Unit Overview	Biology Topic 4: Biodiversity and Ecosystem Dynamics
Year Level	Stage 1
Strands	• Science Understanding (SU) • Science as a Human Endeavour (SHE)
General Capabilities	Critical and creative thinking, literacy, numeracy, personal and social capabilities, ethical understanding, information and communication technology
Aim(s)	In this topic, students investigate diverse ecosystems, exploring the range of biotic and abiotic components to understand the dynamics, diversity, and underlying unity of these systems. Students develop an understanding of the processes involved in the movement of energy and matter in ecosystems. They investigate ecosystem dynamics, including interactions within and between species, and interactions between abiotic and biotic components of ecosystems. They also investigate how measurements of abiotic factors, population numbers and species diversity, and descriptions of species interactions, can form the basis of meaningful comparisons between ecosystems. Students use classification keys to identify organisms, describe the biodiversity in ecosystems, and investigate patterns and changes in relationships between species. (SACE, 2019)
Duration (Lessons/Week)	6 weeks (7 x 40-minute lessons including 1 single and 3 doubles) = 38 lessons in total (4 lessons missed, Monday week 1 and Monday week 4).
Resources	• PowerPoint • Activities • Videos • Online interactive activities • Textbook: Essentials Education: Biology (Crierie, Greig, & Ruthven, 2017)
Assessment Activity	**Formative:** Text book questions and answers, activities, practice test (review) **Summative:** Investigation Folio - SHE Investigation, Source Analysis

Week One: Biodiversity and classification	Week beginning 29th April 2019
Content Descriptor Summary (SACE Stage 1 Biology): Biodiversity and classification	

Aim of Lesson 3: To go through formative source analysis responses.
Student outcome(s): Students will improve their understanding of how to answer source analysis questions.

Student understanding	Teaching Strategies	Resources
• How to answer source analysis questions.	• **PowerPoint.** Formative Source Analysis answers.	PowerPoint OneNote

Aim of Lesson 4-5: To explain biodiversity
Student outcome(s): Students will understand the different types of biodiversity.

Student understanding	Teaching Strategies	Resources

• Biodiversity is the variety of all living things and includes diversity in genetics, species, and ecosystems.
 	
• Distinguish between a species, population, community, and an ecosystem.
 	
  • In general, the higher the biodiversity of an ecosystem, the more stable it is.
	• **Mind Map: What is Biodiversity?** This activity will serve as a prior knowledge assessment for the students.
	• **Video: Why is Biodiversity Important?** Group and Class Discussion: Discuss in groups and share with the class.
	• **Mind Map: What is Biodiversity?** Add more detail to the mind map.
	• **PowerPoint.** Species, population, ecosystem biodiversity and why biodiversity is important.
	  • **Reading and writing.** Textbook questions 1, 2, 3, 4, 7, 9, and 10 pg. 337,338. **Complete textbook questions for homework.**
		Video
		TedED - Why is Biodiversity Important
		
		PowerPoint
		
		Textbook

Aim of Lesson 6-7: To explain the classification system for animals and plants.
Student outcome(s): Students will understand the basis for classification.

Student understanding	Teaching Strategies	Resources
• Biological classification is hierarchical and indicates the relationship between organisms based on their physical structures and the similarities in shared molecular sequences. • There is an internationally agreed system of nomenclature of species which undergoes revision. • Distinguish between scientific names and common names for species. • Recognise that very closely related species have similar scientific names.	• **Question and Answer.** Go through answers to textbook homework questions. • **PowerPoint.** Classification of biodiversity (Nomenclature) • **Smartboard/Whiteboard.** Taxonomy: introduce mnemonics for nomenclature. • **Group Activity 1.** Create your own mnemonic and share with the class. • **PowerPoint continued.** Name an animal • **Group Activity 2.** Select an animal/plant and classify it. **Reading and writing.** Textbook questions 1, 2, 3, 4, 5, 11. pg. 353. **Complete textbook questions for homework.**	PowerPoint Textbook Group Activity: Animal images (electronic/paper)

Week Two: Components of ecosystems	Week beginning 6th May 2019
Content Descriptor Summary (SACE Stage 1 Biology): Components of an ecosystem, relationships, types of ecosystems, Zonation and stratification.	

Aim of Lesson 8-9: To define the biotic and abiotic components of and ecosystem.
Student outcome(s): Students will be able to define and identify the biotic and abiotic factors of an ecosystem.

Teaching Strategies	What students will do	Resources
• Ecosystems can be diverse and can be defined by their biotic and abiotic components and the interactions between elements of these components. o Distinguish between biotic and abiotic components of ecosystems.	• **Question and Answer.** Go through answers to textbook homework questions. • **PowerPoint.** Abiotic and biotic factors. • **Activity:** Arrange images into the abiotic/biotic category. • **PowerPoint continued.** Relationships • **Class activity (Smartboard):** Identify the relationship i.e. symbiosis, completion, predation. • **Reading and writing.** Textbook questions 5,6, 12-13 (pg. 338-339). **Complete textbook questions for homework.**	PowerPoint Activity: abiotic/biotic images (electronic/paper) Class Activity: PowerPoint/OneNote

Aim of Lesson 10: To teach the different environmental components of different ecosystems.
Student outcome(s): To understand that different environmental conditions defines an ecosystem.

Teaching Strategies	What students will do	Resources
• Ecosystems can be diverse and can be defined by their biotic and abiotic components and the interactions o Compare the characteristics of at least two ecosystems.	• **Question and Answer.** Go through answers to textbook homework questions. • **PowerPoint.** Environmental components of a community. Introduce an ecosystem i.e. bushland. • **Reading and writing.** Textbook questions 2, 5,6a, 12-13 (pg. 366-339). **Complete textbook questions for homework.**	PowerPoint Textbook

Aim of Lesson 11-12: To teach the different environmental components of different ecosystems.
Student outcome(s): To understand that different environmental conditions defines an ecosystem.

Teaching Strategies	What students will do	Resources
• Ecosystems can be diverse and can be defined by their biotic and abiotic components and the interactions o Compare the characteristics of at least two ecosystems. o Patterns within a community include zonation and stratification.	• **Question and Answer.** Go through answers to textbook homework questions. • **PowerPoint.** Introduce another ecosystem i.e. arid and aquatic. • **Activity 1.** Determine the characteristics of this ecosystem. Go through answers with the class. • **PowerPoint.** Zonation and Stratification • **Activity 2.** Predict the stratification conditions. Go through answers with the class. • **Reading and writing.** Textbook questions 1-8 (pg. 377-379). • **Question and Answer.** Go through answers to textbook questions. • **PowerPoint.** Environmental components of a community. Introduce an ecosystem i.e. bushland.	PowerPoint Activity (electronic/paper) Activity 2: Image (Electronic)

	Reading and writing. Textbook questions 2, 5,6a, 12-13 (pg. 366-339). **Complete textbook questions for homework.**	

Aim of Lesson 13-14: Summative Source Analysis Test
Student outcome(s): Complete Source Analysis under test conditions

Teaching Strategies	What students will do	Resources
• Summative Source Analysis	• **Complete summative Source analysis.**	

Week Three: Energy and Biogeochemical cycles	Week beginning 13th May 2019
Content Descriptor Summary (SACE Stage 1 Biology): Energy capture, transformation, transfer, and biogeochemical cycles	

Aim of Lesson 15-16: To teach that energy transfer occurs between organisms within an ecosystem.
Student outcome(s): To understand that energy is captured, transformed and transferred between organisms within an ecosystem.

Teaching Strategies	What students will do	Resources
• The biotic and abiotic components of ecosystems interact with each other to capture, transform, and transfer energy.	• **Revision Quiz.** • **Question and Answer.** Go through answers to textbook homework questions. • **PowerPoint.** Energy in ecosystems • **Prepared model:** Energy flow • **Online Interactive Activities** • **Reading and writing.** Textbook questions 1-4, 6 (pg. 390). **Complete textbook questions for homework.** • **Homework 2: Flipped classroom. Watch video.**	Revision Quiz PowerPoint Prepared model http://www.scootle.edu.au/ec/viewing/L8979/index_381.html Online Interactive Activity http://plattebasintimelapse.com/ed/chapter/activities-food-chain-food-web/ Online Interactive Activity http://www.mhhe.com/biosci/genbio/virtual_labs/BL_02/BL_02.html Video https://www.youtube.com/watch?v=ccWUDlKC3dE

Aim of Lesson 17: To teach that there are different biogeochemical cycles that are important in nature.
Student outcome(s): To understand the different biogeochemical cycles.

Teaching Strategies	What students will do	Resources
• Nutrients within an ecosystem are involved in biogeochemical cycles. ○ Represent the water cycle and biogeochemical cycles, for elements such as nitrogen, phosphorus, and carbon.	• **PowerPoint.** Biogeochemical cycles (Water and carbon) • **Activity.** Draw diagrams of each biogeochemical cycle using the textbook, PowerPoint and online interactives. • **Reading and writing.** Textbook questions 5,7 (pg. 390-391). **Complete textbook questions for homework.**	PowerPoint Activity (electronic/paper) Online Interactive Activity (Water) https://water.usgs.gov/edu/watercycle-kids-int.html Online Interactive Activity (C) https://www.sciencelearn.org.nz/image_maps/3-carbon-cycle

Aim of Lesson 18-19: To teach that there are different biogeochemical cycles that are important in nature and that humans can interfere with them.
Student outcome(s): To understand the different biogeochemical cycles and the effects of human impact.

Teaching Strategies	What students will do	Resources
• Nutrients within an ecosystem are involved in biogeochemical cycles. ○ Represent the water cycle and biogeochemical cycles, for elements such as nitrogen, phosphorus, and carbon. • Humans can interfere with natural cycles	• **PowerPoint.** Biogeochemical cycles (Nitrogen and phosphorus) • **Activity.** Draw diagrams of each biogeochemical cycle using the textbook, PowerPoint and online interactives. • **PowerPoint.** Human interference with natural cycles • **Chalk and Talk.** Introduction of SHE Task (3 weeks to complete including homework and class time) • **Homework:** SHE Task	PowerPoint Activity (electronic/paper) Online Interactive Activity (N) https://www.sciencelearn.org.nz/image_maps/14-the-terrestrial-nitrogen-cycle Online Interactive Activity (P) https://www.purposegames.com/game/the-phosphorus-cycle-game

Aim of Lesson 20-21: Introduce SHE task Student outcome(s): To work on the SHE task.		
Teaching Strategies	What students will do	Resources
• SHE Task	• Revision Quiz • Work on SHE Task.	Revision Quiz

Week Four: Adaptations and Niches	Week beginning 20th May 2019
Content Descriptor Summary (SACE Stage 1 Biology): Adaptations and Niche	

Aim of Lesson 22: To teach that animals and plants have different adaptations that help them survive.
Student outcome(s): To understand that animals and plants have physical, structural and physiological adaptations.

Teaching Strategies	What students will do	Resources
• Organisms have adaptations that help them survive and reproduce ○ Discuss examples of adaptations (Behavioural, structural and physiological in plants and animals)	• **Video.** Adaptations • **PowerPoint.** Adaptations • **Reading and Writing.** Textbook questions 1, 6, 8, 9 pg. 366-368) • **SHE Task.** Work on SHE task	Video https://www.youtube.com/watch?v=vnmPdHmRv9o Textbook Resource for activity http://mentalfloss.com/article/57204/20-amazing-animal-adaptations-living-desert

Aim of Lesson 23-24: To teach students that in ecosystems each species fills a niche.
Student outcome(s): To define and understand ecological niches.

Teaching Strategies	What students will do	Resources
• Ecosystems include populations of organisms that each fills a specific ecological niche. • Describe a niche in terms of key indicators within the ecosystem, including habitat, feeding relationships, and interactions with other species.	• **Question and Answer.** Go through answers to textbook homework questions. • **PowerPoint.** Ecological niches • **Activity.** Representing the niche of different species in graphs. Guess the degree of competition between species based on the graphs presented. • **SHE Task.** Work on SHE task	PowerPoint Textbook Activity (Image)

Aim of Lesson 25-26:
Student outcome(s): To understand the importance of keystone species in an ecosystem.

Teaching Strategies	What students will do	Resources
• Keystone species play a critical role in the maintenance of their ecosystem. ○ Explain the significance of keystone species in their ecosystem.	• **PowerPoint.** Keystone species • **Reading and writing.** Textbook questions (4.6) 1-4, 6-9 (pg. 399-400). • **Question and Answer.** Go through answers to textbook homework questions. • **SHE Task.** Work on SHE task	PowerPoint Textbook

Week Five: Ecosystems change overtime	Week beginning 27th May 2019
Content Descriptor Summary (SACE Stage 1 Biology): Succession	

Aim of Lesson 27-28: To teach that ecosystem change overtime.
Student outcome(s): To understand the different ways ecosystems can change overtime.

Teaching Strategies	What students will do	Resources
• Ecosystems can change over time. • Ecological succession involves changes in biotic and abiotic components and their dynamic influence on each other. ○ Describe examples of succession. • Evidence for longer-term changes can be found in geological deposits, including the fossil record.	• **Revision Quiz** • **PowerPoint.** Succession • **Online Interactive activity.** Succession. • **Reading and writing.** Textbook questions 1-10 (pg. 408-410). • **SHE Task.** Work on SHE task.	Revision Quiz PowerPoint Online Interactive activity. https://biomanbio.com/HTML5GamesandLabs/EcoGames/succession_interactive.html Textbook

Aim of Lesson 29: To teach that ecosystem change overtime.
Student outcome(s): To understand the different ways ecosystems can change overtime.

Teaching Strategies	What students will do	Resources

• Humans have significant impacts on ecosystems.
  • Explain how the destruction of habitats as a result of human activity speeds up changes in ecosystems and impacts on biodiversity.
• By measuring key aspects of the biotic and abiotic components of the ecosystem, it is possible to make predictions relating to the impact of environmental change.
  • Describe how these predictions can help to develop strategies to minimise the adverse effects of such change.
	• **PowerPoint.** Human Impact
	• **Question and Answer.** Go through answers to textbook homework questions.
	• **SHE Task.** Work on SHE task.
		PowerPoint
		
		Textbook

Aim of Lesson 30-31: To evaluate student learning.
Student outcome(s): To self-evaluate learning and improve understanding of topic content.

Teaching Strategies	What students will do	Resources

• Humans have significant impacts on ecosystems.
  • Explain how the destruction of habitats as a result of human activity speeds up changes in ecosystems and impacts on biodiversity.
• By measuring key aspects of the biotic and abiotic components of the ecosystem, it is possible to make predictions relating to the impact of environmental change.
  • Describe how these predictions can help to develop strategies to minimise the adverse effects of such change.
	• **PowerPoint.** Human Impact
	• **Question and Answer.** Go through answers to textbook homework questions.
	• **SHE Task.** Work on SHE task.
		PowerPoint
		
		Textbook
		Online interactive acticity
		https://www.hhmi.org/biointeractive/anthropocene-human-impact-environment

Aim of Lesson 32-33: To evaluate student learning.
Student outcome(s): To self-evaluate learning and improve understanding of topic content.

Teaching Strategies	What students will do	Resources

• Populations with reduced genetic diversity face increased risk of extinction. ○ Explain why genetic diversity is important for a species' survival in a changing environment.	• **PowerPoint.** Impact of reduced genetic diversity. • **Question and Answer.** Go through answers to test. • **SHE Task.** Work on SHE task **Submit draft of SHE task**	**PowerPoint** **Textbook**

Week Six: Catch up/Revision/SHE task	Week beginning 3rd June 2019
Content Descriptor Summary (SACE Stage 1 Biology): Biodiversity and Ecosystems	

Aim of Lesson 34-35: SHE task completion
Student outcome(s): Students will complete the final draft of the SHE task

Teaching Strategies	What students will do	Resources
• SHE Task	• **Revision Quiz.** • **The SHE task drafts will be handed back to students.** • **SHE Task.** Work on SHE task. https://www.bbc.com/bitesize/examspecs/zpgcbk7 - Revision	Revision Quiz.

Aim of Lesson 36: SHE task
Student outcome(s): Students will complete the final draft of the SHE task

Teaching Strategies	What students will do	Resources
• SHE Task • Catch up/Revision	**SHE Task.** Work on SHE task. **Class Question:** What concepts do you want more clarification on? Or Catch up.	

Aim of Lesson 37-38:
Student outcome(s):

Teaching Strategies	What students will do	Resources
• SHE Task • Catch up/Revision	• **Revision/Catch up.** • **SHE Task presentation.**	

Aim of Lesson 39-40:
Student outcome(s):

Teaching Strategies	What students will do	Resources
• SHE Task • Catch up/Revision	• **Revision/Catch up.** • **SHE Task presentation.**	