



Government of **Western Australia**  
School Curriculum and Standards Authority

# COMPUTER SCIENCE

GENERAL COURSE

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Year 11 syllabus

## **Acknowledgement of Country**

Kaya. The School Curriculum and Standards Authority (the Authority) acknowledges that our offices are on Whadjuk Noongar boodjar and that we deliver our services on the country of many traditional custodians and language groups throughout Western Australia. The Authority acknowledges the traditional custodians throughout Western Australia and their continuing connection to land, waters and community. We offer our respect to Elders past and present.

## **IMPORTANT INFORMATION**

This syllabus is effective from 1 January 2023.

Users of this syllabus are responsible for checking its currency.

Syllabuses are formally reviewed by the School Curriculum and Standards Authority on a cyclical basis, typically every five years.

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## Rationale

The Computer Science General course focuses on the fundamental principles, concepts and skills within the field, and provides students with opportunities to develop flexibility and adaptability in the application of these in the roles of developers and users. The underpinning knowledge and skills in computer science are practically applied to the development of computer systems and software, while the connectivity between computers, peripheral devices and software used in the home, workplace and in education are examined. Students develop problem-solving abilities and technical skills as they learn how to diagnose and solve problems in the course of understanding the building blocks of computing.

In this course, the impact of technological developments on the personal, social and professional lives of individuals, businesses and communities is investigated. The ethical, moral and legal factors that influence developments in computing are explored so that students recognise the consequences of decisions made by developers and users in respect to the development and use of technology.

This course provides students with practical and technical skills that equip them to function effectively in a world where these attributes are vital for employability and daily life in a technological society. It provides a sound understanding of computing to support students pursuing further studies in related fields.

## Course outcomes

The Computer Science General course is designed to facilitate achievement of the following outcomes.

### Outcome 1 – Technology process

Students apply a technology process to develop computer-based systems.

In achieving this outcome, students:

- investigate ideas and generate proposals
- develop solutions that meet specifications and recognised standards
- evaluate computer-based solutions.

### Outcome 2 – Knowledge and understanding of computer-based systems

Students understand the design, application and interactions of hardware and software in computer-based systems.

In achieving this outcome, students:

- understand the appropriate selection and application of computer-based system components
- understand the nature of the interactions between the elements of computer-based systems
- understand the concepts associated with computer-based systems.

### Outcome 3 – Skills for computer-based systems

Students apply skills to maintain, adapt or develop computer-based systems.

In achieving this outcome, students:

- apply a range of problem-solving techniques when maintaining or developing computer-based systems
- apply a range of conventions and standards when implementing a maintenance or development solution
- apply organisational skills to identify and use appropriate hardware and software resources when maintaining or developing a computer-based system.

### Outcome 4 – Computer-based systems in society

Students understand the interrelationships between the development and use of computer-based systems, the individual and society.

In achieving this outcome, students:

- understand that developers' attitudes and values affect the development of computer-based systems
- understand that users' attitudes and values affect the development and use of computer-based systems
- understand there are legal, societal and ethical impacts when computer-based systems are developed and adopted.

## Organisation

This course is organised into a Year 11 syllabus and a Year 12 syllabus. The cognitive complexity of the syllabus content increases from Year 11 to Year 12.

### Structure of the syllabus

The Year 11 syllabus is divided into two units, each of one semester duration, which are typically delivered as a pair. The notional time for each unit is 55 class contact hours.

#### Unit 1 – Personal use of computer systems

This unit provides students with the knowledge and skills required to use and maintain a personal computer. It introduces a formal method for developing simple information systems and databases. While considering personal needs, students examine the social, ethical and legal implications of personal computer use.

#### Unit 2 – Personal use of communication and information systems

This unit introduces a formal method for developing networks and internet technologies and writing a sequence of simple instructions. Students examine the social, ethical and legal implications associated with software development.

Each unit includes:

- a unit description – a short description of the focus of the unit
- unit content – the content to be taught and learned.

## Organisation of content

The unit content includes both theoretical aspects (Knowledge) and practical aspects (Skills).

The course is divided into five content areas.

Unit 1 is divided into two content areas:

- Systems analysis and development
- Managing data.

Unit 2 is divided into three content areas:

- Developing software
- Programming
- Networks and communications.

### Systems analysis and development

The functions and technical capabilities of systems, how components are configured to form a computer system, and factors which affect the design of an information system, are explored. The compatibility of components, output, bandwidth considerations, and usability, security, health and safety considerations are explored. Evaluations of systems, devices or components are conducted, while acquiring computer hardware knowledge and skills.

## Managing data

The distinction between data and information, including the different types of data (including text and number) and the varied representation of data within a computer, are addressed. The representation of data types, the graphical representation of data, and how data is stored using a database are also addressed.

## Developing software

A systems development cycle (SDC) that includes some basic systems engineering and the application of standards is applied. How a developer's interactions with users affect the development and use of the system is investigated. Various methods of developing software systems and the problems associated with connecting systems in an increasingly global environment are addressed. The different perspectives of users and developers to the development and use of computer-based systems are explored.

## Programming

The different types of programming languages are investigated. The basic constructs of sequence, selection and iteration are examined. The analysing and breaking up problems into small, self-contained units for which procedures or functions are created in a programming language are addressed. The passing of parameters to procedures, functions and modules are explored.

## Networks and communications

The various structures and components of a network, including the communication media used to combine them, are examined. The convergence of technologies which involves the integration of computers and communication hardware, is investigated. Similarly, the design and creation of networks of various configurations, as well as connecting networks of different types, are investigated. The application of connectivity standards relating to networks and the internet, is addressed. Communication software models and standards; the types, purpose and use of protocols, servers and operating systems in communications; and software and the aspects to consider in network security are explored.

## Resources

It is recommended that for delivery of the Computer Science General course, students have access to the following resources:

- computers with access to the internet
- peripheral devices, including
  - scanner/photocopier/printer (multi-function device)
  - printer(s)
- applications software
  - spreadsheet software
  - word processing software
  - presentation software
  - multimedia software
  - personal communication software
  - collaborative management software
  - browser software
  - web-authoring software.

## Programming language

There is no prescribed programming language for the Computer Science General course. However, to meet the assessment requirements for this syllabus, it is required that students use a programming language that enables the:

- development of a purpose-designed software solution
- design, creation, modification, testing, evaluation and documentation of programs
- writing, compiling, interpretation, testing and debugging of code
- use and development of a user interface.

For the Computer Science General syllabus, the programming language should provide the student with opportunity to:

- use control structures, including sequence, selection and iteration
- construct and use data structures
- design and implement data validation techniques
- apply modularised and structured programming methods using modularisation and parameter passing.

There is no requirement within the Computer Science General course to create a user interface, unless required for a particular programming language (e.g. PHP).

The suggested programming languages for the Computer Science General syllabus are:

- Scratch
- Alice
- macros – VBA, application specific macros, scripting languages, Unix Bash
- Applescript
- Gamefroot
- GameMaker
- GameSalad
- Visual Basic
- programmable robotic software - RCX Code, ROBOLAB, RoboMind.

## Database management systems

There is no prescribed database management system for the Computer Science General course. However, to meet the assessment requirements for this syllabus, it is required that students use a database management system that enables the:

- development of a purpose-designed database solution
- design, creation, modification, testing and evaluation of a database solution
- creation of tables, queries, forms and reports
- use and development of a user interface.

The database management systems should provide the student with opportunity to:

- create a working database
- construct simple queries.

The suggested database management system software for the Computer Science General course are:

- Microsoft Access
- MySQL
- FileMaker
- FoxPro
- Paradox
- a spreadsheet application.

## Progression from the Year 7–10 curriculum

This syllabus continues to develop student learning around the knowledge, understandings and skills within the Year 7–10 Digital Technologies curriculum and focuses on the components of digital systems (software, hardware and networks) and their use; the representation of data; and how data are represented and structured symbolically.

The syllabus also continues to develop the students' skills with the production of digital solutions through; collecting, managing and analysing data, defining problems, designing solutions, implementing and evaluating solutions, and communicating, collaborating and managing projects.

## Representation of the general capabilities

The general capabilities encompass the knowledge, skills, behaviours and dispositions that will assist students to live and work successfully in the twenty-first century. Teachers may find opportunities to incorporate the capabilities into the teaching and learning program for the Computer Science General course. The general capabilities are not assessed unless they are identified within the specified unit content.

## Literacy

Students become literate as they develop the knowledge, skills and dispositions to interpret and use language confidently for learning and communicating in and out of school and for participating effectively in society. Literacy involves students listening to, reading, viewing, speaking, writing and creating oral, print, visual and digital texts, and using and modifying language for different purposes in a range of contexts.

In the Computer Science General course, students develop literacy capability as they learn how to communicate ideas, concepts and detailed proposals to a variety of audiences; recognise how language can be used to manipulate meaning; read and interpret detailed written instructions. They learn to understand and use language to discuss and communicate information, concepts and ideas related to the course.

By learning the literacy of computer science, students, understand that language varies according to context and they increase their ability to use language flexibly. Computer science vocabulary is technical and includes specific terms for concepts, processes and production. Students learn to understand that much technological information is presented in the form of drawings, diagrams, flow charts, models, tables and graphs. They also learn the importance of listening, talking and discussing in technologies processes, especially in articulating, questioning and evaluating ideas.

## Numeracy

Students become numerate as they develop the knowledge and skills to use mathematics confidently across other learning areas at school and in their lives more broadly. Numeracy involves students in recognising and understanding the role of mathematics in the world, and having the dispositions and capacities to use mathematical knowledge and skills purposefully.

In the Computer Science General course, students will work with the concepts of number, geometry, scale and proportion. They use models, create accurate technical drawings, work with digital models and use computational thinking in decision-making processes when designing and creating best-fit solutions.

## Information and communication technology capability

Students develop information and communication technology (ICT) capability as they learn to use ICT effectively and appropriately to access, create and communicate information and ideas, solve problems and work collaboratively, and in their lives beyond school. The capability involves students in learning to make the most of the digital technologies available to them. They adapt to new ways of doing things as technologies evolve, and limit the risks to themselves and others in a digital environment.

In the Computer Science General course, students create solutions that consider social and environmental factors when operating digital systems with digital information. They develop an understanding of the characteristics of data, digital systems, audiences, procedures and computational thinking. They apply this when they investigate, communicate and create purpose-designed digital solutions. Students learn to formulate problems, logically organise and analyse data, and represent it in abstract forms. They automate solutions through algorithmic logic. Students decide the best combinations of data, procedures and human and physical resources to generate efficient and effective digital solutions.

## Critical and creative thinking

Students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, clarify concepts and ideas, seek possibilities, consider alternatives and solve problems. Critical and creative thinking are integral to activities that require students to think broadly and deeply using skills, behaviours and dispositions, such as reason, logic, resourcefulness, imagination and innovation in all learning areas at school and in their lives beyond school.

In the Computer Science General course, students develop capability in critical and creative thinking as they imagine, generate, develop, produce and critically evaluate ideas. They develop reasoning and the capacity for abstraction through challenging problems that do not have straightforward solutions. Students analyse problems, refine concepts and reflect on the decision-making process by engaging in systems, design and computational thinking. They identify, explore and clarify technologies, information and use that knowledge in a range of situations. In the Computer Science General course, students think critically and creatively, they consider how data, information, systems, impact on our lives, and how these elements might be better designed and managed.

## Personal and social capability

Students develop personal and social capability as they learn to understand themselves and others, and manage their relationships, lives, work and learning more effectively. The capability involves students in a range of practices, including recognising and regulating emotions, developing empathy for others and understanding relationships, establishing and building positive relationships, making responsible decisions, working effectively in teams, handling challenging situations constructively and developing leadership skills.

In the Computer Science General course, students develop personal and social capability as they engage in project management and development in a collaborative workspace. They direct their own learning, plan and carry out investigations, and become independent learners who can apply design thinking, technologies understanding and skills when making decisions. Students develop social and employability skills through working cooperatively in teams, sharing resources, tools, equipment and processes, making group decisions, resolving conflict and showing leadership. Designing and innovation involve a degree of risk taking and as students work with the uncertainty of sharing new ideas, they develop resilience.

The Computer Science General course enhances students' personal and social capability by developing their social awareness. Students develop understanding of diversity by researching and identifying user needs. They develop social responsibility through the understanding of empathy and respect for others.

## Ethical understanding

Students develop ethical understanding as they identify and investigate concepts, values, character traits and principles, and understand how reasoning can help ethical judgement. Ethical understanding involves students in building a strong personal and socially oriented, ethical outlook that helps them to manage context, conflict and uncertainty, and to develop an awareness of the influence that their values and behaviour have on others.

In the Computer Science General course, students develop the capacity to understand and apply ethical and socially responsible principles when collaborating with others and creating, sharing and using technologies data, processes, tools and equipment. In the Computer Science General course, students consider their own roles and responsibilities as discerning citizens, and learn to detect bias and inaccuracies. Understanding the protection of data, intellectual property and individual privacy in the school environment helps students to be ethical digital citizens.

## **Intercultural understanding**

Students develop intercultural understanding as they learn to value their own cultures, languages and beliefs, and those of others. They come to understand how personal, group and national identities are shaped, and the variable and changing nature of culture. The capability involves students in learning about and engaging with diverse cultures in ways that recognise commonalities and differences, create connections with others and cultivate mutual respect.

In the Computer Science General course, students consider how technologies are used in diverse communities at local, national, regional and global levels, including their impact and potential to transform people's lives. They explore ways in which past and present practices enable people to use technologies to interact with one another across cultural boundaries.

## **Representation of the cross-curriculum priorities**

The cross-curriculum priorities address contemporary issues which students face in a globalised world. Teachers may find opportunities to incorporate the priorities into the teaching and learning program for the Computer Science General course. The cross-curriculum priorities are not assessed unless they are identified within the specified unit content.

## **Aboriginal and Torres Strait Islander histories and cultures**

The Computer Science General course may provide opportunities for students to explore creative, engaging and diverse learning contexts for students to value and appreciate the contribution by the world's oldest continuous living cultures to past, present and emerging technologies.

## **Asia and Australia's engagement with Asia**

The Computer Science General course may provide opportunities for students to explore contemporary and emerging technological achievements that the Asia region and Pacific region have made, and continue to make, to global technological advances, including; innovation in hardware and software design and development; the regions' role in outsourcing of information and communication technology (ICT) services; and globalisation. Students could also consider the contribution of Australia's contemporary and emerging technological achievements to the Asia and Pacific Regions.

## **Sustainability**

The Computer Science General course may provide opportunities for students, within authentic contexts, to choose and evaluate digital technologies and information systems with regard to risks and opportunities they present. They may also evaluate the extent to which digital solutions can embrace and promote sustainable practices.

# Unit 1 – Personal use of computer systems

## Unit description

This unit provides students with the knowledge and skills required to use and maintain a personal computer. It introduces a formal method for developing simple information systems and databases. While considering personal needs, students examine the social, ethical and legal implications of personal computer use.

## Unit content

This unit includes the knowledge, understandings and skills described below.

The content includes theoretical aspects (Knowledge) and practical aspects (Skills) and is organised into the following areas:

- Systems analysis and development
- Managing data.

Typically, approximately 60 percent of class time would be allocated for the Managing data content and approximately 40 percent would be allocated for Systems analysis and development content.

## Systems analysis and development

### Knowledge

- purpose of the systems development life cycle (SDLC)
- stages of the SDLC
  - preliminary analysis
  - analysis
  - design
  - development
  - implementation
  - evaluation and maintenance
- flow of data through an information system
  - input
  - processing
  - storage
  - output
- functions of computer hardware components, including:
  - input
    - keyboard
    - mouse
    - microphone
    - digital camera/web cam
    - scanner

- processing
  - central processing unit (CPU)
  - control unit (CU)
  - arithmetic logic unit (ALU)
  - registers
- primary storage
  - random access memory (RAM)
  - read only memory (ROM)
- secondary storage
  - mechanical drive
  - solid state drive
  - online
- output
  - monitor
  - printer
  - speaker/headphones
- types of computer systems, including:
  - mobile
  - desktop
  - server
- the role of an operating system
- types of hardware booting processes
  - cold
  - warm
- how user wants influence the choice, use and creation of personal computer systems
- types of basic maintenance strategies and computer protection software, including:
  - defragmentation
  - error check
  - disk clean
  - back up
  - anti-malware
- basic maintenance strategies and techniques to rectify simple computer difficulties, including:
  - diagnosis of fault
  - implementation of a solution
  - description of process

### **Skills**

- apply the following hardware booting processes
  - cold
  - warm

- connect peripheral devices to a computer system using:
  - ports
  - universal serial bus (USB)
  - Firewire
  - PS2
  - ethernet
  - serial
- install simple software
- apply basic care and handling of hardware equipment measures to ensure personal safety and appropriate use of components
- apply basic maintenance strategies and computer protection software
- apply basic maintenance strategies and techniques to rectify simple computer difficulties

## Managing Data

### Knowledge

- data management techniques for personal computer use, including hierarchical storage of data using files and folders
- issues related to ethics in the storage of personal data
- features of word processing software, including common formatting functions
- features of spreadsheet software, including:
  - simple functions (sum, average, min and max)
  - simple formulae (addition, subtraction, multiplication and division)
- features of database software, including:
  - components of a single table database (field, record, file)
  - data entry forms
  - simple search techniques
  - create a simple query
  - simple data types (number, text, Boolean, date, currency)

### Skills

- apply hierarchical file management techniques for personal computer use
- use word processing software
- use spreadsheet software
- use database software

## Unit 2 – Personal use of communication and information systems

### Unit description

This unit introduces a formal method for developing networks and internet technologies and writing a sequence of simple instructions. Students examine the social, ethical and legal implications associated with software development.

### Unit content

This unit builds on the content covered in Unit 1.

This unit includes the knowledge, understandings and skills described below.

The content includes theoretical aspects (Knowledge) and practical aspects (Skills) and is organised into the following areas:

- Developing software
- Programming
- Networks and communications.

Typically, approximately 60 per cent of class time would be allocated for the Programming content, approximately 20 per cent would be allocated for Developing software content, and approximately 20 per cent would be allocated for Networks and communications content.

### Developing software

#### Knowledge

- hardware and software systems used in personal computing (applications, operating systems)
- the roles of hardware, software and the user in a computer system
- interrelationship between users, hardware and software in a personal computer system
- the purpose of the software development cycle (SDC)
- stages of the SDC
  - state the problem
  - plan and design
  - develop the solution
  - test the solution
  - evaluate the solution
- comparison of website construction tools
- requirements for software licensing, including:
  - single user
  - site licence

- ethical and legal issues associated with software, including:
  - copyright
  - piracy

## Skills

- modify an existing simple software solution
- develop simple software solutions using the SDC

## Programming

### Knowledge

- the components of a computer program
  - inputs
  - processing
  - outputs
- control structures
  - sequence
  - selection
  - iteration
- the concepts of variables and data types, including:
  - integer
  - real
  - character
  - string

### Skills

- use variables, data types, control structures and a simple programming language to develop a software solution
- use web tools to create linked web pages

## Networks and communications

### Knowledge

- key concepts, terminology and functions of common network components
  - data transmission rates
    - megabits per second (Mbps)
    - gigabits per second (Gbps)
  - wired data transmission media
    - twisted pair
    - fibre optic
  - wireless transmission

- hardware components required for a personal area network (PAN) or home network, including:
  - modem
  - router
  - wireless access point
  - firewall
- types of communication software, including:
  - browser
  - email
  - web authoring
  - scripting
- software requirements for a PAN or home network, including:
  - browser
  - plugin
  - internet connectivity software
- effect of bandwidth availability on network functionality
- features of a network, including the ability to share:
  - files
  - peripheral devices
  - an internet connection
  - storage devices
- the role of an internet service provider in a PAN or home network
- concept of internet protocols, including:
  - hypertext transfer protocol (HTTP)
  - hypertext transfer protocol secure (HTTPS)
  - file transfer protocol (FTP)
- methods to ensure reliability of internet data for personal use
- measures an individual can take to help maintain data privacy and security
- the role of users in maintaining the security of information transmitted through communication systems

**Skills**

- connect common peripheral devices
- create and administer a simple peer-to-peer network to:
  - share files
  - share peripheral devices (printer, scanner)
  - share internet connection
- use Bluetooth to create a simple personal network
- use communication software to upload files to a web server
- analyse the suitability of a PAN or a home network solution

## School-based assessment

The *Western Australian Certificate of Education (WACE) Manual* contains essential information on principles, policies and procedures for school-based assessment that needs to be read in conjunction with this syllabus.

Teachers design school-based assessment tasks to meet the needs of students. The table below provides details of the assessment types for the Computer Science General Year 11 syllabus and the weighting for each assessment type.

### Assessment table – Year 11

Type of assessment	Weighting
<p><b>Project</b></p> <p>The student is required to develop a spreadsheet and/or database and/or software system by using the system development life cycle and/or software development cycle. Students are provided with the stimulus materials on which the project is based.</p> <p>Stimulus material can include: diagrams; extracts from newspaper and journal articles; flow charts; trace tables; algorithms and algorithm segments (in pseudocode); and/or screen captures or representations of spreadsheets, databases and programs. Diagrams could include those related to computer system diagrams, and network diagrams.</p> <p>The student is required to research ideas: implement a database and/or software system using a database management system and programming language, to develop and evaluate solutions and manage processes throughout the production.</p>	60%
<p><b>Theory test</b></p> <p>Typically include a combination of questions requiring short and extended answers.</p> <p>Short answer questions can be a mix of closed and open items that can be sectionalised or scaffolded. The student can be required to explain concepts, apply knowledge, analyse and/or interpret data and/or respond to stimulus materials. Stimulus material can include: diagrams; extracts from newspaper and journal articles; flow charts; trace tables; algorithms and algorithm segments (in pseudocode); and/or screen captures or representations of spreadsheets, databases and programs. Diagrams could include those related to computer system diagrams, and network diagrams.</p> <p>Extended answer questions can be a mix of closed and open items that can be sectionalised or scaffolded typically with an increasing level of complexity. The student can be required to explain concepts; apply knowledge; analyse and/or interpret data, extended algorithms, databases, spreadsheets, tables and/or diagrams; and/or devise labelled diagrams, solutions (or parts or solutions); and/or respond to stimulus materials. Stimulus material can include: diagrams; extracts from newspaper and journal articles; flow charts; trace tables; algorithms and algorithm segments (in pseudocode); and/or screen captures or representations of spreadsheets, databases and programs. Diagrams could include those related to computer system diagrams, and network diagrams.</p>	20%
<p><b>Practical test</b></p> <p>Typically consist of a set of questions requiring the use of spreadsheet software, programming language and/or a database management system.</p> <p>Spreadsheet skills assessed include creating spreadsheets that include formulae and functions</p> <p>Programming skills assessed include: writing code; and/or compiling, testing and/or debugging code.</p> <p>Database skills assessed include: creating fields, data types, keys for tables; queries, forms and/or reports.</p>	20%

Teachers are required to use the assessment table to develop an assessment outline for the pair of units (or for a single unit where only one is being studied).

The assessment outline must:

- include a set of assessment tasks
- include a general description of each task
- indicate the unit content to be assessed
- indicate a weighting for each task and each assessment type
- include the approximate timing of each task (for example, the week the task is conducted, or the issue and submission dates for an extended task).

In the assessment outline for the pair of units, each assessment type must be included at least twice. In the assessment outline where a single unit is being studied, each assessment type must be included at least once.

The set of assessment tasks must provide a representative sampling of the content for Unit 1 and Unit 2.

Assessment tasks not administered under test/controlled conditions require appropriate validation/authentication processes.

## Grading

Schools report student achievement in terms of the following grades.

Grade	Interpretation
A	Excellent achievement
B	High achievement
C	Satisfactory achievement
D	Limited achievement
E	Very low achievement

The teacher prepares a ranked list and assigns the student a grade for the pair of units (or for a unit where only one unit is being studied). The grade is based on the student's overall performance as judged by reference to a set of pre-determined standards. These standards are defined by grade descriptions and annotated work samples. The grade descriptions for the Computer Science General Year 11 syllabus are provided in Appendix 1. They can also be accessed, together with annotated work samples, through the Guide to Grades link on the course page of the Authority website at [www.scsa.wa.edu.au](http://www.scsa.wa.edu.au).

To be assigned a grade, a student must have had the opportunity to complete the education program, including the assessment program (unless the school accepts that there are exceptional and justifiable circumstances).

Refer to the *WACE Manual* for further information about the use of a ranked list in the process of assigning grades.

## Appendix 1 – Grade descriptions Year 11

A	<p><b>Knowledge and understanding</b></p> <p>Uses computer science terminology accurately, and describes processes and concepts in context.</p>
	<p><b>System development processes</b></p> <p>Gathers and refines appropriate data from relevant sources for personal use.</p> <p>Conducts an analysis of an information system using an appropriate methodology and provides a detailed and relevant analysis, planning, and presentation of the system requirements.</p> <p>Provides relevant recommendations with justification, reflecting system requirements, and where relevant presents alternatives.</p>
	<p><b>Data management skills</b></p> <p>Consistently constructs functional database solutions, with relevant data entry forms and queries, accurately reflecting system requirements.</p> <p>Consistently constructs functional spreadsheet solutions, with relevant functions and formulae, accurately reflecting system requirements.</p>
	<p><b>Programming skills</b></p> <p>Designs and effectively applies relevant programming control structures, variables and data types.</p> <p>Creates relevant software solutions accurately reflecting system requirements.</p> <p>Consistently applies the software development cycle effectively to create software solutions accurately reflecting system requirements.</p>
B	<p><b>Knowledge and understanding</b></p> <p>Uses computer science terminology, and describes processes and concepts in context.</p>
	<p><b>System development processes</b></p> <p>Gathers and refines data from relevant sources for personal use.</p> <p>Conducts an analysis of an information system using an appropriate methodology and provides an appropriate analysis, planning and presentation of system requirements.</p> <p>Provides appropriate recommendations, reflecting system requirements, and attempts to justify alternatives.</p>
	<p><b>Data management skills</b></p> <p>Consistently constructs functional database solutions, consisting of appropriate data entry forms and queries, reflecting system requirements.</p> <p>Consistently constructs functional spreadsheet solutions, consisting of appropriate functions and formulae, reflecting system requirements.</p>
	<p><b>Programming skills</b></p> <p>Designs and effectively applies programming control structures, variables and data types.</p> <p>Creates software solutions accurately reflecting system requirements.</p> <p>Applies the software development cycle effectively to create software solutions, accurately reflecting system requirements.</p>

<b>C</b>	<b>Knowledge and understanding</b> Uses computer science terminology, and recalls processes and concepts.
	<b>System development processes</b> Gathers data from a limited range of sources for personal use. Conducts a review of an information system using a methodology and provides an outline, planning and presentation of the system requirements. Provides basic, appropriate recommendations reflecting system requirements drawn from the data collected.
	<b>Data management skills</b> Constructs database solutions, consisting of data entry forms and queries, reflecting system requirements. Constructs spreadsheet solutions, consisting of functions and formulae, reflecting system requirements.
	<b>Programming skills</b> Designs and applies programming control structures, variables and data types. Creates software solutions, occasionally reflecting system requirements. Applies the software development cycle to create software solutions, occasionally reflecting system requirements.
<b>D</b>	<b>Knowledge and understanding</b> Attempts to use computer science terminology, and inconsistently recalls processes and/or concepts.
	<b>System development processes</b> Attempts to gather data for personal use. Develops planning and presentation of system requirements which is brief or incomplete. Makes recommendations which are brief and/or inconsistent with the system requirements.
	<b>Data management skills</b> Constructs incomplete database solutions, occasionally reflecting system requirements. Constructs incomplete spreadsheet solutions, occasionally reflecting system requirements.
	<b>Programming skills</b> Unsuccessfully designs and applies, programming control structures variables and data types. Unsuccessfully creates algorithms and/or software solutions. Unsuccessfully applies the software development cycle, to create incomplete software solutions.
<b>E</b>	Does not meet the requirements of a D grade and/or has completed insufficient assessment tasks to be assigned a higher grade.

## Appendix 2 – Glossary

This glossary is provided to enable a common understanding of the key terms in this syllabus.

### **Algorithm**

Instructions specifying the logic of a program.

### **Attribute**

A name which defines a field in a database table.

### **Authentication**

A system entry security measure based on user input, such as a digital signature, username and password, or forms of biometrics.

### **Bandwidth**

Architecture: rate of data transfer in bits per second.

Communication: range of frequencies analogue signals can be carried over (measured in hertz).

### **Benchmarking**

Software or hardware performance evaluated against standardised criteria.

### **Boolean**

Database: data type exhibiting only two possible conditions – true or false.

Programming: an expression capable of generating only two possible outcomes – true or false.

Operator: AND, OR, NOT used to combine or exclude keywords in a condition.

### **Byte code**

Object code run on a virtual machine allowing portability across multiple platforms.

### **Cardinality**

The relationship defined between two relational database entities.

### **Character**

Data type, that is one byte in size, able to hold a single alphanumeric entry.

### **Computer-aided software engineering (CASE)**

Software tools use to assist in the development of software during the SDC, including code generation, and the creation of Gantt and PERT charts.

### **Condition**

A statement or expression for which there can only be a true or false outcome.

### **Constant**

Name of a memory location whose literal content does not change during the execution of the program.

### **Context diagram**

Top level diagram that graphically defines the system boundary and the flow of data between the system and external entities.

### **Control structures**

Constructs that control the flow of the program's execution; specifically, sequence, selection and iteration.

### **Convergence**

Process of interlinking different technologies into a single device, for example, smart phones.

**Data**

Raw facts that represent real-world items which become information when organised. Singular – datum.

**Data dictionary**

Metadata that describes the attributes of data to be stored in a database.

**Data duplication**

Data that is physically duplicated across a database.

**Data flow diagram (DFD)**

Visual representation describing the flow of data through a system.

**Data redundancy**

Duplication of the same attributes within a table; attribute data that can be derived from other existing data.

**Data type**

The characteristics of data that can be stored in a cell, such as integer, real, Boolean and string.

**Database**

A collection of related data which allows input, editing and deletion, and can be queried for patterns, and produce reports and charts.

**Documentation**

Written text that accompanies software describing attributes, characteristics and/or qualities of the program, including, the code, data dictionary, user manual.

**Domain name server (DNS)**

The DNS translates host addresses (URL) into Internet Protocol (IP) addresses.

**Dynamic host configuration protocol (DHCP)**

A protocol that automatically assigns a unique (IP) address and/or subnet mask to a communication device joining a network.

**Encryption**

Process of encoding data via the implementation of an encryption key.

**Entity**

An entity is an object, thing person, group or idea about which data can be classified, collected and/or stored. Forms of entity used in this course are:

Database: an entity represents a table in a relational database that holds data.

System: the source or sink of the data which flows into or out of a system and over which the system has no control.

**Error**

Types of errors used in this course are:

- Syntax error: an error in the source code that does not meet the requirements of the specific programming grammar structure.
- Logical error: an error in the logic of an algorithm.
- Run-time error: an error occurring during the running of a program.

**Executable code**

Code which has been compiled into a low-level language program; for example, .exe, .com.

**File transfer protocol (FTP)**

Standard for transferring programs and data across a network.

**Flow chart**

Graphical representation of the sequence, selection and iteration flow within an algorithm.

**Form**

User interface for data entry, modification and query.

**Function**

User defined function is a sub routine designed for a specific task which receives data via parameters and returns a single value via the function name.

**Gantt chart**

A bar chart, emphasising time, used for scheduling projects.

**Hypertext transfer protocol (HTTP)**

Rules (protocols) governing the transfer of files (text, media, audio, video) across the Internet.

**Identifier**

User defined name of a program element, including variables, constants and arrays.

**Integrity**

Relates to the accuracy and consistency of the data. Primary areas, include: referential, entity and domain.

**Keys**

A key is a field, used in a database as a unique identifier. The types of keys used in this course are:

- Primary key: an attribute which uniquely identifies a record in a table.
- Composite key: a primary key consisting of two or more attributes.
- Foreign key: an attribute in a table which refers back to a primary key in a related table.

**Malware**

Malicious software designed to covertly access a system and cause harm.

**Module**

A block of code which can exist and run alone or can call other modules. Examples may include the main module, functions, or procedures.

**Open source software**

Collaboratively created software which is licensed to include modifiable source code.

**Parameter**

An argument which can be passed by value or by reference to a function or procedure or module.

**Procedure**

A sub routine designed to perform a specific task which does not return a value.

**Project**

Stimuli in the format of a case study or narrative presented to students undertaking a task, assignment or exam.

**Project management**

The management of a temporary task with defined start and end parameters that includes planning, budgeting, quality control, and/or human resources.

**Protocol**

Agreed formal descriptions of rules and formats used when communication/network devices exchange data.

**Prototype**

A model of a system produced using the iterative method involving design, create, and evaluate. Used in contrast to a formal SDLC method.

**Pseudocode**

Human readable description of the steps within a program, based on the algorithm.

**Query**

A method of interrogating a database to extract information. Examples include QBE and SQL.

**Radio frequency identification (RFID)**

Low cost self-powered RF tags designed to track items, such as animals on a farm or products in a shop or factory.

**Redundant array of inexpensive devices (RAID)**

Storage technology that divides and replicates data among multiple device drives.

**Relation**

A table within a (relational) database.

**Report**

The result of a query provided in a formalised format.

**Simple mail transfer protocol (SMTP)**

Internet standard protocol for transmitting (sending) email.

**Software development cycle (SDC)**

The formalised development structure imposed upon the creation of software.

**Software licence**

A legal instrument governing the Intellectual Property rights of the software creator.

**Source code**

The original readable code created by the programmer before compilation.

**Standard operating environment (SOE)**

The specification of hardware, operating systems and application software to be holistically applied across an office or organisation.

**Statement**

A line of source code.

**String**

A sequence of characters (often in quotation marks) normally consisting of alpha-numeric, symbols and/or spaces

**Structured query language (SQL)**

A (command line) database language that allows interrogation and manipulation of data using the following format:

- **Select:** specifies names of fields to be used in the query
- **From:** specifies the tables the data is contained in
- **Where:** specifies the criteria to be used to extract the data.

**Syntax**

The keywords and rules relating to a specific program language.

**System**

A set of elements or components that interact to accomplish a required outcome.

**System boundary**

An imaginary line separating the internal system from the outside elements.

**Systems development life cycle (SDLC)**

A linear system of defined stages, each of which requires completion before commencement of the following stage. The SDLC is costly, time consuming, highly documented and has little to no user input.

**Topology**

The physical or logical configuration of a network system.

**Trace table**

The manual testing of the logic of an algorithm.

**Transmission control protocol/Internet protocol (TCP/IP)**

TCP: a set of rules (protocols) used to transmit data packages across a network.

IP: a set of rules which allows the routing of data packages across a network.

**Transmission media**

The physical resources used to transmit data across a network, including cables or Wi-Fi.

**Universal resource locator (URL)**

The reference address to a web page (resource) on the internet.

**Variable**

Named memory location whose literal contents can change while the program is executed.