



Dolphin Descendants – Year Eleven + Twelve Program Overview & Schedule

Program Duration: 45 minutes

Minimum Participants: 10 students

Maximum Participants: n/a

Location: Dolphin Beach

Relevant Subjects: Biology, Marine Science

Program Overview:

Aligning to the Queensland Syllabi for Biology and Marine Science and the Australian Curriculum for Biology, this program explores the theory of evolution by investigating the history and development of Bottlenose dolphin species. Students will be introduced to Sea World's dolphins, where they've come from, how they are cared for and how genetic diversity is addressed when the dolphins breed. Reproduction in wild dolphin populations will be discussed, with students considering the potential causes and consequences of reduced genetic diversity. Students will deduce that variation in phenotypic expression of genes in a species will lead to certain individuals being selected for or against and that isolation of populations also influences the process of natural selection. Students will be guided back in time to establish evidence of Bottlenose dolphin evolution through consideration of the fossil record, anatomical features and geographical distribution of present species and their ancestors. Selection processes and drivers of speciation in dolphins will be investigated and case studies will be discussed to address what defines a group as a unique species. Students will then classify Bottlenose dolphins from kingdom to species to determine their relatedness to other organisms. Finally, students will hypothesise how anthropogenic activity can alter environments to a point where no individuals in a population are equipped to cope with this change. Students will consider what human threats impact dolphins and what actions can be taken to help conserve the future of these animals.

Program Schedule:

Time

10:30am Arrival and Park Entry

It is recommended that the group arrive by 10:30am. Entry into the park is through admissions gate number 6.

11:00am Affinity Dolphin Presentation

The school group will head to Dolphin Beach at 11:00am for the 11:15am *Affinity Dolphin Presentation*.

11:35am Education Program

The school group is to remain behind in the stadium on completion of the *Affinity Dolphin Presentation* and a Marine Education Officer, who will deliver the *Dolphin Descendants* program, will meet them. This program is approximately 45 minutes and will finish by 12:25pm at the latest.

12:25pm Program Conclusion

At the conclusion of this session, students will be free to enjoy the park for the rest of the day, at the discretion of school staff.

Dolphin Descendants – Year Eleven + Twelve Program Mapping

Alignment with Queensland Senior Syllabi:

Science as a Human Endeavour - General

Science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility

Development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines.

Advances in science understanding in one field can influence other areas of science, technology and engineering.

The use and acceptance of scientific knowledge is influenced by social, economic, cultural and ethical contexts.

The use of scientific knowledge may have beneficial and/or harmful and/or unintended consequences.

Scientific knowledge can enable scientists to offer valid explanations and make reliable predictions.

Scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability.

Models and theories are contested and refined or replaced when new evidence challenges them, or when a new model or theory has greater explanatory power.

Science can be limited in its ability to provide definitive answers to public debate; there may be insufficient reliable data available, or interpretation of the data may be open to question.

BIOLOGY (2019)

Unit 3: Biodiversity and the interconnectedness of life

Unit objectives	1. Describe and explain biodiversity and ecosystem dynamics
	2. Apply understanding of biodiversity and ecosystem dynamics
	7. Communicate understandings, findings, arguments and conclusions about biodiversity and ecosystem dynamics.

Topic 1: Describing biodiversity

Classification processes	Recognise that biological classification can be hierarchical and based on different levels of similarity of physical features, methods of reproduction and molecular sequences
	Describe the classification systems for similarity of physical features (the Linnaean system)
	Recognise the need for multiple definitions of species

Unit 4: Heredity and continuity of life

Unit objectives	1. Describe and explain DNA, genes and the continuity of life, and the continuity of life on Earth
	2. Apply understanding of DNA, genes and the continuity of life, and the continuity of life on Earth
	7. Communicate understandings, findings, arguments and conclusions about DNA, genes and the continuity of life, and the continuity of life on Earth

Dolphin Descendants – Year Eleven + Twelve Program Mapping

<i>Topic 2: Continuity of life on Earth</i>	
Natural selection and microevolution	Recognise natural selection occurs when the pressures of environmental selection confer a selective advantage on a specific phenotype to enhance its survival (viability) and reproduction (fecundity)
Speciation and macroevolution	Recall that speciation and macroevolutionary changes result from an accumulation of microevolutionary changes over time
	Identify that diversification between species can follow one of four patterns: divergent, convergent, parallel and coevolution
	Describe the modes of speciation: allopatric, sympatric, parapatric
	Understand that the different mechanisms of isolation — geographic (including environmental disasters, habitat fragmentation), reproductive, spatial, and temporal — influence gene flow
	Explain how populations with reduced genetic diversity (i.e. those affected by population bottlenecks) face an increased risk of extinction
MARINE SCIENCE (2019)	
Unit 2: Marine biology	
Unit objectives	1. Describe and explain marine ecology and biodiversity, and marine environmental management
	2. Apply understanding of marine ecology and biodiversity, and marine environmental management
	7. Communicate understandings, findings, arguments and conclusions about marine ecology and biodiversity, and marine environmental management
<i>Topic 1: Marine ecology and biodiversity</i>	
Biodiversity	Define the three main types of diversity (i.e. genetic, species and ecosystem)
	Recall the three unique characteristics of marine biodiversity (i.e. wide dispersal at sea, the need for structural complexity, critical nursery habitats)
	Identify factors that lead to a loss of diversity (e.g. natural hazard, loss/fragmentation of habitat, pollution, exploitation, introduction of new species, disease)
Adaptation	Categorise different groups of animals using structural characteristics
	Identify and classify adaptations as anatomical (structural), physiological (functional) or behavioural
	Describe the role of adaptation in enhancing an organism's survival in a specific marine environment.
<i>Topic 2: Marine environmental management</i>	
Marine conservation	Recall the arguments for preserving species and habitats (i.e. ecological, economic, social, aesthetic, ethical)
	Recognise the issues affecting a selected marine ecosystem

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Program Mapping

Alignment with Australian Curriculum:

BIOLOGY

Science as a Human Endeavour

Advances in science understanding in one field can influence other areas of science, technology and engineering (ACSBL010)

Models and theories are contested and refined or replaced when new evidence challenges them, or when a new model or theory has greater explanatory power (ACSBL069)

Scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability (ACSBL074)

Unit 1: Biodiversity and the interconnectedness of life

Describing Biodiversity	Biological classification is hierarchical and based on different levels of similarity of physical features, methods of reproduction and molecular sequences (ACSBL016)
	Biological classification systems reflect evolutionary relatedness between groups of organisms (ACSBL017)
	Most common definitions of species rely on morphological or genetic similarity or the ability to interbreed to produce fertile offspring in natural conditions – but, in all cases, exceptions are found (ACSBL018)

Unit 3: Heredity and continuity of life

DNA, Genes and the Continuity of life	Variations in the genotype of offspring arise as a result of the processes of meiosis and fertilisation, as well as a result of mutations (ACSBL084)
Continuity of Life on Earth	Life has existed on Earth for approximately 3.5 billion years and has changed and diversified over time (ACSBL088)
	Comparative genomics provides evidence for the theory of evolution (ACSBL089)
	Natural selection occurs when selection pressures in the environment confer a selective advantage on a specific phenotype to enhance its survival and reproduction; this results in changes in allele frequency in the gene pool of a population (ACSBL090)
	In addition to environmental selection pressures, mutation, gene flow and genetic drift can contribute to changes in allele frequency in a population gene pool and results in micro-evolutionary change (ACSBL091)
	Speciation and macro-evolutionary changes result from an accumulation of micro-evolutionary changes over time (ACSBL093)
	Differing selection pressures between geographically isolated populations may lead to allopatric speciation (ACSBL094)
	Populations with reduced genetic diversity face increased risk of extinction (ACSBL095)