Physical Sciences - Foundation

LEVEL 2	15 TCE CREDIT POINTS
COURSE CODE	SPW215114
COURSE SPAN	2014 — 2017
READING AND WRITING STANDARD	NO
MATHEMATICS STANDARD	NO
COMPUTERS AND INTERNET STANDARD	NO

This course was delivered in 2017. Use A-Z Courses to find the current version (if available).

Physical Sciences - Foundation aims to equip learners with skills and knowledge in physical sciences to apply basic principles to explain observations of the properties and behaviour of matter and natural phenomena that occur in the real world

In studying this course, learners will also develop skills in scientific thinking, and understanding of scientific terminology. This course does not have prescribed content. A learner will be exposed to a range of scientifically based approaches for inquiring into the physical and chemical nature of their world. Content will have a strong practical basis that is covered and, where possible, links with the learners' experiences and lives. A variety of approaches can be used to achieve this purpose.

Course Description

For the content areas of Physical Sciences - Foundation, the three (3) interrelated strands - Science Inquiry Skills; Science as a Human Endeavour; and Science Understanding - build on students' learning in F-10 *Australian Curriculum: Science*. In the practice of science, the three strands are closely integrated: the work of scientists reflects the nature and development of science; it is built around scientific inquiry; and it seeks to respond to and influence society. These three strands will be integrated into four (4) general areas of study based on the themes of chemical and physical behaviours in the physical world:

- explain, investigate and predict chemical behaviour through language, terminology and understanding of three basic tenets that underpin chemistry
- explain, investigate and predict physical behaviour through language, terminology and understanding that underpin physics
- investigate, represent and predict chemical behaviour accurately using diagrams, symbols and mathematics
- investigate, represent and predict physical behaviour accurately using diagrams, symbols and mathematics.

While each general area of study is **compulsory**, the order of delivery is not prescribed. The course may be delivered in a number of ways, for example:

- using a theme-based approach
- on the basis of project work
- unitised in traditional topics
- a combination of these and other strategies.

The general areas of study relate directly to Criteria 5 – 8. Criteria 1 – 4 apply to all four general areas of study.

Rationale

Knowledge and understanding of science, scientific literacy and scientific methods are necessary for learners to develop the skills to resolve questions about their natural and constructed world.

The purpose of science education is to develop scientific literacy, which is a high priority for all citizens, helping them: to be interested in, and understand, the world around them; to engage in discourse about science; to be sceptical and questioning of claims made by others about scientific matters; to be able to identify questions and draw evidence-based conclusions; and to make informed decisions about the environment, about their own health and well-being and about issues arising as a result of the application of science and technology.

The physical sciences endeavour to explain natural phenomena and properties of matter that occur in the physical world. Physics uses models and theories based on physical laws to visualise, explain and predict physical phenomena. Chemistry uses an understanding of chemical structures, interactions and energy changes to explain chemical properties and behaviours.

Aims

Physical Sciences - Foundation aims to equip learners with skills and knowledge in physical sciences to apply basic principles to explain observations of the properties and behaviour of matter and natural phenomena that occur in the real world. In studying this course, learners will also develop skills in scientific thinking, and understanding of scientific terminology.

This course does not have prescribed content. A learner will be exposed to a range of scientifically based approaches for inquiring into the physical and chemical nature of their world. Content will have a strong practical basis that is covered and, where possible, links with the learners' experiences and lives. A variety of approaches can be used to achieve this purpose.

Learning Outcomes

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

1. have personal skills to organise and complete activities including practical tasks
2. have cooperative working skills
3. have practical skills in the use of techniques and equipment relating to the physical sciences
4. understand scientific method and skills in drawing valid conclusions
5. be able to collect, process and communicate and organise physical sciences information following accepted conventions
6. understand the application and impact of physical sciences on society
7. understand and apply appropriate principles of chemistry to describe and solve problems associated with chemical behaviours
8. understand and apply appropriate principles of physics to describe and solve problems associated with physical behaviours and systems
9. have skills in the utilisation of mathematics, diagrams and symbols to analyse and interpret chemical data and phenomena
10. have skills in the utilisation of mathematics, diagrams and symbols to analyse and interpret physical data.

Access

Learners are required to be able to work responsibly and safely in practical situations as using potentially dangerous materials and equipment are central to this course.

Pathways

This course is designed for learners who are interested in studying the science related to the physical world. Physical Sciences - Foundation may be studied as a stand alone course and is also useful preparation for further study of Physical Sciences Level 3. It may provide background and support for vocational programs within training packages, where some scientific knowledge and experience is useful. It may also provide links with VET programs, traineeships and apprenticeships.

Resource Requirements

This course requires a suitably equipped laboratory and resources to conduct experiments safely and effectively. Learners need to be able to access a wide range of reliable sources of information about the uses and applications of science within the wider community.

Course Size And Complexity

This course has a complexity level of 2.

At Level 2, the learner is expected to carry out tasks and activities that involve a range of knowledge and skills, including some basic theoretical and/or technical knowledge and skills. Limited judgement is required, such as making an appropriate selection from a range of given rules, guidelines or procedures. VET competencies at this level are often those characteristic of an AQF Certificate II.

This course has a size value of 15.

Course Content

GENERAL AREAS OF STUDY

- explain, investigate and predict chemical behaviour through language, terminology and understanding of three basic tenets that underpin chemistry (criterion 5):
    - substances are made of compounds that have predictable composition and behaviour
    - reactions between compounds can be predicted, generalised and observed
    - constituents within compounds and reactions are not created or destroyed – they maintain constant proportions
- explain, investigate and predict physical behaviour through language, terminology and understanding that underpin physics (criterion 6):
    - physics utilises measurable, standardised and inter-related quantities to explain, predict and explore physical behaviour
    - basic physical principles can be used to predict, explore and explain physical behaviours
    - physical behaviours within systems can be explained, explored and predicted through the inter-relationships between basic physical principles and quantities
- investigate, represent and predict chemical behaviour accurately using diagrams, symbols and mathematics (criterion 7):
    - chemical formulae and the notion of chemical reactions, basic chemical equations and simplified reacting quantities
    - inquiring into chemical systems by creating and utilising graphs and tables of measurable chemical phenomena
    - use diagrams and symbols that represent the components of chemical systems to simplify, explain and explore the underlying nature of chemical behaviours
- investigate, represent and predict physical behaviour accurately using diagrams, symbols and mathematics (criterion 8):
- measuring and manipulating physical quantities such as mass, volume, length, time, temperature, force, energy, etc.
- inquiring into physical systems by creating and utilising graphs and tables of measurable physical phenomena
- use diagrams and symbols that represent the components of physical systems to simplify, explain and explore the underlying nature of physical behaviours.

Assessment

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.

Providers offering this course must participate in quality assurance processes specified by TASC to ensure provider validity and comparability of standards across all awards. Further information on quality assurance processes, as well as on assessment, is on the TASC website: http://www.tasc.tas.gov.au

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 process 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 learners
- community confidence in the integrity and meaning of the qualification.

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

- learner attendance records; and
- course delivery plans (the sequence of course delivery/tasks and when assessments take place):
    - assessment instruments and rubrics (the 'rules' or marking guide used to judge achievement)
    - class records of assessment
    - examples of learner work that demonstrate the use of the marking guide
    - samples of current learner's work, including that related to any work requirements articulated in the course document.

This process may also include interviews with past and present learners. It will be scheduled by TASC using a risk-based approach.

Criteria

The assessment for Physical Sciences - Foundation Level 2 will be based on the degree to which the learner can:

1. demonstrate personal skills to organise and complete activities
2. develop, interpret and evaluate physical sciences experiments
3. collect, process and communicate science information
4. demonstrate understanding of the application and impact of physical sciences on society
5. demonstrate understanding of fundamental principles of chemistry
6. demonstrate understanding of fundamental principles of physics
7. use diagrams, symbols and mathematics in chemistry
8. use diagrams, symbols and mathematics in physics

Standards

Criterion 1: demonstrate personal skills to organise and complete activities

The learner:

Rating A	Rating B	Rating C
selects and uses techniques and equipment safely, competently and methodically	selects and uses techniques and equipment safely and methodically	uses familiar techniques and equipment safely
follows instructions accurately, adapting to new circumstances	follows instructions accurately	follows instructions. There may be some errors or omissions in doing so.
monitors and evaluates progress towards meeting goals and timelines and plans future actions	monitors progress towards meeting goals and timelines and plans future actions	monitors progress towards meeting goals and timelines
performs and monitors own tasks and guides others in their contribution to the successful completion of group activities.	performs tasks and monitors their contribution to the successful completion of group activities.	performs tasks to contribute to the completion of group activities.

Criterion 2: develop, interpret and evaluate physical sciences experiments

The learner:

Rating A	Rating B	Rating C
expresses a valid idea to explain observations	expresses an appropriate idea to explain observations	expresses an idea that relates to observations
selects and uses appropriate equipment	selects and uses appropriate equipment from a given range	uses equipment as directed
draws a valid conclusion, based on an interpretation of the results, that relates to the purpose of an experiment	draws a conclusion based on experimental results, that relates to the purpose of an experiment and has some validity	draws a conclusion, based on experimental results, that relates to the purpose of an experiment
identifies some limitations in an experimental design and suggests some improvements.	identifies a limitation in an experimental design.	lists some limitations to an experimental design.

Criterion 3: collect, process and communicate science information

The learner:

Rating A	Rating B	Rating C
uses a variety of relevant resources to collect information, and evaluates their reliability	uses a variety of practical resources or other sources to collect information	uses a limited range of practical resources or other sources to collect information
documents sources of information using a selected recognised format	documents sources of information in a given format	documents sources of information
selects and uses an appropriate scientific format for communication of information.	from a range of formats, selects and uses an appropriate scientific format for communication of information.	as guided, uses an appropriate scientific format for communication of information.

Criterion 4: demonstrate understanding of the application and impact of physical sciences on society

The learner:

Rating A	Rating B	Rating C
explains the relevance of identified science background to an issue	describes relevant science background to an issue	identifies relevant science background to an issue
describes in detail components of an issue and presents a balanced discussion	identifies key components of an issue and presents a balanced discussion	identifies some components of an issue and lists points in favour, and against
argues a reasoned conclusion, articulating links to relevant evidence.	presents a reasoned conclusion, using some relevant evidence.	uses some evidence to reach a conclusion.

Criterion 5: demonstrate understanding of fundamental principles of chemistry

The learner:

Rating A	Rating B	Rating C
relates appropriate properties within classes of chemical compounds	attributes appropriate properties to classes of chemical compounds	identifies different chemical properties of different chemicals
uses a given chemical reaction to predict reactants and products of similar chemical reactions	correctly identifies reactants and products within a given chemical reaction	identifies the principle of chemical reactions occurring in a predictable manner, in a given example
uses constant proportions within compounds and reactions in practical contexts and, where appropriate, refers to relevant theory.	uses constant proportions within compounds and reactions in practical contexts.	identifies the principal of constant proportions within compounds and reactions.

Criterion 6: demonstrate understanding of fundamental principles of physics

The learner:

Rating A	Rating B	Rating C
applies and appropriately converts units of measure when solving problems	applies appropriate units of measure in solving problems	identifies appropriate units of measure
explains basic physics principals that apply to ‘real world’ situations	describes basic physics principles that apply to ‘real world’ situations	identifies basic physics principles that apply in ‘real world’ situations
explains relationships and ideas that connect physics in a system, and applies them to solve problems.	describes straightforward relationships and ideas that connect physics in a system, and applies them to solve problems.	identifies straightforward relationships and ideas that connect physics in a system.

Criterion 7: use diagrams, symbols and mathematics in chemistry

In the study of Chemistry, the learner:

Rating A	Rating B	Rating C

selects and applies appropriate mathematical techniques in solving problems	applies straightforward mathematical techniques in solving problems	uses mathematical information from given data to solve simple problems
accurately reads and interprets complex data from a scientific graph or table	accurately reads and interprets data from a scientific graph or table	accurately reads data from a scientific graph or table
constructs appropriate scientific graphs or tables from data	selects from a range of given formats and constructs scientific graphs and tables from data	following given instructions, constructs scientific graphs and tables from data
accurately reads and interprets diagrams and symbols, and uses them appropriately in solving problems.	accurately reads and appropriately interprets diagrams and symbols.	accurately reads diagrams and symbols.

Criterion 8: use diagrams, symbols and mathematics in physics

In the study of Physics, the learner:

Rating A	Rating B	Rating C
selects and applies appropriate mathematical techniques in solving problems	applies straightforward mathematical techniques in solving problems	uses mathematical information from given data to solve simple problems
accurately reads and interprets complex data from a scientific graph or table	accurately reads and interprets data from a scientific graph or table	accurately reads data from a scientific graph or table
constructs appropriate scientific graphs or tables from data	selects from a range of given formats and constructs scientific graphs and tables from data	following given instructions, constructs scientific graphs and tables from data
accurately reads and interprets diagrams and symbols, and uses them appropriately in solving problems.	accurately reads and appropriately interprets diagrams and symbols.	accurately reads diagrams and symbols.

Qualifications Available

Physical Sciences - Foundation Level 2 (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 internal ratings.

The minimum requirements for an award in Physical Sciences - Foundation Level 2 are as follows:

EXCEPTIONAL ACHIEVEMENT (EA)
7 'A' ratings, 1 'B' rating

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 ratings 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

The Department of Education's Curriculum Services will develop and regularly revise the curriculum. This evaluation will be informed by the experience of the course's implementation, delivery and assessment.In addition, stakeholders may request Curriculum Services to review a particular aspect of an accredited course.

Requests for amendments to an accredited course will be forwarded by Curriculum Services to the Office of TASC for formal consideration.

Such requests for amendment will be considered in terms of the likely improvements to the outcomes for learners, possible consequences for delivery and assessment of the course, and alignment with Australian Curriculum materials.

A course is formally analysed prior to the expiry of its accreditation as part of the process to develop specifications to guide the development of any replacement course.

Expectations Defined By National Standards

There are no content statements developed by ACARA relevant to this course.

Accreditation

The accreditation period for this course is from 1 January 2014 to 31 December 2017.

Version History

Version 1 – Accredited 3 July 2013 for use in 2014 to 2017. This course replaces Physical Sciences - Foundation (SPW215109) that expired on 31 December 2013.

Version 2 – Approval granted 9 September 2013 to:

- Amend course title from Science of the Physical World (SPW215114) to Physical Sciences – Foundation (SPW215114), and
- Apply minor changes to wording in Criteria 1, 2 and 3, to align with standards in Life Science (LSC215114).

Supporting documents including external assessment material

- SPW215114CourseAccreditation.pdf (2017-07-25 04:31pm AEST)

Tasmanian Government