|  |  |
| --- | --- |
|  | Years 9 and 10 band plan — Technologies  Overview for planning with the Australian Curriculum: Digital Technologies |

This band plan has been developed in consultation with the Curriculum into the Classroom (C2C) project team.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| School name: | | | | | |
| Australian Curriculum: Digital Technologies Band: Years 9 and 10 | | | | | |
| Identify curriculum[[1]](#footnote-1) | Technologies learning area | The Technologies curriculum provides students with opportunities to consider how solutions that are created now will be used in the future. Students will identify the possible benefits and risks of creating solutions and learn to recognise that views about the priority of the benefits and risks will vary and that preferred futures are contested. They will use critical and creative thinking to weigh up possible short-term and long-term impacts. They develop solutions to meet needs considering impacts on liveability, economic prosperity and environmental sustainability.  The Australian Curriculum: Technologies describes two distinct but related subjects:   * Design and Technologies, in which students use design thinking and technologies to generate and produce designed solutions for authentic needs and opportunities * Digital Technologies, in which students use computational thinking and information systems to define, design and implement digital solutions.   The Australian Curriculum: Digital Technologies empowers students to shape change, by influencing how contemporary and emerging information systems and practices are applied to meet current and future needs. A deep knowledge and understanding of information systems enables students to be creative and discerning decision-makers when they select, use and manage data, information, processes and digital systems to meet needs and shape preferred futures.  Digital Technologies provides students with practical opportunities to use design thinking and to be innovative developers of digital solutions and knowledge. The subject helps students to become innovative creators of digital solutions, effective users of digital systems, and critical consumers of information conveyed by digital systems.  Digital Technologies provides students with authentic learning challenges that foster curiosity, confidence, persistence, innovation, creativity, respect and cooperation. These are all necessary when using and developing information systems to make sense of complex ideas and relationships in all areas of learning. Digital Technologies helps students to be regional and global citizens capable of actively and ethically communicating and collaborating. | | | |
| Course organisation | In the Australian Curriculum: Digital Technologies, the two strands, Knowledge and Understanding, and Processes and Production Skills, are interrelated and inform and support each other. In Digital Technologies students are actively engaged in the process of defining problems and opportunities, designing, implementing and evaluating digital solutions, and creating and sharing information that meets a range of current and future needs. These solutions and information are created through the application of computational and design thinking, and technical skills.  Students will create digital solutions that will use data, require interactions with users and within systems, and will have impacts on people, the economy and environments. Solutions may be developed using combinations of readily available hardware and software applications, and/or specific instructions provided through programming. Some examples of solutions are instructions for a robot, an adventure game, products featuring interactive multimedia including digital stories, animations and websites.  When developing teaching and learning programs teachers should consider:   * the relationship between each of the curriculum components (band descriptions, content descriptions, elaborations and achievement standards) and how they contribute to the development of coherent programs * integrating the two strands, as content in Processes and Production Skills strand frequently draws on understanding of concepts in the Knowledge and Understanding strand, and focus on a digital technologies application in a unit of work * combining aspects of the strands within a subject in different ways to provide students with learning experiences that meet their needs and interests * providing opportunity for ongoing practice and consolidation of previously introduced knowledge and skills as many aspects of Technologies curriculum are recursive * developing a variety of learning experiences that are relevant, rigorous and meaningful and allow for different rates of development, in particular for younger students and for those who need extra support * opportunities for integration of learning between the Technologies subjects and with other learning areas.   Teaching and learning programs should providing opportunities for students to:   * use their knowledge and understanding of data and digital systems to apply processes and production skills as they create digital solutions * engage in learning activities that do not require the full use of the process, particularly in the early years * be safe when they use information systems and create and communicate information online.   The Band plan for Digital Technologies is organised to:   * provide flexibility when making decisions about how the subject will be implemented, based on the local context and needs of students in schools * align with the Australia Curriculum: Digital Technologies, which is organised in bands for the achievement standards and content descriptions * provide a course structure and content that includes a sequence of teaching and learning and identification of opportunities for assessment and feedback, organised in units according to year levels, and developed using the Australian Curriculum: Digital Technologies content descriptions and achievement standards. | | | |
|  |  | The Band plan course organisation allows schools to implement the Australian Curriculum: Digital Technologies in:   * conjunction with other learning areas/subjects * a term * a semester * only one year of a band of years.   Safety  All practical work must be organised with student safety in mind. Identifying and managing risk in Technologies learning addresses the safe use of technologies, as well as risks that can impact on project timelines. It covers all necessary aspects of health, safety and injury prevention and, in any technologies context, the use of potentially dangerous materials, tools and equipment. It includes ergonomics, safety including cyber safety, data security, and ethical and legal considerations when communicating and collaborating online. The current safety requirements are clearly explained on the Queensland Government Education Health and Safety webpage: [http://education.qld.gov.au/health/safety](http://education.qld.gov.au/health/safety/). School must ensure that their practices meet current guidelines.  Animal ethics  Any teaching activities that involve caring, using, or interacting with animals must comply with the Australian code of practice for the care and use of animals for scientific purposes in addition to relevant state or territory guidelines. The *Animal Care and Protection Act 2001* and the accompanying Animal Care and Protection Regulation 2002 govern the treatment and use of all animals in Queensland (see [www.legislation.qld.gov.au](http://www.legislation.qld.gov.au/Acts_SLs/Acts_SL.htm)). The Department of Agriculture, Fisheries and Forestry Queensland (DAFF), through Biosecurity Queensland, is responsible for enforcement of the legislation. | | | |
| Phase curriculum focus | Curriculum focus: Years 7 to 10  As students move into adolescence, they undergo a range of important physical, cognitive, emotional and social changes. Students often begin to question established community conventions, practices and values. Their interests extend well beyond their own communities and they develop their concerns about wider social, ethical and sustainability issues. Students in this age range increasingly look for and value learning they perceive as relevant, consistent with personal goals, and leading to important outcomes. Increasingly they analyse and work with more abstract concepts, consider the implications of individual and community actions and are keen to examine evidence prior to developing ideas.  In the Technologies learning area, students use technologies knowledge and understanding; technologies processes and production skills; and systems, design, and/or computational thinking to solve and produce creative solutions to problems, needs or opportunities. They communicate and record their ideas using a range of media and technologies. These specialised problem-solving activities will be sophisticated, acknowledge the complexities of contemporary life and may make connections to related specialised occupations and further study.  Students develop a global perspective; they have opportunities to understand the complex interdependencies involved in the development of technologies and between the developer and user in their solutions, and how these can contribute to preferred futures. Students develop an understanding of the interdependence of technologies development, values, beliefs and environment (systems thinking). Through undertaking technologies processes students develop systems, design and computational thinking; and organisational and project management skills. | | | |
| Band description | Learning in Digital Technologies focuses on further developing understanding and skills in computational thinking such as precisely and accurately describing problems and the use of modular approaches to solutions. It also focuses on engaging students with specialised learning in preparation for vocational training or learning in the senior secondary years.  By the end of Year 10, students will have had opportunities to analyse problems and design, implement and evaluate a range of digital solutions, such as database-driven websites and artificial intelligence engines and simulations.  In Year 9 and 10, students consider how human interaction with networked systems introduces complexities surrounding access to, and the security and privacy of, data of various types. They interrogate security practices and techniques used to compress data, and learn about the importance of separating content, presentation and behavioural elements for data integrity and maintenance purposes.  Students explore how bias can impact the results and value of data collection methods and they use structured data to analyse, visualise, model and evaluate objects and events.  They learn how to develop multilevel abstractions, identify standard elements such as searching and sorting in algorithms, and explore the trade-offs between the simplicity of a model and the faithfulness of its representation.  When defining problems students consider the functional and non-functional requirements of a solution through interacting with clients and regularly reviewing processes. They consolidate their algorithmic design skills to incorporate testing and review, and further develop their understanding of the user experience to incorporate a wider variety of user needs. Students develop modular solutions to complex problems using an object-oriented programming language where appropriate, and evaluate their solutions and existing information systems based on a broad set of criteria including connections to existing policies and their enterprise potential. They consider the privacy and security implications of how data are used and controlled, and suggest how policies and practices can be improved to ensure the sustainability and safety of information systems.  Students progressively become more skilled at identifying the steps involved in planning solutions and developing detailed plans that are mindful of risks and sustainability requirements. When creating solutions, both individually and collaboratively, students comply with legal obligations, particularly with respect to the ownership of information, and when creating interactive solutions for sharing in online environments. | | | |
| Achievement standard | By the end of Year 10, students [explain](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Explain) the control and management of networked digital systems and the security implications of the interaction between hardware, software and users. They [explain](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Explain) simple data compression, and why content data are separated from presentation.  Students plan and manage digital projects using an iterative approach. They define and decompose complex problems in terms of functional and non-functional requirements. Students [design](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Design) and [evaluate](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Evaluate) user experiences and algorithms. They [design](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Design) and implement modular programs, including an object-oriented program, using algorithms and data structures involving modular functions that reflect the relationships of real-world data and data entities. They take account of privacy and security requirements when selecting and validating data. Students test and [predict](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Predict) results and implement digital solutions. They [evaluate](http://www.australiancurriculum.edu.au/glossary/popup?a=F10AS&t=Evaluate) information systems and their solutions in terms of risk, sustainability and potential for innovation and enterprise. They share and collaborate online, establishing protocols for the use, transmission and maintenance of data and projects. | | | |
| Teaching and learning | Units overview  The Australian Curriculum assumes that students in Year 9 and 10 will study Technologies subjects as determined by school authorities.  These could include Design and Technologies and/or Digital Technologies and/or subjects relating to specific technologies contexts, determined by state and territory school authorities or individual schools.  Schools decide which units of study per subject to complete, and how and when. This band plan provides two potential units. | **Unit 1 — There’s an app for that!** | **Unit 2 — The Morpheus project** | | |
| Students use mark-up language and style sheets to design and create a prototype data-driven web app to solve an identified problem, e.g. an app to locate the best surfing spots in Queensland. Learning opportunities include:   * examining existing apps * studying agile software development cycle used in real-world projects * exploring and evaluating examples of solutions developed using big data, e.g. meteorology, transportation, government   Students apply a range of skills and processes when creating digital solutions by:   * investigating the secure transmission of data across internetworks * developing skills for collecting, managing and analysing appropriate data from a range of sources to meet client requirements including privacy and security * applying computational thinking skills including abstraction and specification to address complex problems * interviewing stakeholders to identify needs that can be addressed by a data-driven web app * designing a user experience of a solution for a data-driven web app using storyboards and mock-ups * using flowcharts and pseudocode to design algorithms and validate them through tracing and test cases * applying an object-oriented programming language to implement interactive features * planning and managing a client-based project using the agile software development cycle * investigating indicators of economic success for their apps considering safety and sustainability. | Students design and implement a security system to protect data transmissions within a social media information system. Learning opportunities include:   * exploration of cryptographic systems; how data is encrypted and compressed when it is stored and decrypted and uncompressed when it is retrieved by an information system * designing schema less databases using object-oriented techniques * working in teams to design and develop modular programs to solve a mini-challenge.   Students apply a range of skills and processes when creating digital solutions by:   * investigating the security protocols applied to existing information systems to evaluate their effectiveness in protecting sensitive information * considering privacy principles and other applicable policies with respect to legal obligations that must be considered in database design * modelling data relationships using UML diagrams * resolving conflicts between functional and non-functional requirements by applying stakeholder priorities * designing and implementing complex algorithms to interpret and process data using a modular, object-oriented approach * evaluating the effectiveness of security algorithms and their own solutions based on a broad set of criteria and test data * planning and managing a collaborative project using an iterative approach, identifying risks and establishing protocols to protect project data. | | |
| Content descriptions | Knowledge and Understanding | | Unit 1 | Unit 2 |
| Investigate the role of hardware and software in managing, controlling and securing the movement of and access to [data](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Data) in networked [digital systems](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Digital+systems) [(ACTDIK034)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIK034) | | ✓ | ✓ |
| Analyse simple [compression](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Compression) of [data](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Data) and how content [data](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Data) are separated from presentation [(ACTDIK035)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIK035) | | ✓ | ✓ |
| Processes and Production Skills | | Unit 1 | Unit 2 |
| Develop techniques for acquiring, storing and validating quantitative and qualitative [data](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Data) from a range of sources, considering privacy and security requirements [(ACTDIP036)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP036) | | ✓ | ✓ |
| Analyse and visualise [data](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Data) to create information and address complex problems, and [model](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Model) processes, entities and their relationships using structured [data](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Data) [(ACTDIP037)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP037) | | ✓ | ✓ |
| Precisely define and [decompose](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Decompose) real-world problems, taking into account functional and non-functional requirements and including interviewing stakeholders to identify needs [(ACTDIP038)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP038) | | ✓ | ✓ |
| Design the user experience of a digital system, [evaluating](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Evaluating) alternative designs against criteria including [functionality](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Functionality), [accessibility](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Accessibility), usability, and [aesthetics](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Aesthetics) [(ACTDIP039)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP039) | | ✓ |  |
| Design algorithms represented diagrammatically and in [structured English](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Structured+English) and validate algorithms and programs through tracing and test cases [(ACTDIP040)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP040) | | ✓ | ✓ |
| Implement modular programs, applying selected algorithms and [data](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Data) structures including using an object-oriented programming language [(ACTDIP041)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP041) | | ✓ | ✓ |
| Critically evaluate how well developed solutions and existing [information systems](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Information+systems) and policies take account of future risks and sustainability and provide opportunities for innovation and [enterprise](http://www.australiancurriculum.edu.au/glossary/popup?a=T&t=Enterprise) [(ACTDIP042)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP042) | | ✓ | ✓ |
| Create interactive solutions for sharing ideas and information online, taking into account social contexts and legal responsibilities [(ACTDIP043)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP043) | | ✓ | ✓ |
| Plan and manage projects using an iterative and collaborative approach, identifying risks and considering safety and sustainability [(ACTDIP044)](http://www.australiancurriculum.edu.au/curriculum/contentdescription/ACTDIP044) | | ✓ | ✓ |
| General capabilities | Literacy    Numeracy    ICT capability    Critical and creative thinking    Personal and social capability    Ethical understanding | | | |
| Cross-curriculum capabilities | Description: Description: cc_sust Sustainability | | | |
| Develop assessment | Assessment  The Years 7 to 10 Technologies: Australian Curriculum in Queensland — assessment and reporting advice and guidelines brings together advice about assessment, making judgments and reporting in a single document.  See [www.qcaa.qld.edu.au/p-10/aciq/p-10-technologies/year-7-technologies](https://www.qcaa.qld.edu.au/p-10/aciq/p-10-technologies/year-7-technologies) > *Years 7 to 10 Technologies: ACiQ*. | Students use their knowledge and understanding of data and digital systems to apply processes and production skills as they create digital solutions. In both teaching and learning and assessment students undertake projects. A project is a set of activities to address specified content, involving understanding the nature of a problem, situation or need; creating, designing and producing a solution to the project task; and documenting the process. Students progress from managing the independent creation of ideas and information to managing collaborative projects in online environments.  The assessment for each unit provides evidence of student learning and provides opportunities for teachers to make judgments about whether students have met the Australian Curriculum: Digital Technologies Years 9 and 10 Achievement standard. Students should contribute to an individual assessment folio that provides evidence of their learning and represents their achievements. The folio should include a range and balance of assessments for teachers to make valid judgments about whether the student has met the Achievement standard. | | | |
| **Unit 1 —There’s an app for that!** | **Unit 2 — The Morpheus project** | | |
| This assessment will gather evidence of students ability to:   * explain the control and management of internetwork systems and the security implications of hardware, software and user interactions * optimise data for the web using data compression techniques * analyse client needs to define and decompose complex problems * design complex algorithms with modular functions * implement modular algorithms * evaluate the suitability of open data sources for presentation via the web * evaluate the data driven web app solution against specified criteria to ensure it meets stakeholders needs * establish protocols for the sustainability of knowledge bases * plan and manage client based projects using the a software development cycle, e.g. inquiry model; design, develop, evaluate cycle; Polya’s problem-solving cycle; information literacy cycle; agile development cycle; and extreme programming. | Students collaborate to complete a crypto-challenge, create a prototype security system and design an object-oriented database by:   * explaining how security issues can be addressed using hardware, software and security policies, comparing the advantages and disadvantages of different approaches * creating a data model, considering privacy and security requirements * collaboratively develop an agile system development plan and establish project protocols to protect intellectual property and safeguard data * defining and prioritising security requirements to justify the scope of a project * designing modular algorithms and validate them using tracing and test cases * implementing a modular program in an object oriented programming language * evaluating the sustainability and future risks for a secure social media information system. | | |
| Make judgments  and use feedback | Consistency of teacher judgments | Identify opportunities to moderate samples of student work at a school or cluster level to reach consensus and consistency. | | | |

1. Source: Australian Curriculum, Assessment and Reporting Authority (ACARA), *Australian Curriculum: Technologies*: [www.australiancurriculum.edu.au/technologies/rationale](http://www.australiancurriculum.edu.au/technologies/rationale) and   
   *Australian Curriculum: Digital Technologies*: [www.australiancurriculum.edu.au/technologies/digital-technologies/curriculum/f-10?layout=1](http://www.australiancurriculum.edu.au/technologies/digital-technologies/curriculum/f-10?layout=1). [↑](#footnote-ref-1)