

School administrators, Heads of Learning Area – Science and Technologies and Teachers of Marine and Maritime Studies ATAR Year 12 are requested to note for 2027 the following minor syllabus changes. The syllabus is labelled as ‘For teaching from 2027’.

Marine and Maritime Studies | ATAR Year 12 | Summary of minor syllabus changes for 2027

The content identified by ~~strikethrough~~ has been deleted from the syllabus and the content identified in *italics* has been revised in the syllabus for teaching from 2027.

Unit 3

Unit description

This unit explores the importance of plankton and coral communities in the marine environment. Major resource management issues affecting Australia’s marine environment, including pollution, water quality and over-fishing, are investigated.

Students also investigate methods of locating shipwrecks, formation and decay processes, excavation and conservation of artefacts.

The concepts, including some scientific principles, behind snorkelling and *SCUBA* diving are considered. Students further develop the skills associated with scientific inquiry, and the scientific method is applied to the investigation of real-world problems.

Science as a Human Endeavour

- biosecurity is increasingly an issue of state and national concern. Introduced marine species (pests) and diseases pose a huge threat to Australia’s marine environment. Biosecurity initiatives, ~~including the National System for the Prevention and Management of Marine Pest Incursions (the National System)~~, aim to prevent new pests arriving, guide responses when a new pest does arrive, and minimise the spread and impact of pests already established
- ~~in recent decades advances in science have provided new ways to locate and conserve the artefacts that are found in maritime archaeological sites~~
- ~~maritime communication systems, including underwater hand signals, from the World Recreational Scuba Training Council Guidelines~~

Science Understanding

Marine

Oceanography

- ~~The influence of the Western Australian ocean currents, including Leeuwin and West Australian ocean currents and South Equatorial, and their influence on Western Australian marine ecosystems~~
- *characteristics of plankton, including:*
 - *identification* (phytoplankton and zooplankton)
 - *lifecycles (Holoplankton or Meroplankton): identification, life cycles,*
 - interactions

- seasonal patterns
- importance to fish stocks
- measurement (*including point sampling, AusCPR and remote sensing methods*)

Environmental and resource management

- *Cause, impact and potential solutions to major issues affecting Australia's marine environment, including:*
 - declining water quality *due to increased sedimentation and turbidity*
 - loss of habitat
 - over-fishing
 - introduced species
 - *eutrophication*
 - ~~▪ ocean acidification~~
- *Cause, impact and potential solutions to types of marine pollutants, including:*
 - nutrient levels from human and domestic wastes
 - plastics
 - petroleum oil
 - *eutrophication*
 - *heavy metals*
 - *persistent chemicals, including heavy metals and organic compounds*
- ~~• processes used to manage and control marine pollutant problems~~

Maritime

History and archaeology

- methods of locating shipwrecks:
 - historical records
 - aerial survey
 - magnetometer
 - sonar (*side scan SONAR and multibeam echosounder*)

Concepts and skills

Snorkelling and diving

- snorkelling equipment: types, *parts*, preparation, fitting and *care removing*
- ~~• pre- and post-dive care and maintenance of equipment~~
- buddy responsibilities: pre-dive safety *plan check*, monitoring *and tired buddy tow*
- hand signals (*from the World Recreational SCUBA Training Council Guidelines*)
- entry and exit techniques relevant to a natural environment (*slide, backwards roll, giant stride and beach*)
- ~~• underwater swimming in a natural environment~~
- finning: techniques, direction control in a natural environment *and cramp release*

- mask defogging *and clearing a partially flooded mask*
- ~~clearing a partially flooded mask~~
- snorkel breathing *and methods to clear the snorkel (blast and displacement)*
- ~~snorkel clearing blast and displacement method~~
- ~~duck diving, safe descending~~
- *safe descending and ascending techniques for both snorkelling and SCUBA diving contexts*

Unit 4

Unit description

This unit focuses on the impacts of climate change, the process of coastal erosion and coastal engineering structures. Environmental and resource management is considered, including strategies for managing marine biodiversity.

Students further explore the maritime history of Western Australia through the example of the Batavia shipwreck.

Students have the opportunity to develop additional skills relating to snorkelling and SCUBA diving. Students further develop the skills associated with scientific inquiry.

Science as a Human Endeavour

- a world-wide sighting and photo-identification system has been created which enables people to act as citizen scientists, assisting in the conservation of *marine megafauna such as* whale sharks and enhancing knowledge of the demographics of *these* ~~this~~ species. The demographics of *marine megafauna* ~~whale sharks~~ can serve as an indication of ocean health and bio-productivity. ~~The technology, which was developed collaboratively by a multidisciplinary team of scientists, can also potentially be used to identify other marine species~~
- ~~snorkelling and diving requires knowledge of the behaviour of gases, with reference to volume and pressure. In particular, divers should understand how the volume of a gas varies with the surrounding pressure in order to prevent barotraumas. Diving equipment is designed to enhance the safety and comfort of the user and reduce the risk of dealing with gases. Materials are chosen, and equipment designed, to improve efficiency and safety.~~

Science Understanding

Marine

Oceanography

- impact of the enhanced greenhouse effect on:
 - ~~marine habitats and coastal communities~~
 - coral bleaching
 - *ocean acidification*
 - global sea levels

- thermohaline current
- features, role and impact of coastal engineering structures, including
 - ~~physical barriers~~ *hard engineering structures such as groynes, breakwaters, sea walls, training walls and artificial reefs*
 - *soft engineering solutions such as beach nourishment, dredging, sand bypass systems and dune rehabilitation*
 - ~~artificial reefs~~
 - ~~ports~~
 - ~~canals~~

Environmental and resource management

- strategies for managing marine biodiversity, including:
 - role of marine protected areas and zones
 - global protection of cetaceans
 - role of scientific research in marine environmental management
 - *rationale for the ethical management of human interactions with whale sharks, dolphins and whales during ecotourism experiences.*
- ~~ecotourism, reasons for rules and the ethical management of human interactions with whale sharks, dolphins and whales~~

Maritime

History and archaeology

- the Batavia shipwreck, including:
 - historical background
 - location process
 - *survey of underwater and land sites*
 - *excavation of artefacts*
 - ~~recovery~~ *safe retrieval of artefacts*
 - conservation and interpretation of artefacts.

Concepts and skills

Nautical concepts and skills

Snorkelling and diving

- underwater vision: the eyes, refraction, light and colour
- underwater hearing: the ear, effects of water on sound
- heat loss underwater: ways to reduce *the risk of hypothermia*
- positive, negative and neutral buoyancy
- pressure: effect of depth on body
- Boyle's Law
- barotraumas, *including pulmonary, middle ear, sinus, mask squeeze and reverse block (middle ear)*

- *potential medical emergencies such as carbon dioxide poisoning, shallow water blackout and decompression sickness (the bends)*
- Archimedes' principle
- methods of equalising ear pressure, including
 - Valsalva
 - Frenzel
 - Toynbee
- ~~tired buddy tow~~
- ~~cramp release~~
- ditch and recovery of an object: weight belt
- establish neutral buoyancy at the surface
- making observations while snorkelling in a natural environment
 - slates
 - photography