o Iteration within selection o Selection within iteration • Conversion of flowcharts into pseudo codes and subsequent coding into a programming language	• Identifies cases where nested control structures are required. • Uses nested control structures in programs.	3

Competency	Competency Level	Content	Learning outcomes	Periods

	10.9 Develops programs using one dimensional arrays.	• The purpose of the use of arrays
		• Definition of the one dimensional array
		• Properties of an array
		  ○ Index
		  ○ Contiguous locations
		  ○ Random access
		• Array Operations
		  ○ Declaration
		  ○ Accessing values
		  ○ Assignment of values
			• Describes features of one dimensional arrays.
			• Carries out operations in arrays.
			• Uses one dimensional arrays in programs.
				3

	10.10 Structures programs through the use of sub-programs.	• The purpose of the use of sub-programs
		  ○ Improvement of code reusability,
		  ○ Readability
		  ○ Maintainability
		• Types of sub-programs: value turning and not returning
		• Structuring of programs using sub-programs
		  Development of basic programs with a single sub-program
			• Describes the need of sub-programs.
			• Demonstrates the use of value-returning and value-not returning sub-programs.
			• Uses sub-programs in programming.
				2

Competency	Competency Level	Content	Learning outcomes	Periods
	10.11 Explores the evolution of programming languages.	- Low-level languages - Machine language - Assembly language - High-level languages - Types of high-level languages: - Procedural vs Declarative - Structured vs Object oriented - Programming vs scripting - Methods used to convert source code to machine code - Interpreters - Compilers - Testing and debugging	- Compares and contrasts low-level and high-level languages. - Describes features of high-level languages. - Describes the operation of language translators.	2
11. Explores the Systems Development Life Cycle of information system development.	**11.1 Describes the concept of information system.**	- Definition of a system - Components of a system - Input - Process - Output - Manual systems - Computer based systems - Information systems - Importance of Information in decision making - Inputs, outputs, data-flows and processes	- Describes an information system. - Identifies the relationship between the components of an information system. - Explains the significance of an information system.	4

Competency	Competency Level	Content	Learning outcomes	Periods

	11.2 Explains the Systems Development life cycle.	• The system development life-cycle
		
		   o Identification of requirements
		   o Design of the solution
		   o Implementation of the solution
		   o Testing of the solution
		   o Deployment of the solution
		   o Maintenance of the system.
		• Difference between phased system development life-cycle and iterative increment life-cycle
			• Describes the stages in system development.
			• Provides examples of each stage.
				3

12. Uses the Internet for information search and communication effectively.	**12.1 Uses the Internet to access information**	• Introduction to the Internet: URL, IP address and domain names. • Client-server operation: Bi-directional information flow between browser and the server	• Describes the operation of the Internet. • Explains the services of the Internet • Uses the services to obtain information.	4

Competency	Competency Level	Content	Learning outcomes	Periods
		• Functions of the Internet: E-mail, WWW, ftp, remote access, file-sharing, streaming of media, cloud computing, search engines. • Domain name server and its purpose		
	12.2 Uses the Internet for communication	• e-mail accounts: Sending and receiving mails- to, from, bcc and cc, attachments, subject • Instant messaging services • Video-based communication • Social media networking	• Communicates via e-mail accounts. • Describes basic communication facilities available on the Internet.	3
13. Develops Multimedia contents to express ideas effectively.	13.1 Creates effective still graphics using suitable graphic software.	• Digital image elements: pixel, resolution, size, color • Image capacity and compression: lossy formats and lossless formats	• Describes properties of digital still images. • Creates images using software tools	6

Competency	Competency Level	Content	Learning outcomes	Periods

		• Image types: raster and vector
		• Graphic types: raster and vector
		• Working knowledge of graphic software to perform the following basic operations
		   o Open, save and edit
		   o Importing images
		   o Sizing and transformation
		   o Selections, cut, crop, replace
		   o Working with layers
		   o Text editing and effects
			• Edit digital graphics.
			• Uses basic text effects.	

Competency	Competency Level	Content	Learning outcomes	Periods

	13.2 Creates effective 2D animations using suitable 2D animations software	• Animation basics: Layers, frames, timing, frame rate
		 • Geometrical objects and shapes
		 • Frame types: frame, key frame, initial frame, destination frame, blank key frame.
		 • Animations
		   o Frame by frame animation
		   o Basic Tweening
		 • Publishing
			• Describes basic features of 2D animations.
			 • Creates basic animations using animation software tools
				4

	13.3 Edit Audio and video contents using suitable software	• Recording audio content. • Editing (extracting a relevant segment from original content)	• Carries out basic audio editing using software. • Carries out basic video editing using software.	2
	13.4 Effectively integrates multimedia contents	• Integration of background images with animations • Integration of audio and video	• Designs multimedia according to basic requirements. • Integrate multimedia using software tools.	2

Competency	Competency Level	Content	Learning outcome	Periods
14. Develops websites incorporating multimedia technology.	**14.1 Structures information for development of websites.**	• Contents for websites • Analysis of the purpose and the audience • Organization of the content/messages • Design of the layout and structure: scheme, color, font. • Selection of media assets	• Identifies user needs of the website. • Designs website according to specifications.	2

	14.2 Uses HTML basics.	• Difference between hypertext and normal text.
		• Features of HTML
		• HTML document structure – Head, Title, body
		• HTML basics
		  o Line and paragraph breaks
		  o Text: format and color
		  o Insertion of images
		  o Use of hyperlinks
		  o Lists
		  o Tables
			• Explains the use of basic tags in HTML.
			• Creates web pages using HTML.
				3

Competency	Competency Level	Content	Learning outcome	Periods

	14.3 Develops web sites using web development tools	• Web authoring tools
		• Text Formatting
		• Page Layout
		• Use of Multimedia building blocks: text, graphics, audio and video
		• Hyperlinks
		• Methods of web development
		   o Static vs dynamic webs
		   o Content managed web development
		• Content Management Systems (CMS)
		   o The purpose of the process of CMS based web development:
		   o Work-flow and roles in CMS
		   o Content creation, editing, publishing, and use
		   o Roles: Creator, editor, publisher, administrator, user
			• Uses web authoring tools to develop websites.
			• Explains the purpose and the process of content managed websites.
			• Uses CMS tools to create and manage websites.
				5

Competency	Competency Level	Content	Learning outcome	Periods
	14.4 Demonstrates preparedness to publish web sites	• Internet Service Providers for Web hosting: • Maintenance of a website	• Identifies requirements of web publishing.	1
15. Compares and contrasts benefits and issues related to ICT in society	**15.1. Investigates the contribution of ICT to the health sector**	• ICT in Health services o Tele Medicine o Tele monitoring • Computer controlled medical equipment o Computer Axial Tomography (CAT) scanner o Magnetic Resonance Imaging • Maintenance of medical history records. o Clinical history o Medication • Test reports	• Describes the use of ICT in health services. • Describes the use of ICT based medical equipment. • Describes the use of ICT in medical records.	2

Competency	Competency Level	Content	Learning outcome	Periods

	15.2. Investigates the contribution of ICT to education	• ICT Assisted Learning (e-learning)
		  o Interactive teaching and learning material
		  o Web-based learning
		• Learning Management Systems (LMS)
		• School Management Information Systems
			• Explains the use of ICT in interactive learning.
			• Describes the use of ICT in LMS.
			• Explains the use of ICT in school management.
				1

	15.3. Investigates the contribution of ICT to agriculture	• Computer controlled agricultural equipment : Green houses • Information searching on agriculture • Virtual competitive market for agricultural products • Optimization of agricultural productivity • Detection and control of pests • Optimization of fertilizer use • Weather prediction	• Explains the use of ICT to enhance productivity in agriculture • Explains the use of ICT in dissemination of information in agriculture.	1

Competency	Competency Level	Content	Learning outcome	Periods
	15.4.Investigates the usage of ICT in different industries.	• Architecture: Computer-Aided Design(CAD) • Manufacturing - Computer Aided Manufacture (CAM)/Computerized machines in production • Production - Robotic	• Explains the use of ICT in engineering designs. • Explains the use of ICT in production.	1

	15.5. Explores the contribution of ICT to Business	• e-Business
		  o Internet based (on-line) shopping
		  o Internet based (on-line) Share market transactions
		  o Safety measures
		• Advertising
		• Outsourcing IT-Business Process (IT BPO)
			• Explains the use of the Internet in business
			• Explains the use of ICT in advertising
			• Explains the use of the Internet in BPO.
				1

	15.6 Explores the contribution of ICT to Entertainment	• Movies and cartoon production • Digital sound editing • Games • Simulations	• Describes the use of ICT in movie and game production. • Explains the use of ICT in audio editing.	1

Competency	Competency Level	Content	Learning outcome	Periods

	15.7. Assesses issues related to ICT with respect to ethical and legal aspects	• Legal Issues
		  o Data theft
		  o Unauthorized access to systems
		• Intelligent property: copyright, patents and piracy.
		• Privacy
		• Forgery
		• ICT legislation framework in Sri Lanka
		• Ethical issues: Fair use, plagiarism
			• Explains legal issues in the use of ICT
			• Explains ethical issues in the use of ICT
				1

	15.8. Explores issues and precautions related to ICT infrastructure protection.	• Physical Security
		  o UPS
		  o Hardware firewalls
		  o Restricted access via door-locks
		  o CCTV surveillance
		  o Surge protectors
		• Logical Security
		  o Passwords
		  o Software firewalls
		  o Backups
		• Protection against malware: spam, virus, key-loggers
			• Identifies security issues.
			• Takes precautions to eliminate or minimize security threats.
				2

Competency	Competency Level	Content	Learning outcome	Periods

		• Environmental factors
		  o Dust
		  o Humidity
		  o Temperature
		• Institutions for information security of Sri Lanka		

	15.9. Investigates health and safety issues inherent in the use of ICT.	• Ergonomics and Health issues Repetitive Strain Injury: eye-strain, backaches • E-waste: Hazardous elements and its impact on the environment. • Safe disposal and destruction of electronic equipment.	• Explains basic health and environmental issues associated with the use of computers. • Explains the precautions to be taken in the use of computers. • Explains safe disposal methods of electronic equipment.	2
	15.10. Assesses issues associated with ICT and society.	• Digital divide • Digital bridge • De-skilling • Techno-rich employment • Equal Opportunities • Misuse of ICT and precautions to be taken (social media)	• Explains problems caused by ICT in society • Explains changes in employment caused by advances in ICT	1
		Total (Periods)		90