



Course Outline

IT Year 13/A level

*Inspiring excellence, empowering global minds*

## Overview

This syllabus overview provides ideas for teachers about how to construct and deliver a course for Cambridge International AS & A Level Information Technology (9626). The syllabus has been broken down into teaching units with suggested teaching activities and learning resources to use in the classroom. This scheme of work, like any other, is meant to be a guideline, offering advice, tips and ideas. It can never be complete but aims to provide teachers with a basis for planning their lessons. As well as making sure that the content of the Information Technology syllabus is covered, it includes development ideas for topics.

## Learning Outcomes

The key concepts on which this syllabus is built are set out below.

### **Impact of IT in Society**

Information Technology (IT) is the application of technology to process information.

The impact of IT on all aspects of everyday life is immense. The enormity of the impact can be seen in industry and commerce, transport, leisure, medicine and the home. The impact on the work force is a very important factor to consider and communications using new technologies have made the World seem smaller.

### **Hardware and software**

Many hardware components and software applications are used in IT systems. It is important to understand how these work, and how they interact with each other and within our environment.

### **Network**

Computer systems can be connected together to form networks allowing them to share resources.

### **The internet**

The internet is a global communications network that allows computers worldwide to connect and share information in many different forms. Examples include email, web pages, and audio and video files. The impact of the internet on our lives is profound. While it provides huge benefits to society, security of data is an issue, both in the workplace and for personal data.

### **System life cycle**

Information systems are developed within a planned cycle of stages that cover the initial development of the system and continue through to its scheduled updating or redevelopment.

### New technologies

As the information industry changes so rapidly, it is important to keep track of new and emerging technologies and consider how they might affect everyday life.

### Ongoing Objectives

- There are objectives that are covered and built upon throughout each unit of work.
- develop a broad range of IT skills
- develop an understanding of the parts, use and applications of IT systems within a range of organizations, including the use of basic computer networks
- develop an understanding of how IT systems affect society in general
- develop an understanding of the main system life cycle and apply this understanding to workplace situations
- develop a broad knowledge of the use of Expert Systems
- be aware of new and emerging technologies
- be aware of the role of the internet and its potential but also its risks
- apply their knowledge and understanding of IT to solve problems.
- To articulate and justify answers, arguments, and opinions
- Recall, select and communicate knowledge and understanding of IT
- Apply knowledge, understanding and skills to produce IT-based solutions
- Analyse, evaluate, make reasoned judgements and present conclusions

### Unit Overviews

#### Term 1

#### Unit 12 – IT in society

**Approximate length: 2 weeks**

#### Specific National Curriculum Objectives Covered:

All pupils must have the opportunity to study aspects of information technology and computer science at sufficient depth to allow them to progress to higher levels of study or to a professional career.

All pupils should be taught to:

- develop their capability, creativity and knowledge in computer science, digital media and information technology
- develop and apply their analytic, problem-solving, design, and computational thinking skills
- understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.

Candidates should be able to:

#### E-business

- evaluate the impact of information technology on e-business (including: banking, shopping, trading goods)
- describe how it is possible to be subjected to fraud when using credit cards online
- evaluate the impact of digital currency (including: Bitcoin, Litecoin)
- explain how IT is used in e-business (including: electronic funds transfer, automatic stock control, electronic data exchange, business-to-business buying and selling, online stores)
- discuss how organisations mine data to analyse social and economic trends

#### Social networking

- evaluate methods used for social networking (including: chat rooms, instant messaging, forums, email,

blogs, microblogs) and their impact on changing social patterns

#### 1Video conferencing and teleworking

- describe video conferencing and the hardware and software used
- describe web conferencing and the hardware and software used
- discuss the advantages and disadvantages of video conferencing on employers and employees
- discuss the advantages and disadvantages of web conferencing on employers and employees
- describe teleworking
- discuss the effects of teleworking on employers and employees

#### Technology in society

- evaluate the impact of information technology on society (including: sport, manufacturing, medicine,

education, banking, e-business)

#### Technology enhanced learning

- discuss the advantages and disadvantages of software-based training methods
- evaluate the impact of technology on learning (including: Massive Open Online Courses (MOOC), computer based training, online tutorials, video conferencing)

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important factor to consider and communications using new technologies have made the World seem smaller.

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**Unit 13 - Emerging technologies**

**Approximate length: 2 weeks**

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Candidates should be able to:

- describe emerging technologies (including: 3D printing, 4G and 5G cellular communications, artificial intelligence, augmented reality, biometrics, cloud computing, computer-assisted translation, holographic and 4th generation optical data storage, holographic imaging, quantum cryptography, robotics, QR codes, wearable computing, ultra-high definition television (including: 4K resolution screens) vision enhancement, virtual reality, and their possible uses in different fields, (including: medicine, manufacturing, space exploration)
- evaluate the impact of emerging technologies on individuals and their lifestyles (including: smartphones performing many of the tasks that PCs and laptops perform)
- evaluate the impact of emerging technologies on organisations
- evaluate the impact of emerging technologies on medicine (including: development of prosthetics and medical products, tissue engineering, artificial blood vessels and the design of medical tools and equipment)
- evaluate the impact of emerging technologies on the environment

- discuss the advantages and disadvantages of storing data in the cloud

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**Unit 14 - Networks**

**Approximate length: 2 weeks**

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Candidates should be able to:

**Network components**

- describe the role and operations of the following components in a network: switches, hubs, wireless

access points, network interface cards, wireless network interface cards, routers, repeaters, gateways,

bridge, firewalls (hardware and software) and servers

- describe bandwidth
- describe bit rate
- describe bit streaming (both real time and on demand)
- discuss the importance of bit rates/broadband speed on bit streaming
- describe packet switching, circuit switching and message switching
- describe optical communication/transmission methods (fibre optic, laser), their advantages, disadvantages and their typical applications
- evaluate wireless communication/transmission methods (including: Bluetooth, infrared, WiFi, radio), their advantages, disadvantages and their typical applications

- explain the importance of bandwidth and bit rate when transmitting data
- analyse how different types of communication/transmission media (cables, wireless, optical) govern the bandwidth available for transmitting data
- describe what a protocol is and different types of protocols (including: Wide Area Network protocols and Local Area Network access protocols)
- describe how the BitTorrent protocol provides peer-to-peer file sharing

#### **Network security**

- describe the security issues that could arise from networking computers
- explain how security issues can be prevented on a computer network
- evaluate a range of physical and software based security methods for a computer network
- list the principles of a data protection act
- analyse the need for a data protection act
- evaluate methods for combating IT crime (including: physical security methods, biometric methods, firewalls, back-up, encryption, access rights, malware security, antivirus, anti-spyware)

#### **Satellite Communication Systems**

- describe how Satellite Communication Systems are used and work in data transfer systems, television and radio broadcasting systems and global positioning systems (GPS)
- discuss the advantages and disadvantages of using satellites for data transfer systems, television and radio broadcasting systems, and GPS

### **Unit 15 – Project management**

**Approximate length: 2 weeks**

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Candidates should be able to:

#### **Stages in project management**

- describe the stages of project management from project conception to project close

#### **Types of project management**

- discuss the types of project management software and the advantages and disadvantages of each type

**Project management software**

- explain how project management software is used (including: planning, scheduling of tasks, allocation of resources, costings, communications, decision-making)

**Critical path analysis**

- describe, interpret and create a critical path analysis

**Gantt charts**

- describe, interpret and create a Gantt chart

**Disaster recovery management**

- describe disaster recovery management (including: risk analysis, perpetrator analysis, risk testing, quantifying the risk, securing the risk, software protection, password controls, recovery management)

**Prototyping**

- describe prototyping
- describe types of prototyping (including: evolutionary, incremental, throw-away, rapid)
- discuss the advantages and disadvantages of prototyping
- describe Rapid Application Development (RAD) and other methods of software development (including: the conventional 'waterfall' method)
- discuss the advantages and disadvantages of rapid application development (RAD)

**CAD/CAM**

- evaluate the use of computer-aided design (CAD) and computer-aided manufacturing (CAM)
- describe the uses of computer-aided design (CAD) and computer-aided manufacturing (CAM)
- discuss the benefits and drawbacks of using computer-aided design (CAD) and computer-aided manufacturing (CAM)

**Unit 16 - System life cycle****Approximate length: 2 weeks**Specific National Curriculum Objectives Covered:

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Candidates should be able to:

**Analysis**

- analyse and evaluate different methods of researching a situation (including: questionnaires, interviews, observation, document analysis)

- describe the content of the requirements specification, system specification and design specification

### **Design**

- identify a flow of data through a system and create a data flow diagram (DFD) and a system flowchart
- design and evaluate data collection forums and screen layouts
- design and evaluate validation routines
- create a data dictionary for a given situation
- evaluate suitable hardware and software for a new system

### **Development and testing**

- describe the purpose of test data
- explain the purpose of alpha testing
- explain the purpose of beta testing
- analyse the difference between alpha testing and beta testing
- explain the purpose of black box testing
- explain the purpose of white box testing
- analyse the difference between black box testing and white box testing
- explain the importance of testing and having a test plan
- describe how a test plan is created
- create a test plan for a given situation

### **Implementation**

- describe the different methods of implementing a system (including: parallel running direct changeover, phased implementation, pilot implementation)
- analyse the suitability of an implementation method for a given situation

### **Documentation**

- design and develop elements of technical documentation
- design and develop elements of user documentation
- explain the need for technical and user documentation

### **Evaluation and maintenance**

- evaluate a new system in terms of efficiency, ease of use and meeting user requirements
- explain the need for maintenance
- explain perfective, adaptive, preventive and corrective maintenance

## **Unit-17 Mail merge**

**Approximate length: 2 weeks**

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- understand how changes in technology affect safety, including new ways to protect their online privacy and identity, and how to identify and report a range of concerns.

Candidates should be able to:

- create a master document structure (including: standard letter)
- create a source file using appropriate software
- link a master document to a source file, identifying and using correct field names, using conditional operators
- specify rules for managing recipients and contents of a mail merge
- set up fields for manual completion
- create appropriate prompts to the user for manual completion
- use the software to automatically select the required records
- use manual methods and software tools to ensure error-free accuracy
- perform mail merge using the master document and data sources
- create variable fields to control record selection and omission when merging
- explain why mail merge documents are created

### Unit 18 – Graphics creation

Approximate length: 2 weeks

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Candidates should be able to:

#### **Vector images**

- create a vector image that meets the requirements of its intended application and audience
- use layers to overlap items
- use grouping or merging tools
- use rotation and place an item
- use transform tools to resize
- use selection tools to select parts of an image
- use crop tools to crop part of an image
- use fill tools to colour items
- use colour gradients
- use node editing
- fit text to a path
- save an image in different file formats

- compress an image to different resolutions using file formats (including: .jpg and .png) to suit

different media file size requirements

### Bitmap images

- create a bitmap image that meets the requirements of its intended application and audience
  - use layers to overlap items
  - use rotation and place an item
  - use grouping or merging tools
  - use selection tools to select parts of an image
  - use crop tools to crop part of an image
  - use masking tools
  - use tools to improve parts of an image (including: blend, replicate, retouch)
  - use tools to remove red eye
  - use filters (including: blur, distort, sharpen)
  - convert between colour, duotone and black and white images
  - use colour gradients
  - resize an image
  - resize the canvas
  - change the opacity of all or part of an image
  - use text tools to include text
  - save an image in different file formats
  - compress an image to different resolutions using file formats (including: .bmp, .jpg, .png, gif

to suit

different media file size requirements)

- describe the difference between a bitmap and a vector graphic
- describe how typical features found in bitmapped and vector graphics software are used in practice
- evaluate their suitability for a given scenario
- evaluate the impact of image editing on society (including: media, advertising, fashion, shopping, politics, entertainment)

## Unit 19 – Animation

Approximate length: 2 weeks

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Candidates should be able to:

- create and evaluate an animation (stop frame and key frame) that meets the requirements of its
- intended application and audience
- place objects
- place an image
- use frames
- set key frames
- use timings
- use layers
- show and hide objects
- resize objects
- use coordinates to move and place objects
- understand the use of tweening and what effect it creates
- use tweening (motion tweening) to create a smooth transition between frames
- use morphing (shape tweening)
- understand the use of morphing and what effect it creates
- use morphing to create a smooth transition between images
- add text
- change the opacity of objects and text
- use masking layers

## Unit 20 – Programming for the web

Approximate length: 3 weeks

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It is recommended that for this section of the syllabus, candidates should have a working knowledge of html and css, (for example, have studied website authoring in Cambridge IGCSE Information and Communication Technology, syllabus 0417).

Candidates should be able to use JavaScript to:

- demonstrate a range of object-based programming techniques
- recognise data types (including: number, string, Boolean, array, object)
- assign and understand the term variables
- carry out calculations and basic string manipulation
- use arrays
- use comparison and logical operators
- use conditional statements (including: if, else, else if, switch)

- use loops (including: for, for/in, while, do/while)
- use iterative methods
- create functions
- trap errors
- control events
- create html forms to interact with the user
- add comments to explain JavaScript code
- output/display data to:
  - HTML documents
  - HTML elements
  - alert boxes
  - the browser console
- add interactivity to webpages
- explain JavaScript terms and programming techniques

### Assessment

Assessment of the practical tests is hardware and software independent. Any hardware platform, operating system, and applications packages can be used, providing that learners have the opportunity to demonstrate the full range of skills in the syllabus.

**Formative:** Throughout the units, the children will complete graded work, quizzes and speaking and listening activities which allows the teacher to assess the students attainment and inform their planning.

For each unit the students complete a pre and post write of the text type. This allows us to see progress across the units.

**Summative:** At the end of each term we complete internal and standardized tests. This allows us to measure the students' progress throughout the term and year. At the end of the academic year, the students complete the standardized GL and NGRT assessment.