



Information and Communication Technology

Grade 11

Teacher's Guide

Effective from 2016

Department of Information Technology

National Institute of Education

Maharagama

Sri Lanka

www.nie.lk

5. 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 outcome	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
		  ○ Sequence
		  ○ Selection
		  ○ 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
		  ○ Flow charts
		  ○ Pseudo codes
		  ○ 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 outcome	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 outcome	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
		  ○ Beginning of the iteration
		  ○ 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 outcome	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
		  ○ Selection within selection
		  ○ Iteration within iteration
		  ○ Iteration within selection
		  ○ 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 outcome	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 o Index o Contiguous locations o Random access • Array Operations o Declaration o Accessing values o 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 o Improvement of code reusability, o Readability , ease of testing o 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
			• Compa res 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 outcome	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 outcome	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 outcome	Periods

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

Competency	Competency Level	Content	Learning outcome	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
		  • Frame by frame animation
		  • 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
		  ○ Static vs dynamic webs
		  ○ Content managed web development
		• Content Management Systems (CMS)
		  ○ The purpose of the process of CMS based web development:
		  ○ Work-flow and roles in CMS
		  ○ Content creation, editing, publishing, and use
		  ○ 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. • Publishes on free hosts.	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)
		  ○ Interactive teaching and learning material
		  ○ 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
		  ○ Data theft
		  ○ 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
		  ○ UPS
		  ○ Hardware firewalls
		  ○ Restricted access via door-locks
		  ○ CCTV surveillance
		  ○ Surge protectors
		• Logical Security
		  ○ Passwords
		  ○ Software firewalls
		  ○ 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
		  ○ Dust
		  ○ Humidity
		  ○ 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