|  |
| --- |
| Year 10 Science curriculum and assessment plan Example |

# Curriculum overview

|  |  |
| --- | --- |
| Year level description | Cohort description  |
| The science inquiry skills and science as a human endeavour strands are described across a two-year band. In their planning, schools and teachers refer to the expectations outlined in the achievement standard and also to the content of the science understanding strand for the relevant year level to ensure that these two strands are addressed over the two-year period. The three strands of the curriculum are interrelated and their content is taught in an integrated way. The order and detail in which the content descriptions are organised into teaching and learning programs are decisions to be made by the teacher.**Incorporating the key ideas of science** In the Year 10 curriculum students explore systems at different scales and connect microscopic and macroscopic properties to explain phenomena. Students explore the biological, chemical, geological and physical evidence for different theories, such as the theories of natural selection and the Big Bang.Students develop their understanding of atomic theory to understand relationships within the periodic table. They understand that motion and forces are related by applying physical laws. They learn about the relationships between aspects of the living, physical and chemical world that are applied to systems on a local and global scale and this enables them to predict how changes will affect equilibrium within these systems. | This year level plan has not been developed with a specific cohort in mind. It is provided as an example of the intent of the Australian Curriculum: Science, and reflective of QCAA advice and resources. |
| Course organisation  |
| This year level plan is written with the consideration that all school scenarios for delivery of Science are unique. It is written to:* offer units of work that could be adapted to suit multiple contexts as required by the school, including allocated time and resources
* consider different types of assessment that are suitable for the Science learning area
* provide examples for schools to adapt to their own contexts.

**Senior pathways**Senior Science pathways are diverse. Consideration of these pathways is necessary when designing a course of work — opportunities to develop the knowledge and skills necessary to succeed in these pathways should be evident across a course of study.Senior pathways include: Agricultural Practices, Agricultural Science, Aquatic Practices, Biology, Chemistry, Earth and Environmental Science, Marine Science, Physics, Psychology and Science in Practice. |

# Unit overview

|  |  |  |  |
| --- | --- | --- | --- |
| Term 1 | Term 2 | Term 3 | Term 4 |
| Unit 1 — Earth and space science | Unit 2 — Biology | Unit 3 — Chemistry | Unit 4 — Physics |
| Inquiry question: Why do scientists use models and theories? Students will analyse scientific theories on the origin of the universe and gain an understanding of the contestability of scientific theories and models. Students will collect and communicate data as evidence and develop science inquiry skills by evaluating claims made about the human impact on global systems such as the interaction between the carbon cycle and the biosphere, lithosphere, hydrosphere and atmosphere. Students will use simulations to test predictions about the impact of changes to the carbon cycle that cannot be tested in the classroom.They will also develop critical and creative thinking by analysing the effectiveness of geoengineering solutions to carbon dioxide overproduction.Students will realise the importance of developing personal and social capability skills and ethical understanding as they develop a position in response to the evidence supporting climate change.  | Inquiry question: Are the answers in our genes? Students will examine the processes and patterns of inheritance and develop questions to identify variables that have influenced the diversity of life on earth.Students will focus on the transmission of heritable characteristics and explore the management of natural selection, using technological advances, to potentially mitigate human-caused changes to life on earth. Students will also enhance their understanding of natural selection using specialised computer laboratory ICT to simulate multiple generations of offspring acted on by selected pressures. Students will engage in learning activities including discussing current gene therapies where they will develop their understanding of how the values and needs of contemporary society can influence the focus of scientific research.  | Inquiry question: Is ‘chemical free’ possible? Students will develop an understanding of the historical development of the periodic table and become aware of the value of valid and reliable data collection that forms the evidence to support predictions about the properties of unknown elements.Students will apply scientific inquiry skills to explore possible chemical solutions to real-world problems such as recycling material and the promise of chemical-free solutions to reducing pollution. Students will also use simulations to test predictions that cannot be tested in the classroom.Students will understand how the search for real-world solutions generates new career opportunities and will develop personal and social capability as they consider how the application of science meets a range of personal and social needs. | Inquiry question: Can you break Newton’s laws?Students will explain the concepts of force and energy theoretically and through experimental investigations. They will use models and theories to make sense of abstract concepts such as force and energy, and to develop the ability to be comfortable with a degree of uncertainty.Students will develop a realisation that the physical world can be understood using mathematics and apply this to manipulate variables and to measure outcomes within the known parameters of Newton’s laws.Students will also apply scientific inquiry skills to explore the development of technologies based on Newton’s laws then use simulations to test their predictions about breaking Newton’s laws. |

# Assessment overview

|  | Term 1 | Term 2 | Term 3 | Term 4 |
| --- | --- | --- | --- | --- |
|  | Unit 1 — Earth and space sciences | Week/s | Unit 2 — Biological sciences | Week/s | Unit 3 — Chemical sciences | Week/s | Unit 4 — Physical sciences | Week/s |
| Assessment | Technique: InvestigationIn this investigation, students will write a research question from the claim: ‘People living on islands such as Pitcairn in the southern Pacific Ocean, should have a greater interest in reducing the impacts of climate change than people living in Peak Downs in Central Queensland.’ Students will analyse and interpret data to answer their question.Format: Written reportConditions:* 2 weeks
* 600–800 words
 | 8–10 | Technique: Examination (Units 1 and 2)In this examination, students will answer questions derived from Units 1 and 2 content descriptions for Earth and space sciences and Biological sciences.Format: Written* Short response items including multiple choice
* Extended response items including construction, use, interpretation and analysis of secondary data, graphs, tables and diagrams

Conditions: 90 minutes, plus 10 minutes perusal | 10 | Technique: Experimental investigationUsing the practical experience from this unit, students design and conduct an investigation to demonstrate their understanding of the role of collision theory in determining reaction rates.Format: Written scientific reportConditions:* 3 weeks
* 600–800 words
 | 7–10 | Technique: Examination (Units 3 and 4)In this examination, students will answer questions derived from Units 3 and 4 content descriptions for Chemical sciences and Physical sciences. Format: Written* Short response items including multiple choice
* Extended response items including construction, use, interpretation and analysis of secondary data, graphs, tables and diagrams, and application of algorithms

Conditions: * 90 minutes, plus 10 minutes perusal
* Formula and data booklets provided prior
 | 8 |
| Achievement standard | By the end of Year 10, students analyse how the periodic table organises elements and use it to make predictions about the properties of elements. They explain how chemical reactions are used to produce products and how different factors influence the rate of reactions. They explain the concept of energy conservation and represent energy transfer and transformation within systems. They apply relationships between force, mass and acceleration to predict changes in the motion of objects. Students describe and analyse interactions and cycles within and between Earth’s spheres. They evaluate the evidence for scientific theories that explain the origin of the universe and the diversity of life on Earth. They explain the processes that underpin heredity and evolution. Students analyse how the models and theories they use have developed over time and discuss the factors that prompted their review.Students develop questions and hypotheses and independently design and improve appropriate methods of investigation, including field work and laboratory experimentation. They explain how they have considered reliability, safety, fairness and ethical actions in their methods and identify where digital technologies can be used to enhance the quality of data. When analysing data, selecting evidence and developing and justifying conclusions, they identify alternative explanations for findings and explain any sources of uncertainty. Students evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited. They construct evidence-based arguments and select appropriate representations and text types to communicate science ideas for specific purposes. | By the end of Year 10, students analyse how the periodic table organises elements and use it to make predictions about the properties of elements. They explain how chemical reactions are used to produce particular products and how different factors influence the rate of reactions. They explain the concept of energy conservation and represent energy transfer and transformation within systems. They apply relationships between force, mass and acceleration to predict changes in the motion of objects. Students describe and analyse interactions and cycles within and between Earth’s spheres. They evaluate the evidence for scientific theories that explain the origin of the universe and the diversity of life on Earth. They explain the processes that underpin heredity and evolution. Students analyse how the models and theories they use have developed over time and discuss the factors that prompted their review.Students develop questions and hypotheses and independently design and improve appropriate methods of investigation, including field work and laboratory experimentation. They explain how they have considered reliability, safety, fairness and ethical actions in their methods and identify where digital technologies can be used to enhance the quality of data. When analysing data, selecting evidence and developing and justifying conclusions, they identify alternative explanations for findings and explain any sources of uncertainty. Students evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited. They construct evidence-based arguments and select appropriate representations and text types to communicate science ideas for specific purposes. | By the end of Year 10, students analyse how the periodic table organises elements and use it to make predictions about the properties of elements. They explain how chemical reactions are used to produce particular products and how different factors influence the rate of reactions. They explain the concept of energy conservation and represent energy transfer and transformation within systems. They apply relationships between force, mass and acceleration to predict changes in the motion of objects. Students describe and analyse interactions and cycles within and between Earth’s spheres. They evaluate the evidence for scientific theories that explain the origin of the universe and the diversity of life on Earth. They explain the processes that underpin heredity and evolution. Students analyse how the models and theories they use have developed over time and discuss the factors that prompted their review.Students develop questions and hypotheses and independently design and improve appropriate methods of investigation, including field work and laboratory experimentation. They explain how they have considered reliability, safety, fairness and ethical actions in their methods and identify where digital technologies can be used to enhance the quality of data. When analysing data, selecting evidence and developing and justifying conclusions, they identify alternative explanations for findings and explain any sources of uncertainty. Students evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited. They construct evidence-based arguments and select appropriate representations and text types to communicate science ideas for specific purposes. | By the end of Year 10, students analyse how the periodic table organises elements and use it to make predictions about the properties of elements. They explain how chemical reactions are used to produce particular products and how different factors influence the rate of reactions. They explain the concept of energy conservation and represent energy transfer and transformation within systems. They apply relationships between force, mass and acceleration to predict changes in the motion of objects. Students describe and analyse interactions and cycles within and between Earth’s spheres. They evaluate the evidence for scientific theories that explain the origin of the universe and the diversity of life on Earth. They explain the processes that underpin heredity and evolution. Students analyse how the models and theories they use have developed over time and discuss the factors that prompted their review.Students develop questions and hypotheses and independently design and improve appropriate methods of investigation, including field work and laboratory experimentation. They explain how they have considered reliability, safety, fairness and ethical actions in their methods and identify where digital technologies can be used to enhance the quality of data. When analysing data, selecting evidence and developing and justifying conclusions, they identify alternative explanations for findings and explain any sources of uncertainty. Students evaluate the validity and reliability of claims made in secondary sources with reference to currently held scientific views, the quality of the methodology and the evidence cited. They construct evidence-based arguments and select appropriate representations and text types to communicate science ideas for specific purposes. |
| Moderation | Individual teachers choose a range of three student responses from their class and grade these using the task-specific standards. HOD to facilitate year level moderation, two days after the submission date. | Individual teachers choose a range of three student responses from their class and grade these using the task-specific standards. HOD to facilitate year level moderation, the day after the exam. Year-level moderation of the semester's work will take place in Week 10. | Individual teachers choose a range of three student responses from their class and grade these using the task-specific standards. HOD to facilitate year level moderation, two days after the submission date. | Individual teachers choose a range of three student responses from their class and grade these using the task-specific standards. HOD to facilitate year level moderation, the day after the exam. Year-level moderation of completed folios of work will take place in Week 8. |

# Teaching and learning focus

|  |
| --- |
| Content descriptions |
| Science understanding | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Science as a human endeavour | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Science inquiry skills | Unit 1 | Unit 2 | Unit 3 | Unit 4 |
| Biological sciences Transmission of heritable characteristics from one generation to the next involves DNA and genes  |  | ✓ |  |  | Nature and development of science Scientific understanding, including models and theories, is contestable and is refined over time through a process of review by the scientific community  | ✓ | ✓ |  | ✓ | Questioning and predicting Formulate questions or hypotheses that can be investigated scientifically  | ✓ |  | ✓ |  |
| The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence  |  | ✓ |  |  | Advances in scientific understanding often rely on technological advances and are often linked to scientific discoveries  | ✓ | ✓ |  | ✓ | Planning and conducting Plan, select and use appropriate investigation types, including field work and laboratory experimentation, to collect reliable data; assess risk and address ethical issues associated with these methods  | ✓ |  | ✓ | ✓ |
| Chemical sciences The atomic structure and properties of elements are used to organise them in the Periodic Table |  |  | ✓ |  | Use and influence of sciencePeople use scientific knowledge to evaluate whether they accept claims, explanations or predictions, and advances in science can affect people’s lives, including generating new career opportunities | ✓ | ✓ | ✓ | ✓ | Select and use appropriate equipment, including digital technologies, to collect and record data systematically and accurately  |  |  | ✓ | ✓ |
| Different types of chemical reactions are used to produce a range of products and can occur at different rates  |  |  | ✓ |  | Values and needs of contemporary society can influence the focus of scientific research | ✓ | ✓ |  |  | Processing and analysing data and informationAnalyse patterns and trends in data, including describing relationships between variables and identifying inconsistencies | ✓ |  | ✓ | ✓ |
| Earth and space sciences The universe contains features including galaxies, stars and solar systems, and the Big Bang theory can be used to explain the origin of the universe  | ✓ |  |  |  |  |  |  |  |  | Use knowledge of scientific concepts to draw conclusions that are consistent with evidence  | ✓ | ✓ | ✓ | ✓ |
| Global systems, including the carbon cycle, rely on interactions involving the biosphere, lithosphere, hydrosphere and atmosphere  | ✓ |  |  |  |  |  |  |  |  | EvaluatingEvaluate conclusions, including identifying sources of uncertainty and possible alternative explanations, and describe specific ways to improve the quality of the data | ✓ | ✓ | ✓ | ✓ |
| Physical sciencesEnergy conservation in a system can be explained by describing energy transfers and transformations |  |  |  | ✓ |  |  |  |  |  | Critically analyse the validity of information in primary and secondary sources and evaluate the approaches used to solve problems  | ✓ | ✓ | ✓ | ✓ |
| The motion of objects can be described and predicted using the laws of physics |  |  |  | ✓ |  |  |  |  |  | Communicating Communicate scientific ideas and information for a particular purpose, including constructing evidence-based arguments and using appropriate scientific language, conventions and representations  | ✓ | ✓ | ✓ | ✓ |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| General capabilities | Year 10 |  | Cross-curriculum priorities | Year 10 |
| Unit | 1 | 2 | 3 | 4 |  | Unit | 1 | 2 | 3 | 4 |
| Literacy | ✓ | ✓ | ✓ |  |  | Aboriginal and Torres Strait Islander histories and culture | ✓ | ✓ |  |  |
| Numeracy | ✓ | ✓ | ✓ | ✓ |  | Asia and Australia’s engagement with Asia |  | ✓ |  | ✓ |
| Information and communication technology | ✓ | ✓ | ✓ | ✓ |  | Sustainability | ✓ |  | ✓ |  |
| Critical and creative thinking | ✓ | ✓ |  |  |  |
| Personal and social capability | ✓ |  | ✓ |  |  |
| Intercultural understanding | ✓ |  |  | ✓ |  |
| Ethical understanding | ✓ | ✓ |  |  |  |

# Planning considerations

|  |
| --- |
| Prior to implementation the teaching team will consider questions such as:* Where has prior and future learning across the year level/band been reflected in the plan?
* Are there adequate opportunities for students to develop depth of conceptual understanding and sophistication of skills across the year level/band?
* Does the plan ensure adequate opportunities for students to demonstrate the achievement standard/s by the end of the year level/band?
* Are the timing and demands of the planned assessment appropriate in relation to assessment of other learning areas and subjects taught in this year?
* Are there any Indigenous cultural and intellectual property (ICIP) rights to consider? For guidance, see <https://smartcopying.edu.au/guidelines/copyright-basics/indigenous-cultural-and-intellectual-property-rights>.
* Do the assessment techniques and conditions offer a range and balance across the year/band? What strategies for authentication are included?
* What moderation processes will be used? When will assessment and moderation occur?
* Is the planned teaching, learning and assessment sequence appropriate for reporting purposes?
* Do strategies for differentiation and reasonable adjustments complement the teaching, learning and assessment sequence?
* How will planned strategies for differentiation and reasonable adjustments impact other year level/band plans?
 |
| Following implementation, the teaching team will consider questions such as:* Was the teaching, learning and assessment effective?
* Are there opportunities to improve the effectiveness of the teaching, learning and assessment? If so, what?
* Were there any common student misconceptions that need, or needed, to be clarified?
* How do student outcomes in this year of learning impact on the planning of subsequent year level/band plans?
 |

 © State of Queensland (QCAA) 2021

The **Year 10 Science curriculum and assessment plan** is licensed under the CC BY 4.0 Licence**. Licence URL:** <https://creativecommons.org/licenses/by/4.0>

Australian Curriculum extracts are licensed as follows: © ACARA 2010–2019, licensed under[**CC BY 4.0**](https://creativecommons.org/licenses/by/4.0/). For the latest information and additional terms of use, please check the [**Australian Curriculum website**](https://www.australiancurriculum.edu.au/) (www.australiancurriculum.edu.au/)and its [**copyright notice**](https://www.australiancurriculum.edu.au/copyright-and-terms-of-use) **(**www.australiancurriculum.edu.au/copyright-and-terms-of-use**)**.