

2016

Full Day Programs

KEY:

Ecolinc Themes

occupied the second with the Australian Curriculum Science Strand

SU - Science Understanding

- B Biological sciences
 - C Chemical sciences
 - E Earth and space sciences
 - P Physical sciences

SHE - Science as a Human Endeavour

- 1 Nature and development of science
- 2 Use and influence of science

SIS - Science Inquiry Skills

- 1 Questioning and predicting
- 2 Planning and conducting
- 3 Processing and analysing data and information
- 4 Evaluating
- 5 Communicating

ONSITE PROGRAMS

Living in the extremes

Year Level F-2 Investigate how wetland plants and animals are ₩ = adapted to survive in extreme conditions. Themes

SU-B,E,P, SHE-1, SIS-1-5 Watching the weather

Year Level F-2 Investigate how the seasons affect the plants and ₩ = animals in the wetland. Learn how they adapt to Themes SU-B,E, SHE-1, SIS-1-5 the changing seasons. Make and test a windsock.

Introduction to a plant's world (also Outreach)

Be a plant detective and explore the indigenous Year Level **F-2** Themes plant garden and vegie patch. Propagate seeds **SU**-B, **SHE**-1,2, **SIS**-1-5 and cuttings in the glasshouse.

Minibeasts (also Outreach)

Examine the wonderful world of minibeasts Year Level **F-4** including wetland macroinvertebrates and Themes compost critters. **SU**-B,P **SHE**-2, **SIS**-1-5

Fascinating frogs

Take a walk around the Ecolinc wetland to hear Year Level **F-6** Themes the frog chorus. Investigate the life cycle of frogs, SU-B,P1, SHE-1,2, SIS-1 habitat requirements and identification calls.

Reduce, reuse, recycle (also Outreach)

Complete the Sustainability Trail and investigate Year Level **F-6** options for reducing, reusing and recycling. Themes ≋ 🕸 SU-C, SHE-2, SIS-2

Digging up the Diprotodon

Follow Ecolinc's geological trail, learn about the Year Level **1,4,6,8** discovery of the Diprotodon in Bacchus Marsh and Themes ₩ ◎ the world of the megafauna using casts of mega-SU-E, SHE-1, SIS-2 fauna trackways, and conduct a 'dig' to find your own fossil.

Indigenous plants (also Outreach)

Explore the Ecolinc wetland trail and investigate Year Level 3-4 traditional aboriginal food, fibre & healing plants. Themes **SU**-B, **SHE**-1,2, **SIS**-1,2,5 Plant seeds and propagate a range of bush foods.

A plant's world (also Outreach)

Year Level **3-6** Tour the Ecolinc wetland and identify the diversity of plants that are growing. Look at the structure of Themes flowers and learn about propagation techniques **SU**-B, **SHE**-1, **SIS**-1-5 including cuttings and plant division.

Climate watch

Explore Ecolinc's CSIRO designed Weather Wall. Year Level **3-6** Record your own weather measurements and Themes SU-B,E, SHE-1, SIS-2-4 investigate the effect of the climate on species and how they adapt to their environment.

What's growling in the wetland? (also Outreach)

Use chemical & biological indicators to assess the Year Level 3-7 Themes ₩ ≋ habitat of the growling grass frog. **SU-B, SHE-1, SIS-1,5**

Who eats who? (also Outreach)

Year Level 3-7 Explore the relationships between aquatic Themes ₩ ≋ animals and plants in the wetland by sampling the SU-B, SHE-1, SIS-2 wetland and determining 'who eats who?'

Create a nature documentary

Explore the biodiversity of the Ecolinc wetland Year Level 4-7 using a range of online and mobile technologies. Themes ₩<u></u> SU-B, SHE-1, SIS-2,3,5 Use this information to create a 60 second movie addressing an aspect of biodiversity.

NEW Animal and plant survival

Explore how plants and animals are adapted to Year Level 4-7

Saving energy Explore Ecolinc's energy saving features on the Year Level 5-6 Sustainability Trail. Use models to investigate Themes

SU-E, **SHE-**2, **SIS-**2,3

SU-E5,P6, SHE-2, SIS-2

SU-E₅,P₆, **SHE**-₂, **SIS**-₂ energy use and alternate energy options. Get down and dirty Year Level 6,8 Explore the Ecolinc geological trail and measure a number of soil properties including colour, Themes

and nutrient status. **Classifying living things** (also Outreach)

Examine the Ecolinc wetland ecosystem and Year Level 7 **₩ ≅** …**>** classify aquatic/terrestrial plants and animals Themes using a variety of keys. Students will then develop **SU-B, SHE-1, SIS-1,3** their own dichotomous key.

Extracting plant pigments

Year Level 7 Themes SU-C, SHE-2, SIS-1,3 Use thin layer chromatography to separate and identify plant pigments and investigate their role in photosynthesis.

dispersion, texture, pH, electrical conductivity

NEW Exploring ecosystems (Wetlands)

Investigate the Werribee River Trail (weather Year Level **7-8** permitting) and explore the biotic and abiotic Themes ₩ 🔅 features. Students will investigate the diversity of SU-B, SHE-1, SIS-2 macroinvertebrates in a wetland environment,

NEW Renewable energy

Explore Ecolinc's energy saving features and Year Level 7-8 Themes alternative energy sources such as solar energy SU-E, SHE-2, SIS-2,3 and wind power.

explore foodwebs and energy flow.

Stormwater (also Ou

Explore the Ecolinc stormwater wetland and the Year Level **7-10** effects of pollution in an aquatic ecosystem. Themes **SU-**C,E **SHE-**2, **SIS-**1,5

What's under the microscope?

Students will use compound microscopes to Year Level 8 investigate plant and animal cells, use stereo Themes microscopes to investigate macroinvertebrate **SU-B, SHE-1,2, SIS-2** body parts and use technology to investigate cells.

Environmental indicators

Use chemical and biological indicators to Year Level 9-10 determine the quality of the Ecolinc stormwater Themes ₩ 🗮 wetland or the Werribee River system. Compare **SU**-B9,E10, **SHE**-1,2, with a range of other water samples. **SIS**-2,3

Exploring ecosystems (Grasslands)

Use survey techniques including transects and Year Level **9-10** quadrats to assess habitat quality, species ₩ ...> Themes abundance and diversity in the Ecolinc grassland. **SU**-B9,E10, **SHE**-1,2, Investigate relationships and interactions **SIS-2,3** between the abiotic and biotic components of the ecosystem. An opportunity to survey a natural grassland at nearby Mt Rothwell* may be

included as an option. Terms 1 and 4 are recommended for this option. NEW How healthy is the habitat? (Werribee River)

Use habitat surveys to determine the effect-Year Level 9-10 Themes **SU**-B9,E10, **SHE**-1,2, of the Werribee River (weather permitting). Use chemical and biological indicators to assess the **SIS-2,3** health of the ecosystem.

How real is climate change?

Investigate climate change issues. Students will Year Level 9-10 Themes measure carbon dioxide levels, explore Ecolinc's ecologically sustainable design features and use **SU**-P9,E10, **SHE**-1,2, **SIS**-3 technology to calculate personal greenhouse gas emissions.

Plant propagation techniques

Year Level 9-10 Discover how the Wollemi Pine was discovered Themes ₩ and propagated using plant tissue culture SU-B, SHE-2, SIS-2 techniques in the laboratory. Compare with traditional plant propagation methods.

Be a DNA detective

Year Level 10 Use experimental techniques and technology to Themes extract and explore DNA.

SU-B, SHE-1,2, SIS-1,3,4 **DNA Barcoding**

Use plant DNA extraction tools including PCR and Year Level 10 Themes gel electrophoresis, in addition to bioinformatics SU-B, SHE-1,2, SIS-1-4 tools, to accurately identify a range of Ecolinc grassland/wetland plants.

Evolution

Year Level 10 Investigate evidence of evolution by extracting Themes muscle proteins from different species followed SU-B, SHE-1,2, SIS-1-4 by analysis using protein electrophoresis to compare protein banding patterns.

Nanotechnology

Year Level 10 Themes \$\$ \$\$ \$\$ SU-C, SHE-1,2, SIS-1-4

Discover the world of nanotechnology by exploring nano fabrics, sunscreens, nitinol, a ferrofluid and buckyballs and investigate the potential effects on the environment.

FIELD TRIPS

Investigating salinity, soil and water quality issues

Explore the Balliang and Werribee River areas to Year Level 4-7 conduct field work investigating a range of land Themes **₩ = -->** SU-E, SHE-2, SIS-2 management issues, followed by interpretation activities at Ecolinc.

NEW Footprints of the Western Volcanic Plains (Mt Rothwell)

A field trip to Mt Rothwell enables students to Year Level 4-7 study a grassy woodland ecosystem, identify Themes SU-B,E, SHE-1, SIS-2 plants and animals, learn about endangered species and threats faced by these animals and ways to protect them.

NEW Footprints of the Western Volcanic Plains (Mt Cottrell)

impact of introduced species and ways to manage this ecosystem.

A field trip to Mt Cottrell enables students to Year Level 4-7 ern plains and how it has shaped the landscape. SU-B,E, SHE-1, SIS-2 Students study the grassland ecosystem, identify plants and animals, the

Endangered animals (Mt Rothwell)

Investigate a range of 'grassy woodland' plants and Year Level **9-10** ₩ ...> animals at Ecolinc followed by a visit to nearby Mt Themes **SU**-B9,E10, **SHE**-1,2, Rothwell* to investigate management strategies for a variety of endangered species. A dusk walk reveals a range of endangered nocturnal mammal species including eastern

ONLINE CURRICULUM PROGRAMS - www.ecolinc.vic.edu.au

quolls, brush-tailed rock wallabies and eastern barred bandicoots.

Biodiversity of the Western Volcanic Plains

Year Level **3,4,6,9** Themes ∰ ···▶ SU-B, SHE-2, SIS-1-5 Watching the weather

Year Level 4-7 Themes 2%**SU**-B5,6,E6,7, **SHE**-1,2, **SIS**-1-5 **Discovering wetlands**

Year Level 5-7 Themes 🛞 SU-B, SHE-2, SIS-1-5

Year Level **5,6,8,9** Themes **\$\pi\$** SU-B, SHE-2, SIS-2 ONLINE RESOURCES - www.ecolinc.vic.edu.au

Weather wall

Year Level **4,7,10** Themes SU-E, SHE-1, SIS-2 Sustainability trail

SU-E7,P5,6,8,9,10, **SHE**-2, **SIS**-2 **Building management system**

Year Level **8-10** Themes 🍪 🍣 SU-P, SHE-2, SIS-3

OUTREACH PROGRAMS

Investigating minibeast parts Year Level F-4 Themes 🛞

Links to onsite programs Minibeasts, Classifying living things, **Adaptations** Life cycles of macroinvertebrates

SU-B, SHE-1,2, SIS-1-5

SU-B,P(F), **SHE**-1, **SIS**-1-5

SU-B, SHE-1,2, SIS-1-5

Year Level **F-4** Themes 🛞

Links to onsite program Minibeasts Companion planting in the vegie patch

Year Level **F-6** Themes 🛞

Links to onsite programs A plant's world Landscaping an indigenous garden

Year Level **F-6** Themes 🛞 **SU**-B, **SHE**-1,2(1-6), **SIS**-1,2,5 Links to onsite program **Indigenous plants**

More fascinating frogs

Year Level **F-6** Themes 🛞 SU-B, SHE-2, SIS-1 Starting from scratch – soil testing in the school grounds

Year Level **F-6** Themes 🛞 **SU**-B, **SHE**-1,2(1-6), **SIS**-1,2,5

Links to onsite program Indigenous plants, Get down and dirty

Who's living in the compost patch?

Year Level **F-6** Themes 🛞 **SU-B, SHE-1,2, SIS-1-5**

Links to onsite program A plant's world

Wonderful world of plants Year Level **F-6** Themes 🛞 🔘

SU-B, **SHE**-1,2, **SIS**-1-5 **Explore macroinvertebrates**

Year Level **F-7** Themes 🛞 **SU**-B,P(F), **SHE**-1, **SIS**-1-5 Links to onsite programs Minibeasts, Classifying living things

Sustainable art

SU-B, SHE-2, SIS-2 Themes 🛞 Year Level **F-9**

Year Level 1-4

Themes 🛞 Links to onsite programs Adaptations, A Plant's World

Living in the extremes Year Level 1-8

SU-B, SHE-2, SIS-3 Themes # =**Fabulous flowers** Themes 🛞

Year Level **2-6 Bush Bunnings**

Year Level 3-4 Themes 🛞 **SU**-B, **SHE**-1,2(1-6), **SIS**-1,2,5

SU-B, SHE-2, SIS-5

Links to onsite programs Indigenous plants **Foodwebs**

Year Level 3-7 Themes 🛞 🧮 SU-B, SHE-1, SIS-1,5 Links to onsite programs What's growling in the wetland?, Who eats who?

Eat like a bird

Year Level 3-8 Themes 🛞 SU-B, SHE-2, SIS-3 Reduce, reuse, recycle – from PET to recycled polar fleece

Year Level **4-6** Themes **≋ ७** SU-C, SHE-2, SIS-2

Links to onsite program Reduce, reuse, recycle

Chemical and biological testing of a local waterway Year Level **5-7** Themes ∰ 🧱 **SU**-B,E(7), **SHE**-1, **SIS**-2, 3

Links to onsite programs What's growling in the wetland? Introduction to classification

Themes ∰ ∰ Year Level 7 SU-B, SHE-1, SIS-1,3 Links to onsite program **Classifying living things**

VCE Biology

Unit 1: How do living things stay alive?

AoS 1 How organisms function – cells in action and functioning

Part 1 – Students use compound light microscopes to study plant and animal cell structure. They see the effect of a hypertonic solution on a cell and learn techniques for studying mobile organisms under the microscope.

Part 2 – Students conduct micropropagation (tissue culture) in the laboratory to examine how plants obtain nutrients, energy and water whilst growing in test tubes.

AoS 2 How living systems sustain life – adaptations and dynamic ecosystems

Part 1 – Students investigate the adaptations of some wetland plants and the structural, behavioural and physiological adaptations of some Ecolinc animals. Biotic and abiotic environmental factors are also considered.

Part 2 – Students conduct field investigations exploring the interactions of living things in the wetland ecosystem. They sample and identify the wetland macroinvertebrates, examine relationships between organisms, classify organisms into trophic levels and construct energy flow pyramids. They also use a computer program to model the effects of human induced changes, such as pollution on the wetland ecosystem.

Optional extension – Students investigate a grassy woodland ecosystem for comparison at nearby Mt Rothwell*. A dusk walk reveals a range of endangered nocturnal mammal species including eastern quolls, brushtailed rock wallabies and eastern barred bandicoots.

Unit 2: How is continuity of life maintained?

AoS 2 How inheritance is explained – DNA barcoding

Students investigate genomes through DNA barcoding. They use plant DNA extraction tools including PCR and gel electrophoresis, in addition to bioinformatics tools, to accurately identify a range of Ecolinc grassland / wetland plants.

Unit 3: Signatures of life

AoS 1 Molecules of life

To complete SAC Outcome 1, investigate energy transformations within plants through the process of photosynthesis. Conduct experiments to determine the rate of gas exchange in plant leaves and use spectroscopy to determine the rate of photosynthesis on isolated chloroplasts.

AoS 2 Detecting and responding

To complete SAC Outcome 2, conduct micropropagation (plant tissue culture) in the laboratory. Investigate the effects of plant growth regulators on wood formation in culture and examine the effects of gibberellic acid and abscisic acid on seed germination.

Unit 4: Continuity and change

AoS 1 Heredity

To complete SAC Outcome 1, detect genetically modified organisms in foods using PCR and gel electrophoresis techniques.

AoS 2 Change over time

To complete SAC Outcome 2, use protein electrophoresis to generate protein profiles from the muscles of both distantly and closely related species of fish. Compare the different species' profiles to test the hypothesis that protein profiles can be indicators of evolutionary relatedness.

Programs for VCE 2016

VCE Environmental Science

Unit 1: How are Earth's systems connected?

AoS 1 How life is sustained on Earth

Part 1 (the carbon cycle) – Students measure levels of CO2 and O2 in the air at Ecolinc using data loggers. They then measure dissolved CO2 and O2 levels in the water in the Ecolinc wetland and other water samples.

Part 2 (the nitrogen cycle) – Students analyse a range of samples for nitrogen containing compounds. They explore interactions in and between the Earth's spheres, particularly in relation to the nitrogen cycle. They also relate findings to the recycling of critical nutrients in the Ecolinc wetland.

AoS 2 How Earth is a dynamic system – investigating change in wetland and grassland ecosystems

Students conduct practical investigations involving sampling and identifying living things in wetland and grassland ecosystems. Students construct food webs and energy pyramids for each ecosystem. Students model the long term interactions of organisms and describe the effects of anthropogenic and natural environmental changes on each ecosystem. This program may be extended by including an investigation of a grassy woodland ecosystem at Mt Rothwell*. An optional dusk walk reveals a range of endangered mammal species.

Unit 2: How can pollution be managed?

AoS 1 When pollution becomes a hazard – environmental indicators

Students conduct field work to investigate environmental indicators including turbidity, pH, nitrates, dissolved oxygen and the presence/absence of pollution intolerant macroinvertebrate species to determine the ecological health of the wetland and Werribee River ecosystems.

AoS 2 Why pollution management is complex

Students use laboratory techniques to extract and measure pollutants from three categories: air, water and soil. They determine the source of these pollutants and their effect on living things and the environment. They also investigate management options related to each pollutant.

Unit 3: Ecological issues: energy and biodiversity

AoS 1 Energy and global warming

To complete SAC Outcome 1, use Ecolinc's award winning ESD facility and energy source equipment to investigate ways of increasing energy efficiency to reduce the enhanced greenhouse effect. Explore Ecolinc's efficiency and resulting environmental impacts.

AoS 2 Diversity in the biosphere

To complete SAC Outcome 2, investigate the eastern barred bandicoot's habitat requirements, significance, threats and captive breeding data. Travel to Mt Rothwell* to: complete a habitat assessment, explore methods for protecting remaining populations and participate in a dusk walk to view a range of endangered species including the eastern barred bandicoot, brushtailed rock wallaby and eastern quoll.

Unit 4: Ecological sustainability

AoS 1 Pollution and health

To complete SAC Outcome 1, collect primary data on SO2 and NO2 emissions using colorimetry. Examine the effects posed by SO2 and NO2 to human health and the environment. Evaluate protocols for reducing the risks associated with NO2.

VCE Chemistry

Unit 1: How can the diversity of materials be explained?

AoS 1 How the knowledge of elements explains the properties of matter. Investigating crystals and gold

This is a half day program and can be combined with AoS 2 to create a full day program. Students use molecular model kits and 3D interactive computer modelling to explore ionic and metallic bonding. They also investigate the properties and uses of metallic nanoparticles.

AoS 2 How the versatility of non-metals is explained. Investigating diamond and bucky balls

This is a half day program and can be combined with AoS 1 to create a full day program. Students use molecular model kits and 3D interactive computer modelling to explore covalent bonding, network and layer lattices. They also investigate carbon nanoparticles.

Unit 2: What makes water such a unique chemical?

AoS 2 How substances in water are analysed

Students undertake an extended experimental investigation testing water quality in the Ecolinc wetland, which includes a risk assessment, using a variety of data probes to measure variables including pH, electrical conductivity, dissolved oxygen, nitrates and phosphates and then compare results with environmental standards. They also use atomic absorption spectroscopy (AAS) to measure the sodium concentration of the Ecolinc wetland and other water samples.

Unit 3: Chemical pathways

AoS 1 Chemical analysis

To complete SAC Outcome 1 Task 1 – an extended experimental investigation including a Risk Assessment, or, Task 3 – analysis of qualitative/quantitative data (if the extended experimental investigation is completed from AoS 2), evaluate the suitability of techniques and instruments used in chemical analyses including atomic absorption spectroscopy (AAS), infrared spectroscopy (IR), and ultraviolet/visible spectroscopy (UV-VIS).

- AAS: determine metal concentrations in commercial products e.g. calcium in milk.
- UV-VIS: determine the protein content of common foods e.g. milk samples.
- IR: obtain and interpret IR spectrographs for commercial products e.g. milk samples.

VCE Physics

Unit 1: What ideas explain the physical world?

AoS 2 How thermal effects can be explained

Students examine Ecolinc's award winning Ecologically Sustainable Design features and use thermal imaging and simulation data to investigate the thermal performance and energy use of buildings.

Ecolinc Programs

Ecolinc offers onsite, online, outreach and professional development programs.

There is an extensive range of engaging onsite programs as outlined on the Ecolinc website. These generally run from 10am to 2.30pm although staff are flexible. Everything is provided and all students are required to bring is their lunch. Unit 3 & 4 sessions can be taken as SACs and teachers are provided with a set of suggested answers to the student workbook along with an assessment rubric.

In addition, there are **Online Curriculum Programs** and **Online Resources** available to complement existing onsite programs. Online Programs consist of a suite of learning objects, which may be completed individually or together as an entire unit. Current programs have been designed for Years 5 to 8.

Outreach Programs are available to eligible schools and are conducted by an Ecolinc Education Officer as part of a pre or post visit to Ecolinc, or as a stand-alone program, for primary levels. All required resources, equipment and technologies are supplied. All Onsite, Online and Outreach Programs are designed to meet Australian Curriculum Standards and are detailed on the Ecolinc website.

 ${\bf Ecolinc\ designs,\ by\ request,\ environmental\ programs\ for:}$

- The Victorian Certificate of Applied Learning (VCAL)
- The International Baccalaureate (IB)
- VCE Outdoor and Environmental Studies

Ecolinc will develop programs to suit individual class requirements and curriculum needs, however these must be booked well in advance. A range of teacher professional learning programs are held throughout the year. Requests for particular themes are welcome. Free introductory tours of Ecolinc are available for school staff.

Online Resources

Footprints of the Western Volcanic Plains – is a new signature program that provides activities and learning resources for Years 4 to 7. Students explore the precarious nature of the wildflower grasslands found across the volcanic plains, which is one of the world's most endangered ecosystems. Further information can be found on the Ecolinc website.

Sustainability trail – highlights Ecolinc's ESD features and links to Ecolinc onsite programs including Saving Energy, Renewable Energy and How Real is Climate Change?

Discovering wetlands – is a package of interactive and online wetland activities designed for students in Years 5 to 8 (AusVELS 4-5). It explores the importance of wetland environments, including the plants and animals that inhabit them, the threats they are under and the importance of protecting these threatened ecosystems. The activities include a student and teacher navigator, a unique macroinvertebrate ID tool, virtual wetland tour, wetlands through the seasons interactive widget, talk with the experts question and answer session, managing wetland ecosystems animation, interactive quiz and wetlands gallery.

Watching the weather – an online weather unit incorporating the existing Ecolinc Weather Wall. Activities include: making weather instruments, exploring the Ecolinc Weather Wall, weather throughout the world, when to plant out a native garden, be a weather presenter, talk to an expert, an interactive quiz, online gallery and glossary. All activities are fully supported by comprehensive teacher notes, student worksheets, resource links and PowerPoint presentations.

Biodiversity of the Western Volcanic Plains – focuses on the flora and fauna of Victoria's Western Volcanic Plains. Interactive learning objects include a BWVP flora and fauna field guide app. quadrats online, grassland foodwebs, managing grassland ecosystems, a virtual tour, talk with the experts and an interactive quiz.



Other Information

For more detailed information about our programs or events go to our website www.ecolinc.vic.edu.au or subscribe to our Ecolinc newsletter 'Newslinc'.

Prices

Please contact Ecolinc for current program charges.

* Programs linked to Mt Rothwell attract an additional fee per student, payable to Mt Rothwell.

(Minimum numbers apply for Mt Rothwell tours.)

Facility Hire

The Ecolinc Conference Room and Information Resource Centre are available for hire for your next staff meeting, conference or professional learning activity.

- Conference Room (audio visual presentation equipment and hospitality facilities available, seats 100)
- Information Resource Centre (presentation facilities including laptop and plasma screen technology, seats 28)

Hire costs available on application.



Department of Education and Training • Bacchus Marsh College • Federation University Australia • Moorabool Shire Council





Federation III



Department of Environment and Primary Industries • University of Melbourne • Royal Botanic Gardens Melbourne • Melbourne Water • Western Water • Department of Innovation, Industry and Regional Development • Texas Instruments • Gillespie Earthmoving • Vernier Software and Technology • Olympus Australia • Southern Rural Water • Envirosax

For more information, contact:

T: 03 5367 0171 F: 03 5367 0174

The Director,

Ecolinc Science and Technology Innovations Centre 17-23 Labilliere Street (PO Box 329), Bacchus Marsh VIC 3340





