# Science

| LEVEL 1 | 15 TCE CREDIT POINTS |
|---|---|
| **COURSE CODE** | SCC115122 |
| **COURSE SPAN** | 2022 — 2026 |
| **READING AND WRITING STANDARD** | NO |
| **MATHEMATICS STANDARD** | NO |
| **COMPUTERS AND INTERNET STANDARD** | NO |

This course was delivered in 2023. Use A-Z Courses to find the current version (if available).

### Science Level 1 enables learners to be in control of their understanding of our shared world and prepare them for their possible futures

Science Level 1 provides opportunities to harness learners' curiosity, wonder and interest in biology, Earth and space science, physics and chemistry. They will follow and extend their own interests to investigate, imagine and explore ideas by inquiring into what is around them in their local community. Learners can be guided in a variety of rich and meaningful inquiry-based experiences when learning. Through a flexible and open-ended approach, they will revisit and reflect on their ideas, extending their thinking to take on further challenges.

**Focus Area**

## Personal Futures

Courses aligned to the Years 9 to 12 Curriculum Framework belong to one of the five focus areas of Discipline-based Study, Transdisciplinary Projects, Professional Studies, Work-based Learning and Personal Futures.

*Science* Level 1 is a Personal Futures course.

Personal Futures courses prepare learners to be independent young adults, able to lead healthy, fulfilled and balanced lives. Learning is highly personalised. Learners develop strategies to optimise learning, make decisions, solve problems, set career and life goals, and pursue areas of strong personal interest. Personal Futures supports learners to develop the required knowledge, skills and understandings to make informed choices that enhance their own and health and wellbeing. The inclusion of Personal Futures as a focus area responds to a range of contemporary research findings highlighting the importance of learners having broad educational goals that include individual and collective wellbeing and opportunities for student agency as they navigate a complex and uncertain world.

Personal Futures courses have three key features that guide teaching and learning:

- theory and dialogue
- informed action
- reflection and dialogue.

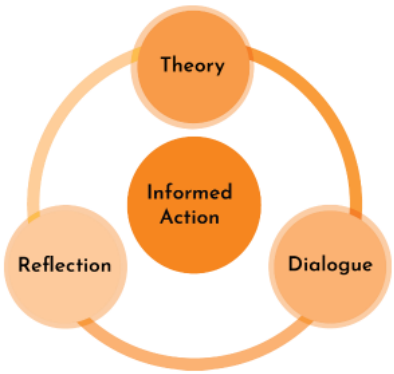


*Figure 1: Transdisciplinary Project Cycle of Learning (adapted from OECD Learning Compass 2030)*

In this course, learners will do this by:

- engaging with fundamental skills and knowledge
- identifying personal challenges in science
- negotiating where learning will be most effective and valuable
- planning and completing tasks to meet their goals in ways relevant to them
- reflecting on their achievement and integrating their learning into their broader life
- identifying areas of further potential growth and setting new goals.

**Rationale**

Science provides a rational and empirical way of answering interesting and important questions about the biological, physical and technological world. The knowledge it produces has proven to be a reliable basis for action in our personal, social and broader lives.

*Science* Level 1 fills an identified gap between Preliminary Science Stage 4 and science courses at Level 2. It allows continuity of learning for students who have completed Preliminary Science Stage 4 or need reinforcement of science knowledge and skills from Australian Curriculum Science F-10.

Currently, over 50% of jobs in Tasmania benefit from a science background (calculated from: https://economy.id.com.au/tasmania/employment-by-industry), and this will only increase.

*Science* Level 1 will:

- prepare learners for employment opportunities that require foundational scientific knowledge and skills
- enable equity of access to science for all learners, ensuring that learners can include science as part of their pathway within senior secondary education
- provide a flexible course for those not on a university pathway and where their pathway is not easily defined within one area of science
- increase student agency through explicit articulation of the General Capabilities, with learner choice embedded
- allow learners to negotiate areas of focus where they can gain the greatest benefit from their learning and for their possible future pathways.

All learners should have the opportunity within their compulsory education to engage or reengage with all learning areas, including science. It has been identified locally (https://stem.education.tas.gov.au), nationally (https://www.dese.gov.au/quality-schools-package/resources/review-achieve-educational-excellence-australian-schools) and internationally (https://en.unesco.org/unesco_science_report) that greater STEM understanding, in this case science, benefits learners, the workforce and the broader community.

The purpose of Years 9 to 12 Education is to enable all learners to achieve their potential through Years 9 to 12 and beyond in further study, training or employment.

Years 9 to 12 Education enables personal empowerment, cultural transmission, preparation for citizenship and preparation for work.

This course is built on the principles of access, agency, excellence, balance, support and achievement as part of a range of programs that enables learners to access a diverse and flexible range of learning opportunities suited to their level of readiness, interests and aspirations.

**Learning Outcomes**

On successful completion of this course, learners will be able to:

1. communicate foundational science concepts using appropriate formats and adapt strategies for learning
2. conduct safe, ethical inquiries to collect, present and interpret simple scientific data and improve processes
3. observe and identify components and processes of biological, Earth and space systems and apply scientific knowledge to make predictions
4. identify where applications of biological, Earth and space sciences are used to meet needs in their local community and how these sciences are applied with examples of use of technology
5. observe and identify components and processes of physical and chemical systems and apply scientific knowledge to make predictions
6. identify where applications of physical and chemical sciences are used to meet needs in their local community and how these sciences are applied with examples of use of technology
7. observe and identify components and processes of simple scientific systems within their local community and apply scientific knowledge to make predictions
8. identify where related applications of scientific knowledge and skills are used to meet needs in their local community and how the knowledge and skills are applied with examples of use of technology

**Pathways**

*Science* Level 1 is designed:

- for learners who require re-engagement with the concepts within the Australian Curriculum: Science F-10 for them to follow their preferred pathways
- to provide a pathway for learners who have achieved at Stage 4 of the TASC Preliminary Suite of courses
- to provide a pathway to Level 2 TASC courses, including science, and support or lead into a number of vocational pathways.

**Integration of General Capabilities and Cross-curriculum Priorities**

The general capabilities addressed specifically in this course are:

- Critical and creative thinking
- Ethical understanding
- Literacy
- Numeracy
- Personal and social capability

## The cross-curriculum priorities enabled through this course are:

- Aboriginal and Torres Strait Islander histories and cultures
- Sustainability

**Course Size And Complexity**

This course has a complexity level of 1.

## For a full description of courses at a complexity level of 1, please refer to the Levels of Complexity - Tasmanian Senior Secondary Education document.

This course has a size value of 15. Upon successful completion of this course (i.e., a Preliminary Achievement (PA) award or higher), a learner will gain 15 credit points at Level 1 towards the Participation Standard of the Tasmanian Certificate of Education (TCE).

**Course Structure**

This course consists of three 50-hour modules.

Module 1: Biological, Earth and Space Sciences

Module 2: Physical and Chemical Sciences

Module 3: Scientific Inquiry

**Course Delivery**

Modules 1 and 2 should be delivered before Module 3. There is no other prescribed order.

## Course Requirements

### Access

Learners are required to work as directed in practical situations, as potentially dangerous materials and equipment may be used in this course.

This course requires learners to collaborate with others.

### Resource requirements

Providers offering this course will need equipment, materials and a suitable space to carry out the practical component of the course effectively and safely. Providers will oversee the delivery of a safe program for Science Level 1 in their school and ensure that these procedures are adhered to.

**Course Content: Module 1**

# Module 1: Biological, Earth and space sciences

This module aims to provide applied learning contexts within the biological, Earth and space sciences that are valued by learners and are found within their communities. Learners will use theory from the biological, Earth and space sciences to explore their communities, their values and their future plans. They will consider how we inquire into the natural world and the tools we use to do this.

Learners will identify local applications of biological, Earth and space sciences and develop their own goals to inform their actions. They will develop skills and strategies to address and reflect on their stated goals. They will plan and direct aspects of their own learning to research, apply, test, and compare their solutions. Learners will employ critical thinking skills to review, justify, and refine personal decisions.

## Module 1 learning outcomes

The following learning outcomes are a focus of this module:

1. communicate foundational science concepts using appropriate formats and adapt strategies for learning
2. conduct safe, ethical inquiries to collect, present and interpret simple scientific data and improve processes
3. observe and identify components and processes of biological, Earth and space systems and apply scientific knowledge to make predictions
4. identify where applications of biological, Earth and space sciences are used to meet needs in their local community and how these sciences are applied with examples of use of technology.

## Module 1 content

In Module 1 learners will follow inquiry processes to explore biological, Earth and space sciences. Links will be made between the science being applied and the learner's life and their community.

## Module 1 key knowledge

**Science as a human endeavour - theory**

Learners will explore how science is part of the community, including:

- ways to use technologies to assist them to gain greater scientific understanding, including recording, organising and interpreting data
- where the Earth and space sciences can be, or are, applied within their local community
- where First Nations Australians' knowledge is useful.

**Science understanding - theory**

Learners will explore and explain where science can be, or is, applied in their local community related to the biological, Earth and space sciences, including:

- the interdependency of living things and how they interact with each other in a local environment
- the relationships between form and features of living things to the functions their systems perform within familiar and unfamiliar organisms
- local examples of where Earth is subject to change within and on its surface, over a range of timescales as a result of natural processes and human use of resources
- observable phenomena linked to space, for example, seasons, tides, or day length
- diversity of living things on Earth and evolution over time.

## Module 1 key skills

**Monitoring and reviewing to demonstrate learning – dialogue and informed action**

Learners, in dialogue with others, will reflect on and identify where in the biological, Earth and space sciences:

- their strengths and interests in the biological, Earth and space sciences lie
- there is opportunity for growth within the scope of the course.

Using this reflection, learners will co-construct a plan to:

- demonstrate their current strengths in the biological, Earth and space sciences
- build their understanding to meet the requirements of the course including opportunities for inquiry.

Learners will use this plan to reflect on and review their progress.

**Science inquiry skills - design of inquiry - informed action**

Within application of biological, Earth and space sciences chosen from the local community, learners:

- identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge
- collaboratively and individually plan and conduct a range of investigations, including fieldwork and experiments, ensuring safety guidelines are followed.

**Science inquiry skills - implementation of inquiry - informed action**

While completing a range of related investigations within applications of biological, Earth and space sciences chosen from the local community, learners:

- measure and control variables, select from given equipment appropriate to the task and collect data with accuracy
- use representations to organise, record and communicate mathematical ideas and concepts.

**Science inquiry skills - evaluation of inquiry - informed action**

While completing a range of related investigations within an application of biological, Earth and space sciences chosen from the local community, learners:

- summarise data, from their own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence
- reflect on scientific investigations, including to make predictions and generalisations, and identifying improvements
- use scientific knowledge and findings from investigations to analyse simple claims based on evidence.

## Module 1 work requirements summary

This module includes one folio work requirement.

See Appendix 4 for the work requirement specifications for this course.

## Module 1 assessment

This module has a focus on criteria 1, 2, 3 and 4.

**Course Content: Module 2**

# Module 2: Physical and chemical sciences

This module aims to provide applied learning contexts within the physical and chemical sciences that are valued by learners and are found within their communities. Learners will use theory from the physical and chemical sciences to explore their communities, their values and their future plans. They will consider how we inquire into the physical world and the tools we use to do this.

Learners will identify local applications of physical and chemical sciences and develop their own goals to inform their actions. They will develop skills and strategies to address and reflect on their stated goals. They will plan and direct aspects of their own learning to research, apply, test and compare their solutions. Learners will employ critical thinking skills to review, justify and refine personal decisions.

## Module 2 learning outcomes

The following learning outcomes are a focus of this module:

1. communicate foundational science concepts using appropriate formats and adapt strategies for learning
2. conduct safe, ethical inquiries to collect, present and interpret simple scientific data and improve processes
5. observe and identify components and processes of physical and chemical systems and apply scientific knowledge to make predictions
6. identify where applications of physical and chemical sciences are used to meet needs in their local community and how these sciences are applied with examples of use of technology.

## Module 2 content

In Module 2 learners will follow inquiry processes to explore physical and chemical sciences. Links will be made between the science being applied and the learner's life and their community.

## Module 2 key knowledge

**Science as a human endeavour - theory**

Learners will explore how science is part of the community, including:

- ways to use technologies to assist them to gain greater scientific understanding including recording, organising and interpreting data
- where the physical and chemical sciences can be, or are, applied within their local community
- where First Nations Australians' knowledge is useful.

**Science understanding - theory**

Learners will explore and explain where science can be, or is, applied in their local community related to the physical and chemical sciences, including how:

- chemical and physical properties of substances are determined by their structure at an atomic scale
- substances change and new substances are produced by the rearrangement of atoms through atomic interactions and energy transfer
- forces affect the behaviour of objects
- energy can be transferred and transformed from one form to another.

## Module 2 key skills

**Monitoring and reviewing to demonstrate learning – dialogue and informed action**

Learners, in dialogue with others, will reflect on and identify where in the physical and chemical sciences:

- their strengths and interests in the physical and chemical sciences lie
- there is opportunity for growth within the scope of the course.

Using this reflection learners will co-construct a plan to:

- demonstrate their current strengths in the physical and chemical sciences
- build their understanding to meet the requirements of the course including opportunities for inquiry.

Learners will use this plan to reflect on and review their progress.

**Science inquiry skills - design of inquiry – informed action**

Within applications of physical and chemical sciences chosen from the local community, learners:

- identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge
- collaboratively and individually plan and conduct a range of investigations, including fieldwork and experiments, ensuring safety guidelines are followed.

**Science inquiry skills - implementation of inquiry – informed action**

While completing a range of related investigations within applications of physical and chemical sciences chosen from the local community, learners:

- measure and control variables, select from given equipment appropriate to the task and collect data with accuracy
- use representation to organise, record and communicate mathematical ideas and concepts.

**Science inquiry skills - evaluation of inquiry – informed action**

While completing a range of related investigations within applications of physical and chemical sciences chosen from the local community, learners:

- summarise data from their own investigations and secondary sources and use scientific understanding to identify relationships and draw conclusions based on evidence
- reflect on scientific investigations including to make predictions and generalisations, and identify improvements
- use scientific knowledge and findings from investigations to analyse simple claims based on evidence.

## Module 2 work requirements summary

This module includes one folio work requirement.

See Appendix 4 for the work requirement specifications for this course.

## Module 2 assessment

This module has a focus on criteria 1, 2, 5 and 6.

**Course Content: Module 3**

# Module 3: Scientific inquiry

This module aims to provide further learning contexts where related scientific knowledge and skills are chosen and valued by learners. Learners explore where these are found within their communities. The scientific knowledge and skills may be new to the learner or an extension of what was learnt in Modules 1 and 2. Learners will use theory from sciences to explore their communities, their values and their future plans. They will consider how we inquire into the world and the tools we use to do this.

Learners will identify local applications of science and develop their own goals to inform their actions. They will develop skills and strategies to address and reflect on their stated goals. They will plan and direct aspects of their own learning to research, apply, test, and compare their solutions. Learners will employ critical thinking skills to review, justify, and refine personal decisions.

## Module 3 learning outcomes

The following learning outcomes are a focus of this module:

1. communicate foundational science concepts using appropriate formats and adapt strategies for learning
2. conduct safe, ethical inquiries to collect, present and interpret simple scientific data and improve processes
7. observe and identify components and processes of simple scientific systems within their local community and apply scientific knowledge to make predictions
8. identify where related applications of scientific knowledge and skills are used to meet needs in their local community and how the knowledge and skills are applied with examples of use of technology.

## Module 3 content

Module 3 provides learners with opportunities to explore an area of science of their choice. The scientific knowledge and skills must either be new to the learner or an extension of what was learnt in Modules 1 and 2.

## Module 3 key knowledge

**Science as a human endeavour - theory**

Learners will explore how science is part of the community, including:

- ways to use technologies to assist them to gain greater scientific understanding including recording, organising and interpreting data
- where the biological, chemical, Earth, environmental and physical sciences can be, or are, applied within their local community
- where First Nations Australians' knowledge is useful.

**Science understanding - theory**

Within an area of scientific interest chosen from their local community learners will explore within their inquiry or inquiries and explain:

- the specialist knowledge they applied
- how the knowledge differs from, or was built on, what was learnt in Modules 1 and/or 2
- the theory and methods they applied
- specialist terminology appropriate for the scientific applications explored.

## Module 3 key skills

**Monitoring and reviewing to demonstrate learning – dialogue and informed action**

Learners, in dialogue with others, will reflect on and identify where in local applications of science:

- their strengths and interests lie
- there is opportunity for growth within the scope of the course.

Using this reflection, learners will co-construct a plan to:

- demonstrate their current strengths
- conduct simple investigations that are related, for example, by an inquiry question, scientific theory, location or industry
- build their understanding within the scope of the course, including opportunities for inquiry.

Learners will use this plan to reflect on and review their progress.

**Science inquiry skills - design of inquiry – informed action**

Within applications chosen from the local community, learners:

- identify questions and problems that can be investigated scientifically and make predictions based on scientific knowledge
- identify the relationships between the investigations
- collaboratively and individually plan and conduct at least two simple, related investigations, including fieldwork and experiments, ensuring safety guidelines are followed.

NOTE: the number of investigations will be dependent on their scope and nature; however, at least two related investigations must be completed.

**Science inquiry skills - implementation of inquiry – informed action**

While completing at least two simple, related investigations within applications chosen from the local community, learners:

- measure and control variables, select from given equipment appropriate to the task and collect data with accuracy
- use representations to organise, record and communicate mathematical ideas and concepts.

**Science inquiry skills - evaluation of inquiry – informed action**

While completing at least two simple, related investigations within applications chosen from the local community, learners:

- describe the relationships between the investigations
- summarise data, from their own investigations and secondary sources, and use scientific understanding to identify relationships and draw conclusions based on evidence
- reflect on scientific investigations, including to make simple predictions and generalisations, and identifying improvements
- use scientific knowledge and findings from investigations to analyse simple claims based on evidence.

## Module 3 work requirements summary

This module includes one inquiry and one folio work requirement.

See Appendix 3 for the work requirement specifications for this course.

## Module 3 assessment

This module has a focus on criteria 1, 2, 7 and 8.

**Assessment**

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Criterion-based assessment is a form of outcomes assessment that identifies the extent of learner achievement at an appropriate end-point of study. Although assessment – as part of the learning program – is continuous, much of it is formative, and is done to help learners identify what they need to do to attain the maximum benefit from their study of the course. Therefore, assessment for summative reporting to TASC will focus on what both teacher and learner understand to reflect end-point achievement.

The standard of achievement each learner attains on each criterion is recorded as a rating 'A', 'B', or 'C', according to the outcomes specified in the standards section of the course.

A 't' notation must be used where a learner demonstrates any achievement against a criterion less than the standard specified for the 'C' rating.

A 'z' notation is to be used where a learner provides no evidence of achievement at all.

Internal assessment of all criteria will be made by the provider. Providers will report the learner's rating for each criterion to TASC.

**Quality Assurance Process**

The following processes will be facilitated by TASC to ensure there is:

- a match between the standards of achievement specified in the course and the skills and knowledge demonstrated by individual learners
- community confidence in the integrity and meaning of the qualification

**Process**
TASC will verify that the provider's course delivery and assessment meet the course requirements and community expectations for fairness, integrity and validity of qualifications TASC issues. This will involve checking:

- scope and sequence documentation (Provider Standard 1):
- course delivery plan
- course assessment plan (assessment matrix)
- student attendance records (Provider Standard 2)
- examples of assessments tools / instruments, and associated rubrics / marking guides (Provider Standard 3)
- examples of student work, including that related to any work requirements articulated in the course document (Provider Standard 1 & 3)
- class records of assessment (Provider Standard 4).

This process will be scheduled by TASC using a risk-based approach.

**Criteria**

The assessment for *Science* Level 1 will be based on the degree to which the learner can:

1. communicate science concepts and complete tasks individually and with others
2. plan, complete, present and reflect on scientific inquiry
3. apply models and theories used to explain biological, Earth and space sciences
4. explore local applications of biological, Earth and space sciences
5. apply models and theories used to explain physical and chemical sciences
6. explore local applications of physical and chemical sciences
7. access and apply science models and theories
8. explore local applications of scientific knowledge and skills

| | Module 1 | Module 2 | Module 3 |
|---|---|---|---|
| Criteria focus | 1, 2, 3, 4 | 1, 2, 5, 6 | 1, 2, 7, 8 |

**Standards**

## Criterion 1: communicate science concepts and complete tasks individually and with others

The learner:

| Criterion elements | Rating A | Rating B | Rating C |
|---|---|---|---|
| E1 - Communicates knowledge and ideas | communicates scientific knowledge and ideas effectively when solving problems or answering questions | communicates key scientific knowledge and ideas when solving problems or answering questions | communicates scientific concepts when solving problems or answering questions |
| E2 - Communicates relationships in science | selects and uses appropriate scientific formats to correctly explain relationships in an application of science | selects and uses appropriate scientific formats to explain key relationships in an application of science | uses scientific representations to describe relationships in an application of science |
| E3 - Changes strategies to solve problems and complete tasks | improves strategies to solve problems and complete tasks | makes changes intended to improve strategies to solve problems and complete tasks | follows strategies to solve problems and complete tasks |
| E4 - Completion and contribution to tasks | reflects on, adapts and records their roles and responsibilities when completing personal and group tasks. | reflects on and records their roles and responsibilities when completing personal and group tasks. | identifies and records their roles and responsibilities when completing personal and group tasks. |

## Criterion 2: plan, complete, present and reflect on scientific inquiry

The learner:

| Criterion elements | Rating A | Rating B | Rating C |
|---|---|---|---|
| E1 - Adapts and completes investigations | plans, adapts and completes investigations to answer a question or solve a problem | adapts and completes investigations to answer a question or solve a problem | completes provided investigations to answer a question or solve a problem |
| E2 - Conduct safe and ethical investigations | predicts, and plans and acts in response to safety and ethical issues | identifies, and acts in response to safety and ethical issues | uses strategies to act in response to identified safety and ethical issues |
| E3 -Trends and sources of error in data | identifies and presents key trends and sources of error within data | identifies and presents simple trends and sources of error within data | identifies and presents simple trends within data |
| E4 - Presents valid conclusions | presents valid conclusions based on data and comments on validity | presents valid conclusions based on data | presents plausible conclusions based on data |
| E5 - Reflects on inquiries | reflects on processes and conclusions and suggests valid testable improvements. | considers processes and conclusions and suggests testable improvements. | considers processes and conclusions and suggests improvements. |

## Criterion 3: apply models and theories used to explain biological, Earth and space sciences

The learner:

| Criterion elements | Rating A | Rating B | Rating C |
|---|---|---|---|
| E1 - Identifies system components | identifies critical related components of biological, Earth and space systems | identifies related components of biological, Earth and space systems | identifies components of a biological, an Earth and a space system |
| E2 - Observes processes | explains and reflects on their observations of biological, Earth and space processes | explains their observations of biological, Earth and space processes | describes their observations of biological, Earth and space processes |
| E3 - Applies theories and models to observations | identifies critical parts of theories and models related to biological Earth and space systems | identifies parts of theories and models related to biological Earth and space systems | identifies parts of theories and models related to simple biological, Earth and space systems |
| E4 - Uses observation and knowledge to make predictions | explains observations and justifies valid predictions in related and similar contexts. | describes observations and justifies valid predictions in familiar contexts. | describes observations and makes plausible predictions in familiar, simple contexts. |

## Criterion 4: explore local applications of biological, Earth and space sciences

The learner:

| Criterion elements | Rating A | Rating B | Rating C |
|---|---|---|---|
| E1 - Describes where needs are met using biological, Earth and space sciences | explains where in their local community needs are met using biological, Earth and space sciences | describes where in their local community needs are met using biological, Earth and space sciences | identifies where in their local community needs are met using biological, Earth and space sciences |
| E2 - Describes how biological, Earth and space sciences are applied | explains how in their local community biological, Earth and space sciences are applied | describes how in their local community biological, Earth and space sciences are applied | identifies how in their local community biological, Earth and space sciences are applied |
| E3 - Describes biological, Earth and space sciences and technology | explains examples in their local community of the use of technology in biological, Earth and space sciences. | describes examples in their local community of the use of technology in biological, Earth and space sciences. | identifies examples in their local community of the use of technology in biological, Earth and space sciences. |

## Criterion 5: apply models and theories used to explain physical and chemical sciences

The learner:

| Criterion elements | Rating A | Rating B | Rating C |
|---|---|---|---|
| E1 - Identifies system components | identifies critical related components of physical and chemical systems | identifies related components of physical and chemical systems | identifies components of a physical and a chemical system |
| E2 - Observes processes | explains and reflects on their observations of physical and chemical processes | explains their observations of physical and chemical processes | describes their observations of physical and chemical processes |
| E3 - Applies theories and models to observations | identifies critical parts of theories and models related to physical and chemical systems | identifies parts of theories and models related to physical and chemical systems | identifies parts of theories and models related to simple physical and chemical systems |
| E4 - Uses observation and knowledge to make predictions | explains observations and justifies valid predictions in similar and related contexts. | describes observations and justifies valid predictions in familiar contexts. | describes observations and makes plausible predictions in familiar, simple contexts. |

## Criterion 6: explore local applications of physical and chemical sciences

The learner:

| Criterion elements | Rating A | Rating B | Rating C |
|---|---|---|---|
| E1 - Describes where needs are met using | explains where in their local community needs | describes where in their local community needs | identifies where in their local community needs |

| | | | |
|---|---|---|---|
| physical and chemical science | are met using physical and chemical sciences | are met using physical and chemical sciences | are met using physical and chemical sciences |
| E2 - Describes how physical and chemical sciences are applied | explains how in their local community physical and chemical sciences are applied | describes how in their local community physical and chemical sciences are applied | identifies how in their local community physical and chemical sciences are applied |
| E3 - Describes physical and chemical and technology | explains examples in their local community of the use of technology in physical and chemical sciences. | describes examples in their local community of the use of technology in physical and chemical sciences. | identifies examples in their local community of the use of technology in physical and chemical sciences. |

## Criterion 7: access and apply science models and theories

The learner:

| Criterion elements | Rating A | Rating B | Rating C |
|---|---|---|---|
| E1 - Identifies system components | correctly identifies critical related components of scientific systems | correctly identifies related components of scientific systems | correctly identifies some components of scientific systems |
| E2 - Observes processes | explains and reflects on their observations of scientific processes | explains their observations of scientific processes | describes their observations of scientific processes |
| E3 - Applies theories and models to observations | accesses, identifies and applies key parts of theories and models related to scientific systems | accesses, identifies and applies parts of theories and models related to scientific systems | accesses, identifies and applies parts of theories and models related to simple scientific systems |
| E4 - Uses observation and knowledge to predict | describes observations and justifies valid predictions within an inquiry in similar and related contexts. | describes observations and justifies valid predictions in familiar contexts. | describes observations and makes plausible predictions in familiar, simple contexts. |

## Criterion 8: explore local applications of scientific knowledge and skills

The learner:

| Criterion elements | Rating A | Rating B | Rating C |
|---|---|---|---|
| E1 - Describes where needs are met using scientific skills and knowledge | explains where in their local community needs are met using scientific knowledge and skills | describes where in their local community needs are met using scientific knowledge and skills | identifies where in their local community needs are met using scientific knowledge and skills |
| E2 - Describes how scientific knowledge and skills are applied | explains how in their local community scientific knowledge and skills are applied | describes how in their local community scientific knowledge and skills are applied | identifies how in their local community scientific knowledge and skills are applied |
| E3 - Describes examples of the use of technology in science | explains examples in their local community of the use of technology in science. | describes examples in their local community of the use of technology in science. | identifies examples in their local community of the use of technology in science. |

**Qualifications Available**

*Science* Level 1 (with the award of):

EXCEPTIONAL ACHIEVEMENT

HIGH ACHIEVEMENT

COMMENDABLE ACHIEVEMENT

SATISFACTORY ACHIEVEMENT

PRELIMINARY ACHIEVEMENT

**Award Requirements**

The final award will be determined by the Office of Tasmanian Assessment, Standards and Certification from 8 ratings.

The minimum requirements for an award in *Science* Level 1 are as follows:

EXCEPTIONAL ACHIEVEMENT (EA)
6 'A' ratings, 2 'B' ratings

HIGH ACHIEVEMENT (HA)
3 'A' ratings, 4 'B' ratings, 1 'C' rating

COMMENDABLE ACHIEVEMENT (CA)
4 'B' ratings, 3 'C' ratings

SATISFACTORY ACHIEVEMENT (SA)
6 'C' ratings

PRELIMINARY ACHIEVEMENT (PA)
4 'C' ratings

A learner who otherwise achieves the rating for a CA (Commendable Achievement) or SA (Satisfactory Achievement) award but who fails to show any evidence of achievement in one or more criteria ('z' notation) will be issued with a PA (Preliminary Achievement) award.

**Course Evaluation**

Years 9 to 12 Learning will develop and regularly review and revise the curriculum. Course evaluation is informed by the experience of the course's implementation, delivery and assessment. More information about course evaluation can be found on the Years 11 and 12 website.

**Course Developer**

This course has been developed by the Department of Education's Years 9 to 12 Learning Unit in collaboration with Catholic Education Tasmania and Independent Schools Tasmania.

**Accreditation**

Accredited on 5 October 2021 for use from 1 January 2022 until 31 December 2026.

**Version History**

**Version 1**

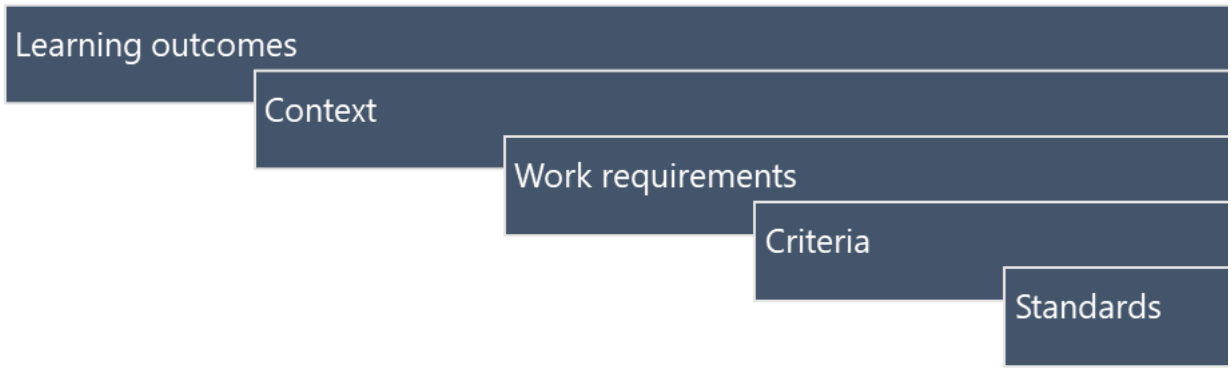
Accredited on 5 October 2021 for use from 1 January 2022 until 31 December 2026.

**Version 1a**

Approved on 5 July 2022. The list of sciences under Key knowledge in the course content for module 3 was expanded to more accurately represent the content of the course.

**Appendix 1 – Line of sight**

**Appendix 1: Line of sight**




| Learning outcomes | Course content: module(s) | Work requirements: module(s) | Criteria | Criterion elements |
|---|---|---|---|---|
| 1. communicate foundational science concepts using appropriate formats, and adapt strategies for learning | 1, 2, 3 | 1, 2, 3 | 1 | All |
| 2. conduct safe, ethical inquiries to collect, present and interpret simple scientific data and improve processes | 1, 2, 3 | 1, 2, 3 | 2 | All |
| 3. observe and identify components and processes of biological, Earth and space systems and apply scientific knowledge to make predictions | 1 | 1 | 3 | All |
| 4. identify where applications of biological, Earth and space sciences are used to meet needs in their local community and how these sciences are applied with examples of use of technology | 1 | 1 | 4 | All |
| 5. observe and identify components and processes of physical and chemical systems and apply scientific knowledge to make predictions | 2 | 2 | 5 | All |
| 6. identify where applications of physical and chemical sciences are used to meet needs in their local community and how these sciences are applied with examples of use of technology | 2 | 2 | 6 | All |
| 7. observe and identify components and processes of simple scientific systems within their local community and apply scientific knowledge to make predictions | 3 | 3 | 7 | All |
| 8. identify where related applications of scientific knowledge and skills are used to meet needs in their local community and how the knowledge and skills are applied with examples of use of technology | 3 | 3 | 8 | All |

# Alignment to curriculum frameworks

**Relationship to the F-10 Australian Curriculum: Science**

This course provides a further opportunity to develop student understanding and skills from across the three strands of the F-10 Australian Curriculum: Science. The Science Understanding strand focuses on knowledge and understanding from across the four sub-strands of biological, physical, chemical, and Earth and space sciences. In particular:

- diversity of living things on Earth and evolution over time
- interdependency of living things and how they interact with each other and their environment
- relationships between form and features of living things to the functions their systems perform
- Earth is subject to change within and on its surface, over a range of timescales as a result of natural processes and human use of resources
- observable phenomena linked to space, for example: seasons, tides, or day length
- chemical and physical properties of substances are determined by their structure at an atomic scale
- substances change and new substances are produced by the rearrangement of atoms through atomic interactions and energy transfer
- forces affect the behaviour of objects
- energy can be transferred and transformed from one form to another.

**Appendix 3 – Work requirements**

# Work requirements

The work requirements of a course are processes, products or performances that provide a significant demonstration of achievement that is measurable against the course's standards. Work requirements need not be the sole form of assessment for a module.

# Module 1 work requirements specifications

## Work requirement 1 of 2

**Title of work requirement**: Biological, Earth and space sciences folio

**Mode or format**: folio

**Description**: Learners will create a record of their work as they progress through the module, engaging with theory, participating in dialogue, and taking informed action. This record may be multimodal to suit the needs of learners and the nature of the task at hand. For example, written observations and reflections, annotated images in an electronic or physical format, or video could be used to demonstrate understanding.

Learners will spend 3 to 6 hours selecting and organising examples to demonstrate:

- planning and monitoring of their learning
- the biological, Earth and space sciences understanding gained from their investigations
- examples of applications within their community
- the range of practical and field investigations undertaken.

Learners will use this time to add and connect information where appropriate.

**Size**: 3 - 6 hours

**Timing**: end of Module 1

**External agencies**: Learners may engage with external agencies or complete work requirements in a learning setting

**Relevant criteria**: 1, 2, 3 and 4.

## Work requirement 2 of 2

**Title of work requirement**: Biological, Earth and space sciences presentation

**Mode or format**: performance

**Description**: Learners will present their work from the biological, Earth and space sciences folio work requirement and answer questions in dialogue for 4 minutes in total. The intention of this requirement is to demonstrate understanding and can be within one-on-one dialogue with a teacher or a small familiar group.

**Size**: 4 minutes multimodal presentation

**Timing**: end of Module 1

**External agencies**: Learners may engage with external agencies or complete work in a learning setting.

**Relevant criteria**: 1, 2, 3 and 4.

# Module 2 work requirements specifications

## Work requirement 1 of 2

**Title of work requirement**: Physical and chemical sciences folio

**Mode or format**: folio

**Description**: Learners will create a record of their work as they progress through the module. They engage with theory, participate in dialogue, and take informed action. This record may be multimodal to suit the needs of learners and the nature of the task at hand. For example, written observations and reflections, annotated images in an electronic or physical format, or video could be used to demonstrate understanding.

Learners will spend 3 to 6 hours selecting and organising examples to demonstrate:

- planning and monitoring of their learning
- the physical and chemical sciences understanding gained from their investigations
- examples of applications within their community
- the range of practical and field investigations undertaken.

Learners will use this time to add and connect information where appropriate.

**Size**: 3 - 6 hours

**Timing**: end of Module 2

**External agencies**: Learners may engage with external agencies or complete work requirement in a learning setting

**Relevant criteria**: 1, 2, 5 and 6.

## Work requirement 2 of 2

**Title of work requirement**: Physical and chemical sciences presentation

**Mode or format**: performance

**Description**: Learners will present their work from the Physical and chemical sciences presentation folio work requirement and answer questions in dialogue for 4 minutes in total. The intention of this requirement is to demonstrate understanding and can be within one-on-one dialogue with a teacher or a small, familiar group.

**Size**: 4 minutes

**Timing**: end of Module 2

**External agencies**: learners may engage with external agencies or complete work requirement in a learning setting

**Relevant criteria**: 1, 2, 5, and 6.

# Module 3 work requirements specifications

## Work requirement 1 of 2

**Title of work requirement**: Scientific inquiry folio

**Mode or format**: folio

**Description**: Learners will create a record of their work as they progress through the module. They engage with theory, participate in dialogue, and take informed action. This record may be multimodal to suit the needs of learners and the nature of the task at hand. For example, written observations and reflections, annotated images in an electronic or physical format, or video could be used to demonstrate understanding.

Learners will spend 3 to 6 hours selecting and organising examples to demonstrate for at least two investigations:

- planning and monitoring of their learning
- the science understanding gained from their investigations
- the relationships between the investigations
- examples of applications within their community
- the range of practical and/or field investigations undertaken.

Learners will use this time to add and connect information where appropriate.

**Size**: 3 - 6 hours

**Timing**: end of Module 3

**External agencies**: Learners may engage with external agencies or complete work requirement in a learning setting.

**Relevant criteria**: 1, 2, 7 and 8.

## Work requirement 2 of 2

**Title of work requirement**: Scientific inquiry presentation

**Mode or format**: performance

**Description**: In preparation for their multimodal presentation learners will present their work from the Extended inquiry folio work requirement and answer questions in one-on-one dialogue with a teacher or a small, familiar group.

Learners will create a multimodal presentation to describe:

- the range of practical and field investigations undertaken
- the relationships between the investigations
- their major findings with the evidence for them
- opportunities for further simple investigation with reasoning

Examples of multimodal presentations include video, voice-over electronic presentation, animated text and images or discussing a product such as a poster.

**Size**: 2 minutes multimodal presentation maximum

**Timing**: end of Module 3

**External agencies**: Learners may engage with external agencies or complete work requirement in a learning setting

**Relevant criteria**: 1, 2, 7 and 8.

## Appendix 4 – General capabilities and cross-curriculum priorities

### General capabilities and cross-curriculum priorities

Learning across the curriculum content, including the cross-curriculum priorities and general capabilities, assists students to achieve the broad learning outcomes defined in the *Alice Springs (Mparntwe) Education Declaration* (December 2019).

**General capabilities**
The general capabilities play a significant role in the Australian Curriculum in equipping young Australians to live and work successfully in the twenty-first century.

In the Australian Curriculum, capability encompasses knowledge, skills, behaviours and dispositions. Students develop capability when they apply knowledge and skills confidently, effectively and appropriately in complex and changing circumstances, in their learning at school and in their lives outside school.

The general capabilities include:

- Critical and creative thinking
- Ethical understanding
- Information and communication technology capability
- Intercultural understanding
- Literacy
- Numeracy
- Personal and social capability

**Cross-curriculum priorities**
Cross-curriculum priorities enable students to develop an understanding about and address the contemporary issues they face, for their own benefit and for the benefit of Australia as a whole. The priorities provide national, regional and global dimensions which will enrich the curriculum through development of considered and focused content that fits naturally within learning areas. Incorporation of the priorities will encourage conversations between students, teachers and the wider community.

The Cross-curriculum priorities include:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability

# Glossary

**adaptation**
A physical or behavioural characteristic that is inherited and which results in an individual being more likely to survive and reproduce in its environment.

**analyse**
To consider in detail for the purpose of finding meaning or relationships, and identifying patterns, similarities and differences.

**characteristic**
A distinguishing aspect, including features and behaviours, of an object material, living thing or event.

**chart**
A visual display of information.

**classify**
To arrange items into named categories in order to sort, group or identify them.

**collaborate**
To work with others to perform a specific task.

**communication**
To convey scientific information using a range of modes, conventions, formats and structures

**conclusion**
A judgement based on evidence.

**contemporary science**
New and emerging science research and issues of current relevance and interest.

**continuous data**
Quantitative data with a potentially infinite number of possible values along a continuum.

**controlled variable**
A variable that is kept constant (or changed in constant ways) during an investigation.

**convention**
An agreed method of representing concepts, information and behaviours.

**data**
The plural of datum; the measurement of an attribute, the volume of gas or the type of rubber. This does not necessarily mean a single measurement it may be the result of averaging several repeated measurements and these could be quantitative or qualitative.

**dependent variable**
A variable that changes in response to changes to the independent variable in an investigation.

**design**
To plan and evaluate the construction of a product or process, including an investigation.

**digital technologies**
Systems that handle digital data, including hardware and software, for specific purposes.

**discrete data**
Quantitative data consisting of a number of separate values where intermediate values are not permissible.

**environment**
All the surroundings, both living and non-living.

**evaluate**
To examine and judge the merit or significance of something, including processes, events, descriptions, relationships or data.

**evidence**
In science, evidence is data that is considered reliable and valid, and that can be used to support a particular idea, conclusion or decision. evidence gives weight or value to data by considering its credibility, acceptance, bias, status, appropriateness and reasonableness.

**experiment or experimental investigation**
An investigation that involves carrying out a practical activity.

**fair test**
An investigation where one variable, the independent variable, is changed and all other conditions, controlled variables, are kept the same; what is measured or observed is referred to as the dependent variable.

**field study or field work**
An observational or practical research undertaken in a normal environment of the subject of a study, that is, an investigation that can be conducted outside the laboratory.

**force**
A push or pull between objects, which may cause one or both objects to change speed and/or direction of their motion, that is, accelerate, or change their shape. all interactions between matter can be explained as an action of one or a combination of forces.

**formal measurement**
Measurement based on an agreed standard unit (metre, second, gram).

**graph**
A visual representation of the relationship between quantities plotted with reference to a set of axes.

**guided investigation**
An investigation partly directed by a teacher.

**informal measurement**
Measurement that is not based on any agreed standard unit, for example, hand spans, paces or cups.

**investigation**
A scientific process of answering a question, exploring an idea or solving a problem that requires activities such as planning a course of action, collecting data, interpreting data, reaching a conclusion and communicating these activities.

**law**
A statement of a relationship based on available evidence.

**material**
A substance with particular qualities, or that is used for specific purposes.

**matter**
A physical substance
anything that has mass and occupies space.

**model**
A representation that describes, simplifies, clarifies or provides an explanation of the workings, structure or relationships within an object, system or idea.

**natural materials**
Products or physical matter that come from plants, animals, or earth and have undergone very little modification by humans.

**observable**
Something that can be seen, heard, felt, tasted or smelled either directly by an individual or indirectly by a measuring device, for example, a ruler, camera or thermometer.

**processed materials**
Products of physical matter that have been modified from natural materials by human intervention or that do not occur at all in the natural environment, but have been designed and manufactured to fulfil a particular purpose.

**property**
An attribute of an object or material, normally used to describe attributes common to a group.

**qualitative data**
Information that is not numerical in nature.

**quantitative data**
Numerical information.

**relate**
To identify connections or associations between ideas or relationships or between components of systems and structures.

**relationship**
A connection or association between ideas or between components of systems and structures.

**report**
A written account of an investigation.

**scientific literacy**
An ability to use scientific knowledge, understanding, and inquiry skills to identify questions, acquire new knowledge, explain science phenomena, solve problems and draw evidence-based conclusions in making sense of the world, and to recognise how understandings of the nature, development, use and influence of science help us make responsible decisions and shape our interpretations of information.

**senses**
Hearing, sight, smell, touch and taste.

**system**
A group of interacting objects, materials or processes that form an integrated whole.

**technology**
A development of products, services, systems and environments, using various types of knowledge, to meet human needs and wants.

**theory**
An explanation of a set of observations that is based on one or more proven hypotheses, which has been accepted through consensus by a group of scientists.

## Appendix 6 - Scientific knowledge and processes within Science Level 1

### Scientific knowledge and processes within ***Science*** Level 1

#### The three interrelated strands of science

The Australian Curriculum: Science has three interrelated strands: science inquiry skills, science as a human endeavour and science understanding.

Together, the three strands of the science curriculum provide learners with understanding, knowledge and skills through which they can develop a scientific view of the world. Learners are challenged to explore science, its concepts, nature and uses through clearly described inquiry processes.

In the practice of science, the three strands of science understanding, science as a human endeavour and science inquiry skills are closely integrated; the work of scientists reflects the nature and development of science, is built around scientific inquiry and seeks to respond to and influence society's needs. Learners' experiences of science should mirror and connect to this multifaceted view of science.

**Science inquiry skills**
Science inquiry involves identifying and posing questions; planning, conducting and reflecting on investigations; processing, analysing and interpreting evidence; and communicating findings. This strand is concerned with evaluating claims, investigating ideas, solving problems, drawing valid conclusions and developing evidence-based arguments. The skills learners develop give them the tools they need to achieve deeper understanding of the science concepts and how scientific thinking applies to these understandings.

Science investigations are activities in which ideas, predictions or hypotheses are tested and conclusions are drawn in response to a question or problem. Investigations can involve a range of activities, including experimental testing, field work, locating and using information sources, conducting surveys, and using modelling and simulations. The choice of the approach taken will depend on the context (science as a human endeavour) and subject of the investigation (science understanding).

In science investigations, collection and analysis of primary data and evidence play a major role. This can involve collecting or extracting information and reorganising data in the form of tables, graphs, flow charts, diagrams, prose, keys, spreadsheets and databases. Learners will also develop their understandings through the collection and analysis of secondary data and information.

**Science as a human endeavour**
This strand highlights the development of science as a unique way of knowing and doing, and the importance of science in contemporary decision-making and problem-solving. It acknowledges that in making decisions about science practices and applications, ethical and social implications must be taken into account. This strand also recognises that science advances through the contributions of many different people from different cultures and that there are many rewarding science-based career paths. This strand provides context and relevance to learners and to our broader community.

**Science understanding**
The science understanding strand comprises four sub-strands. They are:

**Biological sciences**
Through this sub-strand, learners investigate living things, including animals, plants and microorganisms, and their interdependence and interactions within ecosystems. They explore their life cycles, body systems, structural adaptations and behaviours, how these features aid survival, and how their characteristics are inherited from one generation to the next. Learners are introduced to the cell as the basic unit of life and the processes that are central to its function.

**Chemical sciences**
In this sub-strand, learners classify substances based on their properties, such as solids, liquids and gases, or their composition, such as elements, compounds and mixtures. They explore physical changes such as changes of state and dissolving and investigate how chemical reactions result in the production of new substances. Learners recognise that all substances consist of atoms which can combine to form molecules, and chemical reactions involve atoms being rearranged and recombined to form new substances. They explore the relationship between the way in which atoms are arranged and the properties of substances, and the effect of energy transfers on these arrangements.

**Earth and space sciences**
Through this sub-strand, learners view Earth as part of a solar system, which is part of a galaxy, which is one of many in the universe, and explore the immense scales associated with space. They explore how changes on Earth, such as day and night and the seasons, relate to Earth's rotation and its orbit around the sun. Learners investigate the processes that result in change to Earth's surface, recognising that Earth has evolved over 4.5 billion years and that the effect of some of these processes is only evident when viewed over extremely long timescales. They explore the ways in which humans use resources from Earth and appreciate the influence of human activity on the surface of Earth and its atmosphere.

**Physical sciences**
Through this sub-strand, learners gain an understanding of how an object's motion (direction, speed and acceleration) is influenced by a range of contact and non-contact forces such as friction, magnetism, gravity and electrostatic forces. They develop an understanding of the concept of energy and how energy transfer is associated with phenomena involving motion, heat, sound, light and electricity. They appreciate that concepts of force, motion, matter and energy apply to systems ranging in scale from atoms to the universe itself.