

# Syllabus design brief

Science Extension

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# Introduction

A *Syllabus design brief* is developed before a new syllabus is developed, or an existing syllabus is redeveloped. This document provides:

- a definition of a syllabus and syllabus design brief
- an overview of the relationship between the syllabus and the syllabus design brief
- the Syllabus design brief for Science Extension.

## What is a syllabus?

A **syllabus** is a type of official curriculum documentation that:

- is an official 'map' and descriptive overview of a senior subject
- is a practical guide that sets the parameters for all potential subject curriculum
- acts as a policy instrument within a broader policy context.

## What does a syllabus contain?

The Education (Queensland Curriculum and Assessment Authority) Act 2014 states that a syllabus contains:

- a statement of content – the knowledge, understanding and skills that students are expected to learn.
- achievement standards – the fixed reference points, or standards, that describe how well students have achieved.
- assessment processes – the mandatory aspects of assessment appropriate to the subject.

## Syllabus design principles

The form that the statement of content, achievement standards and assessment processes take in a syllabus is referred to as the *syllabus technical form*. While the technical form depends on several factors, some foundational syllabus design principles should be applied when designing a syllabus. These principles state that each syllabus:

- is as short as possible
- is written in teacher-accessible professional language
- covers a designated school subject in its specific phase (e.g. Modern History in Year 11 and 12)
- identifies expected learnings as brief statements that are:
  - accessible and minimal in number
  - state what is essential – not 'minima' but a 'map' of what is to be learned
  - blends of categories ranging from traditional content statements, skills and behaviours, tasks and performances, or processes and experiences, enabling enough flexibility to

accommodate different school subject philosophies, different phase requirements, and different curriculum models

- outline systemic standardised instruments and mandatory assessments and their respective technical details.
- provides standard statements that will establish a shared vocabulary for discussing and setting assessment tasks and judging student performance.

## What is a Syllabus design brief?

A *Syllabus design brief* is written to syllabus writers. It provides the parameters for, and information about how to develop, the *statement of content*, *assessment processes* and *achievement standards* found within a syllabus.

Generally, the syllabus technical form – i.e. the form that the *statement of content*, *assessment processes* and *achievement standards* will take within a syllabus – is pre-determined. As such, the Syllabus design brief will focus on providing the parameters for, and information about how syllabus writers are to develop, the content for each of the sections of the syllabus.

The Syllabus design brief provides instructions to syllabus writers about the mandatory parameters for each syllabus section. These parameters will include:

- information to be included in the Rationale
- the number and focus of syllabus objectives
- the focus of the additional subject-specific information section
- the organising schema for the units
- the form of the subject matter
- the type and focus of each internal assessment instrument
- a suggested allocation of the contribution of each internal assessment instrument to a student's final result
- suggested organisation and construction of instrument-specific marking guide or instrument-specific standards
- the type and focus of the external assessment instrument (if relevant)
- a list of associated syllabus materials to be developed alongside the syllabus (e.g. formula and data booklet, prescribed text list, language elements table)

## Relationship between the Syllabus design brief and the Syllabus

The Syllabus design brief provides the link between the Subject design brief and the Syllabus. It articulates how the school subject, as defined in the Subject design brief, will be transformed into a syllabus.

It will identify how the nature and purpose of the subject will be preserved and represented in the Syllabus.

# Syllabus design brief

## Rationale

The Rationale will state:

1. from where the subject is being drawn.
2. how the subject is constructed from its origin
3. the appropriate phase of learning for the subject
4. the distinction between the aims of the subject and the aims of its originating disciplines.
5. the aims of the subject

An example of how this could be framed for Science Extension has been provided below:

Queensland's senior subject of Science Extension is a distinctive, purpose-built and targeted study that is constructed by selecting research and inquiry skills, and ways of thinking from the disciplines of Science that:

- when considered together, are representative of the nature of science
- are at an appropriate level for students in Year 12 of schooling
- provide a sufficient foundation upon which further study in science could occur
- provide a sufficient foundation upon which further work in scientific research could occur
- further develop scientific literacy, so as adult citizens they can make informed decisions about science related issues.

In this way, the subject is aimed at providing both an education *in* the skills required to undertake extended scientific inquiry, and *about* the nature of thinking within Science.

The aims of the knowledge, skills and processes of science may be to identify and pose questions about the world we live in and work to answer them; however the subject of Science Extension aims to develop students':

- capacity for scientific thinking
- understanding of experimental design
- ability to analyse and evaluate data to support valid conclusions
- thinking about how science is used and who benefits from it
- ability to communicate findings to target audiences.

When drafting the Rationale for the Science Extension syllabus, ensure that the following aspects of the Subject design brief are emphasised:

- an appreciation of the wonder of science and the significant contribution science has made to contemporary society
- that diverse natural phenomena may be explained, analysed and predicted through scientific models and theories that provide a reliable basis for action
- the ways in which scientific models and theories are refined as they evolve over time, how new models and theories are developed, and

- critical examination of how scientific knowledge is developed and used in a wide range of contexts and informs personal, local and global issues
- investigative skills, including the design and conduct of investigations to explore phenomena and solve problems, the collection and analysis of qualitative and quantitative data, and the interpretation of evidence
- the importance of accurate and precise measurement, valid and reliable evidence, and scepticism and intellectual rigour, to evaluate claims
- the importance of communicating complex scientific information, findings, arguments and conclusions using appropriate representations, modes and genres to a variety of audiences.

## Syllabus objectives

This syllabus should be constructed around six objectives.

These objectives will focus on the process of scientific inquiry.

Focusing the syllabus objectives on these areas aligns with both the syllabus Rationale and the nature and purpose of the subject as outlined in the Subject design brief, specifically:

- investigative skills, including the design and conduct of investigations to explore phenomena and solve problems relevant to real-world, societal, or environmental contexts, the collection and analysis of qualitative and quantitative data, and the interpretation of evidence
- ability to use accurate and precise measurement, valid and reliable evidence, and scepticism and intellectual rigour to evaluate claims, including those encountered in public discourse, media, or community debates, with consideration of ethical and societal implications
- ability to communicate complex understanding, findings, arguments and conclusions using appropriate representations, modes and genres to a variety of audiences
- the five stages of scientific inquiry (i.e. forming and describing, finding, analysing, interpreting and evaluating).

An example set of objectives that align with these parameters are:

- describing ideas and findings
- applying understanding
- analysing data
- interpreting evidence
- evaluating conclusions
- investigating phenomena.

## Additional subject-specific information

The additional subject-specific information section of the syllabus allows syllabus writers to communicate to syllabus users some key considerations for when developing a course of study for Science Extension from the syllabus.

It should highlight areas where the syllabus gives freedom for teachers to design a course of study suitable for their context and students.

The additional subject-specific information section should elaborate on the nature and purpose of scientific inquiry and provide a suitable framework to describe inquiry processes. It should also address the nature of knowledge students are expected to learn alongside concepts relating to the nature of science as a human endeavour.

## Organising principles

Syllabuses provide information about the course of study. The subject matter, units, themes, etc. around which the subject may be organised.

To support the aims of this subject, the syllabus will be organised progressively. This will ensure that as students move through the course of study, they will engage with new inquiry and research skills or consolidate knowledge and ideas related to their chosen discipline.

The course will be organised into two units of study.

Subject matter will be further organised across three strands of learning within each unit:

- Science understanding, which will enable students to acquire new knowledge relating to ideas and theories in science
- Science as a human endeavour, which will enable students to explore the nature of science and its impact on society
- Science inquiry, which will enable students to undertake the work of a scientist to analyse and interpret data and evidence.

## Units

Units have been used in the syllabus technical form as discrete 'chunks' of learning able to be accredited in the QCE system. They also act as organising schema for the statement of content found within each Queensland syllabus.

Units may organise syllabus content in terms of student readiness, developmental progression, chronology, subject tradition, themes, problems, or skill ordering or cycling.

The units in this syllabus should align with the Australian Curriculum and organise syllabus content in terms of the three stands of Science understanding, Science as a human endeavour, Science inquiry.

This supports the nature and purpose of the subject by furthering students' competency in the successful collaborative advancement of science, technology, health and society in our rapidly evolving and developing world.

It is suggested that the following set of units/topics are drafted in the syllabus:

- Unit 3: Foundations of scientific thinking and research
  - Topic 1: The foundations of scientific thinking
  - Topic 2: Exploring research methodologies
- Unit 4: Communicating scientific findings
  - Topic 1: Analysing and evaluating evidence
  - Topic 2: Presenting scientific findings

# Assessment

Two options for Internal Assessment are proposed for syllabus writers and key stakeholders to consider and interrogate further:

- Option 1: two internal assessments, each worth 25%
- Option 2: three internal assessments, worth 10%, 15% and 25% respectively.

The conditions under which these assessments will be administered will be considered as a part of the syllabus development process.

## Internal Assessment option 1

### Internal Assessment 1

Internal Assessment 1 will be a Project.

It will contribute 25% to the final subject result.

It will assess the following objectives:

- describing ideas and findings
- applying understanding
- analysing data
- interpreting evidence
- evaluating conclusions
- investigating phenomena.

This assessment will focus on assessing students' abilities to research, and to collect, analyse and draw conclusions about secondary data and information. It supports the realisation of the nature and purpose of the school subject by allowing students to

- explore scientific methods to deconstruct and define the stimulus and/or scenario
- select appropriate research methodologies appropriate to the context
- collect and analyse secondary data
- interpret and evaluate findings to suggest improvements and extensions for future study.

### Internal Assessment 2

Internal Assessment 2 will be an Investigation.

It will contribute 25% to the final subject result.

It will assess the following objectives:

- describing ideas and findings
- applying understanding
- analysing data
- interpreting evidence
- evaluating conclusions
- investigating phenomena.

This assessment will focus on responding to a stimulus and/or scenario through experimentation by collecting primary data in support of a research question. It supports the realisation of the nature and purpose of the school subject by allowing students to

- design an investigation suitable for the collection of valid and reliable data
- analyse data using appropriate techniques
- interpret findings by constructing scientific arguments to draw conclusions
- evaluate the conclusions and process to discuss the validity and reliability of evidence
- communicate findings multimodally.

## Internal Assessment option 2

### Internal Assessment 1

Internal Assessment 1 will be an Extended response.

It will contribute 10% to the final subject result.

It will assess the following objectives:

- describing ideas and findings
- applying understanding
- evaluating processes.

This assessment will focus on responding to a stimulus and/or problem through a review of secondary evidence. It supports the realisation of the nature and purpose of the school subject by allowing students to

- research questions for future investigation
- use credible sources to research and collect secondary data
- extrapolate findings to inform future projects.

### Internal Assessment 2

Internal Assessment 2 will be a Project.

It will contribute 15% to the final subject result.

It will assess the following objectives:

- describing ideas and findings
- applying understanding
- analysing data
- interpreting evidence
- evaluating conclusions
- investigating phenomena.

This assessment will focus on assessing students' abilities to research, and to collect, analyse and draw conclusions about primary and/or secondary data and information. It supports the realisation of the nature and purpose of the school subject by allowing students to

- explore scientific methods to deconstruct and define the stimulus and/or scenario

- select appropriate research methodologies appropriate to the context
- collect and analyse secondary data
- interpret and evaluating the findings to suggest improvements and extensions for future study.

### **Internal Assessment 3**

Internal Assessment 3 will be an Investigation.

It will contribute 25% to the final subject result.

It will assess the following objectives:

- describing ideas and findings
- applying understanding
- analysing data
- interpreting evidence
- evaluating conclusions
- investigating phenomena.

This assessment will focus on responding to a stimulus and/or scenario through experimentation by collecting primary data in support of a research question. It supports the realisation of the nature and purpose of the school subject by allowing students to

- design an investigation suitable for the collection of valid and reliable data
- analyse data using appropriate techniques
- interpret findings by constructing scientific arguments to draw conclusions
- evaluate the conclusions and process to discuss the validity and reliability of evidence
- communicate findings multimodally.

### **External Assessment**

The External Assessment will be an Examination consisting of two papers.

It will contribute 50% to the final subject result.

It will assess the following objectives:

- describing ideas and findings
- applying understanding
- analysing data
- interpreting evidence
- evaluating conclusions

This assessment will focus on responding to stimulus under supervised conditions. It supports the realisation of the nature and purpose of the school subject by allowing students to

- describe and apply concepts relating to the nature of scientific thinking
- analyse secondary evidence using appropriate techniques to
  - identify trends, patterns, relationships and outliers in datasets

- recognise error, uncertainty and limitations of evidence
- draw conclusions about the validity and reliability of evidence presented using scientific arguments.

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