



LEARNING AND TEACHING
ACADEMIC STANDARDS STATEMENT
FOR ENVIRONMENT AND SUSTAINABILITY

Endorsed by the Australian Council of Environmental Deans and Directors

ABOUT

The Learning and Teaching Academic Standards Statement for Environment and Sustainability is the key outcome from the ‘Learning and teaching academic standards: environment and environmental sustainability’ project.

Support for this project has been provided by the Australian Government Office for Learning and Teaching. The views expressed in this document do not necessarily reflect the views of the Australian Government Office for Learning and Teaching.

Learning and Teaching Academic Standards Statement website:

environmentltas.gradschool.edu.au

ISBN 978-0-646-93614-7

This document can be cited as Phelan, L., McBain, B., Ferguson, A., Brown, P., Brown, V., Hay, I., Horsfield, R., Taplin, R. (2015). *Learning and Teaching Academic Standards Statement for Environment and Sustainability*. Sydney: Office for Learning and Teaching.



Unless otherwise noted, all material presented in this document is provided under Creative Commons Attribution-ShareAlike 4.0 International License

<http://creativecommons.org/licenses/by-sa/4.0/>

PROJECT TEAM	
Dr Bonnie McBain Project Co-leader	Conjoint Research Fellow and Lecturer in Sustainability School of Environmental and Life Sciences University of Newcastle
Dr Liam Phelan Project Co-leader	Senior Lecturer and Online Teaching and Learning Coordinator Gradschool, and Conjoint Senior Lecturer School of Environmental and Life Sciences University of Newcastle
Honorary Associate Professor Paul Brown	Institute of Environmental Studies University of New South Wales
Emeritus Professor Valerie Brown AO	Visiting Fellow and Director of the Local Sustainability Project Fenner School of Environment and Society Australian National University
Matthew Flinders Distinguished Professor Iain Hay	School of the Environment Flinders University Discipline Scholar for the Arts, Social Sciences and Humanities
Mr Richard Horsfield	Visiting Fellow Department of Environment and Geography Macquarie University
Professor Ros Taplin	Research Director Australian Centre for Sustainable Mining Practices University of New South Wales
Ms Anna Ferguson Project Manager	School of Environmental and Life Sciences University of Newcastle



CONTENTS

About	2
Executive Summary	4
Background to Disciplinary Learning and Teaching Standards	5
Developing the TLOs	8
The Environment and Sustainability Field	11
Learning and Teaching for Environment and Sustainability	12
Threshold Learning Outcomes for Environment and Sustainability	13
Notes on TLOs	18
Appendices	23

LIST OF SHORTENED FORMS

ACEDD	Australian Council of Environmental Deans and Directors
AQF	Australian Qualifications Framework
Cth	Commonwealth
HES	Higher Education Standards
LTAS	Learning and teaching academic standards
Panel, the	Higher Education Standards Panel
TEQSA	Tertiary Education Quality Standards Agency
TLOs	threshold learning outcomes

EXECUTIVE SUMMARY

The Learning and Teaching Academic Standards Statement for Environment and Sustainability has been developed by the environment and sustainability higher education community. This statement describes the minimum or threshold learning outcomes (TLOs) that graduates of tertiary programs in Environment and Sustainability are expected to meet or exceed. The TLOs provide a curriculum reference point for designing and teaching diverse and innovative environment and sustainability programs. The TLOs are not intended to be prescriptive.

The Australian Council of Environmental Deans and Directors (ACEDD) commissioned the development of the TLOs and 'commends the Project Team on the consultation, dissemination and evaluation process used to develop this *Learning and Teaching Academic Standards Statement for Environment and Sustainability*. The Council endorses the threshold learning outcomes identified in this document as a curriculum reference point for program design, development and delivery in this field.'¹

The TLOs have been developed for the following tertiary qualification levels and types, as described in the Australian Qualifications Framework (AQF): bachelor degree at Level 7; bachelor honours degree, graduate certificate, and graduate diploma

¹ Letter from ACEDD to the Project Team, 18 February 2014. This letter is available in the appendices of the final report.

at Level 8; and masters degree (coursework) at Level 9. The TLOs are grouped into four areas, or domains:

- ⑥ transdisciplinary knowledge
- ⑥ systemic understanding
- ⑥ skills for environment and sustainability
- ⑥ ethical practice.

The TLOs were developed using a collaborative and consultative process which engaged the expertise and experience of the broad environment and sustainability stakeholder community. This process was coordinated by a Project Team who communicated with nearly 1,000 university academics, students, employers, representatives of Indigenous interests, and other education sector representatives through a website, face-to-face workshops, targeted emails, online discussion fora, questionnaires and social media. Over 250 individuals actively collaborated in the development of the TLOs by contributing over 2,500 separate pieces of advice and guidance. The Project Team drew on stakeholders' contributions to iteratively refine the TLOs over the course of the project.

Students can use these TLOs to make informed study and career choices confident that, where offered, the environment and sustainability options in their programs are authentic. The standards support greater

international transferability of qualifications should students choose to study overseas (e.g. for postgraduate programs) through the standards' alignment with other relevant international benchmarks. Employers can refer to the standards, confident that graduates from environment and sustainability programs are equipped with essential and relevant vocational skills. Finally, the standards provide clarity for others engaged in environment and sustainability education in a range of contexts (e.g. vocational education and training, schools and community education) to assist them in providing training that complements formal tertiary qualifications.

The Project Team acknowledges and thanks ACEDD for its vision in commissioning this project and its strong support through the project's term. We give special acknowledgement to the members of the external Reference Group for their expert contribution in developing the consultation draft of the TLOs. The Project Team thanks all colleagues across the environment and sustainability community who contributed their time, enthusiasm, expertise and experience towards making these TLOs both inspiring and workable. Finally, we recognise the invaluable contribution of our external evaluator, Professor Daniella Tilbury, who ensured that both the TLOs and the process of their development remained authentic and robust.

BACKGROUND TO DISCIPLINARY LEARNING AND TEACHING STANDARDS

The Regulatory Context for this Project

The wider regulatory framework for higher education in Australia provides the context for the creation of disciplinary learning and teaching academic standards (LTAS) for Environment and Sustainability. The Tertiary Education Quality Standards Agency (TEQSA), established in 2011 through the *Tertiary Education Quality and Standards Agency Act 2011* (Cth), is Australia's independent national regulator of the higher education sector and is responsible for assuring the quality of tertiary education in Australia. TEQSA does so by evaluating the performance of higher education providers against the Higher Education Standards (HES) Framework – specifically the Threshold Standards.²

The Higher Education Standards Panel (the Panel), an expert body established under the same legislation as TEQSA, but independent of TEQSA, has been charged with reviewing the existing Threshold Standards and recommending to the Minister any variations or new standards. In December 2014 the Panel provided advice to the Commonwealth Minister for Education on making and varying the HES Framework. The Minister is required to consult with the state and territory Education Ministers,

² *Higher Education Standards Framework (Threshold Standards)*, Australian Government, 2011.

with TEQSA and with the Commonwealth Minister responsible for research in relation to the Panel's advice.³ Following this consultation, the Minister will make decisions in relation to the proposed HES Framework.

The proposed HES Framework⁴ recommends that learning outcomes for tertiary qualifications be consistent with the relevant level classifications as specified in the Australian Qualifications Framework (AQF), which specifies the generic skills and attributes all university students need upon graduation irrespective of their disciplinary background.⁵

The Panel's proposed framework also recognises the utility of referring to other resources in considering how higher education standards may be met or demonstrated. As such, the proposed framework includes the recommendation that other significant codes or frameworks – including learning outcomes statements developed by discipline communities – be acknowledged formally as 'Reference Points'. Yet while encouraging their use,

³ *Tertiary Education Quality and Standards Agency Act 2011* (Cth), s 58(3).

⁴ Higher Education Standards Panel, *Higher Education Standards Framework – Advice to Minister* [<http://www.hestandards.gov.au/sites/default/files/FinalProposedHESFramework-AdvicetoMinister.pdf>], December 2014.

⁵ Australian Qualifications Framework Council (AQFC), *Australian Qualifications Framework (2nd Edition)*, AQFC, Adelaide, 2013.

the Panel is not proposing that disciplinary standards will have legislative authority in and of themselves, as the following indicates:

Reference Points are an adjunct to the Standards for Higher Education, but are not themselves Standards Statements. Use of the Reference Points by higher education providers is not mandatory; the Standards do not require a provider to consult the Reference Points or to comply with positions advocated within the Reference Points.⁶

Nevertheless, providers would need to make persuasive arguments for why relevant external references were not drawn on, both for the design and subsequent external evaluation of their programs.

⁶ Higher Education Standards Panel, *Higher Education Standards Framework – Advice to Minister* [<http://www.hestandards.gov.au/sites/default/files/FinalProposedHESFramework-AdvicetoMinister.pdf>], December 2014, p. 4.

... the proposed framework includes the recommendation that significant codes or frameworks be acknowledged formally as 'Reference Points'.

The Role of Learning and Teaching Academic Standards in Higher Education

The threshold learning outcomes (TLOs) set out in this statement represent the minimum learning outcomes expected of graduates from Australian tertiary programs in Environment and Sustainability. Academics can use this statement as a curriculum reference point to confirm essential student learning outcomes which meet or exceed minimum standards. These TLOs align with national and international best practice in teaching and learning standards. (See

Appendix 1 for a comparison of the TLOs with other national and international benchmarks.)

Further, the TLOs provide guidance in designing innovative and diverse programs. The TLOs are not intended to be prescriptive for program design, course content, or assessment.

Students can use these TLOs to make informed study and career choices confident that, where offered, the environment and sustainability options in their programs are authentic. The standards support greater international transferability of qualifications should students choose to study overseas (e.g. for postgraduate

programs) through their alignment with other relevant international benchmarks. Employers can refer to the standards, confident that graduates from environment and sustainability programs are equipped with essential and relevant vocational skills. Finally, the standards provide clarity for others engaged in environment and sustainability education in a range of contexts (e.g. vocational education and training, schools and community education) to assist them in providing training that complements formal tertiary qualifications.

Equipping our Graduates

The TLOs will ensure that graduates have essential knowledge, understanding and skills that:

- ⑥ apply to the broad and diverse nature of the Environment and Sustainability field
- ⑥ are highly adaptable to enable appropriate responses in uncertain futures
- ⑥ are vocationally relevant
- ⑥ allow graduates to participate in the transformation of society toward greater sustainability.

The TLOs are relevant to the broad range of career paths open to graduates including (but not limited to):

- ⑥ environmental manager
- ⑥ environmental consultant
- ⑥ environmental scientist
- ⑥ sustainability scientist
- ⑥ policy officer
- ⑥ forest manager
- ⑥ agricultural officer
- ⑥ conservation
- ⑥ Indigenous land manager
- ⑥ urban planner
- ⑥ corporate social responsibility manager
- ⑥ community engagement officer
- ⑥ natural resource management
- ⑥ environmental educator
- ⑥ environmental lawyer
- ⑥ environmental civil society organisation coordinator
- ⑥ environmental engineer
- ⑥ ecotourism manager.

These TLOs align with national and international best practice in teaching and learning standards

Application of this Statement

Environment and Sustainability encompasses a set of teaching and research concerns that are shared across many traditional disciplines, spanning the humanities and the social and natural sciences. For the purposes of this statement, it encompasses a range of areas of study programs including (but not limited to):

- ⑥ environmental management
- ⑥ environmental science
- ⑥ environmental studies
- ⑥ sustainability
- ⑥ sustainable development
- ⑥ natural science
- ⑥ earth science
- ⑥ atmospheric science
- ⑥ marine science
- ⑥ social science
- ⑥ global studies
- ⑥ urban planning
- ⑥ built environment
- ⑥ environmental engineering
- ⑥ environmental law
- ⑥ environmental accounting
- ⑥ environmental economics
- ⑥ business administration.

These TLOs have been developed for the following tertiary qualification levels and types (as described in the AQF):

- ⑥ bachelor degree (Level 7)
- ⑥ bachelor honours degree (Level 8)
- ⑥ graduate certificate (Level 8)
- ⑥ graduate diploma (Level 8)
- ⑥ masters (coursework) degree (Level 9).

Where environment and sustainability are studied as part of a joint program, double degree or double major, then other relevant disciplinary standards statements will complement this statement. For example, student learning outcomes in environmental science degrees will be informed by both these standards for Environment and Sustainability and the standards for Science (see Appendix 2 for a comparison of these TLOs). It is the responsibility of the individual education institution to relate offered programs to the appropriate standards statement(s).

ACEDD Endorsement

The Australian Council of Environmental Deans and Directors (ACEDD) commissioned the work to develop the TLOs and provided strong support through the project's life. ACEDD 'commends the Project Team on the consultation, dissemination and evaluation process used to develop this *Learning and Teaching Academic Standards Statement for Environment and Sustainability*. The Council endorses the threshold learning outcomes identified in this document as a curriculum reference point for program design, development and delivery in this field.⁷ ACEDD further recommends that the TLOs be reviewed after three years.

⁷ Letter from ACEDD to the Project Team, 18 February 2014. This letter is available in the appendices of the project final report, accessible at www.olt.gov.au.

DEVELOPING THE TLOs

Drafting the LTAS Statement for Environment and Sustainability offered the opportunity to engage with stakeholders across broad and diverse fields characterised by varied viewpoints, perspectives and contested meanings. The Project Team employed a comprehensive strategy of simultaneous consultation, dissemination and evaluation to ensure inclusion of a wide diversity of expertise and experience, to capture collective understanding of what graduates needed to know and be able to do, and to ensure the statement is strongly supported by broad consensus amongst the environment and sustainability stakeholder community. The Project Team is itself diverse in the disciplinary backgrounds of its members, and an initial draft set of TLOs was developed by the Project Team (February to April 2014). This draft was then reviewed and revised by the project's Reference Group in May 2014.

Reference Group

The Reference Group was chaired by Professor Greg Hill, Vice-Chancellor and President, University of the Sunshine Coast, and was made up of frontline teaching academics in the Environment and Sustainability field, reflecting broad disciplinary diversity. The composition of

the Reference Group also reflected career-point breadth (i.e., a mix of early career, mid career and senior scholars) and gender balance, and a spread in institutional and state representation. The Reference Group also included an industry representative with expertise in education for Environment and Sustainability.

MEMBERSHIP OF THE PROJECT'S REFERENCE GROUP

Professor Greg Hill Chair	Vice-Chancellor and President University of the Sunshine Coast
Dr Aidan Davison	Senior Lecturer, Discipline of Geography and Spatial Science University of Tasmania
Professor Pierre Horwitz	School of Natural Sciences Edith Cowan University
Dr Anna Hurlimann	Senior Lecturer, Faculty of Architecture, Building and Planning University of Melbourne
Dr Dimity Podger	Director and Principal Barasa Consulting
Associate Professor Michele Rosano	Director, Sustainable Engineering Group, School of Civil and Mechanical Engineering Curtin University
Professor Steve Turton ACEDD President's nominee	College of Marine and Environmental Sciences James Cook University

Consultation

Further collaborative development of the TLOs and piloting was then undertaken in two consultation phases and a piloting phase. **Phase one** (June and July 2014) of the consultation focused on the dissemination of the first draft TLOs through the project website⁸ and a national series of workshops to critique the TLOs. Workshops were held in Perth, Sydney, Melbourne, Canberra, Gold Coast, Newcastle and Adelaide. A further two meetings came about through invitations from stakeholders during phase one. Around 650 invitations were emailed to organisations and individuals, and recipients forwarded the invitation to an estimated further 200 colleagues.

Phase two (August and September 2014) of the consultation was targeted to address gaps in stakeholder representation identified at the conclusion of phase one. Phase two involved:

1. invitations to industry, Indigenous and professional association stakeholders (more than 150 personalised emails and around 700 broadcast emails with invitation to comment via a questionnaire)
2. nationally and internationally focused online discussion fora (around

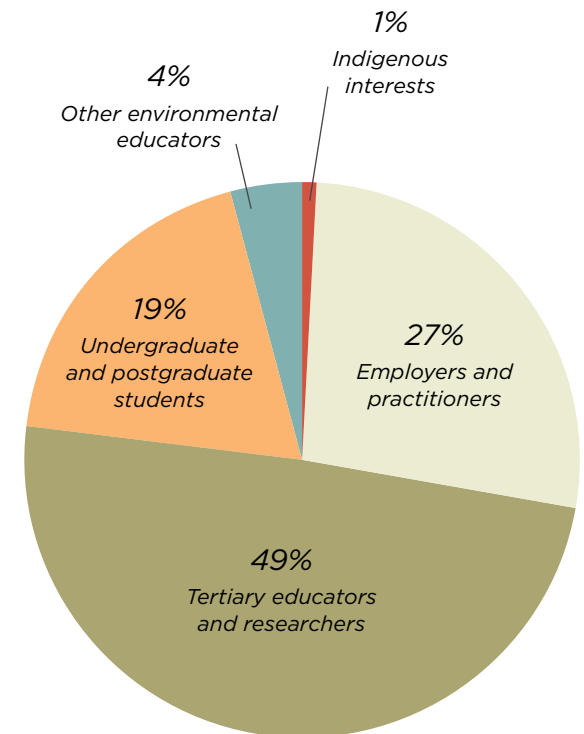
850 invitations to participate in a discussion using the same questions as for the workshops)

3. a Q&A-style workshop for students at the University of Newcastle in September 2014.

The chart below shows the broad representation of stakeholder groups who provided advice on TLO development in this project. More than 250 individuals contributed over 2,500 separate pieces of advice and guidance towards the development of the TLOs.

The **piloting phase** (November and December 2014) tested the TLOs against a range of bachelor degrees across the Environment and Sustainability field to ensure the TLOs were practical and workable for programs offered at universities nationally. The piloting phase demonstrated that the TLOs work well in practice. Translating TLOs to other qualification levels and types was achieved by retaining the consensus-supported, discipline-specific quality of the TLOs, and then adapting them conservatively, with reference to the Australian Qualifications Framework (AQF).

Stakeholder representation by group



⁸ Project website <<http://environmenttas.gradschool.edu.au/>>.

Dissemination

In the course of consulting with stakeholders the Project Team also disseminated the draft TLOs. Nearly 1,000 stakeholders were invited to participate through the project website⁹, face-to-face workshops, targeted emails, online discussion fora, questionnaires and social media. Dissemination also included a presentation to the Australian Council of Science Deans Teaching and Learning Conference in July 2014 on the complementarity of the Environment and Sustainability standards with the Science discipline standards. Lessons and outcomes from the project were disseminated to international audiences at the International Conference on Higher Education for Sustainable Development at Nagoya University, Japan, in November 2014.

⁹ Project website <<http://environmentltas.gradschool.edu.au/>>.

Evaluation

The project was evaluated externally by Professor Daniella Tilbury, who is the Chair of the UNESCO Decade of Education for Sustainable Development (DESD) Global Monitoring and Evaluation Group and based in Cheltenham, UK. Professor Tilbury is recognised internationally for her research in the areas of sustainability education, higher education quality and organisational change.

Following guidance from the external evaluator, an evaluation framework was developed. This comprised of a number of relevant quality criteria aligning with key project outcomes and mapping of data collection opportunities throughout the life of the project. An evaluation plan, which outlined internal and external evaluation processes and actions, accompanied the framework. The key data for evaluation were collected by the Project Team throughout the course of the project and presented to the evaluator for her assessment in quarterly reports. The evaluator also conducted her own independent data collection and validity checks in the form of interviews with key stakeholders. The evaluator's quarterly

reports provided formative feedback to the Project Team.

At the project's conclusion the evaluator provided a short summative report, to ACEDD and to the Australian Government Office for Learning and Teaching, evaluating the quality of the TLOs and the consultation process through which they were developed. The evaluator's assessment was highly affirming, noting that 'evaluation has confirmed that the project processes and outcomes have met pre-defined core objectives and the relevant quality criteria'.

The evaluator's assessment was highly affirming, noting that 'evaluation has confirmed that the project processes and outcomes have met pre-defined core objectives and the relevant quality criteria'.

The development of the TLOs has been underpinned by inclusive engagement with the diverse environment and sustainability community. This process has resulted in TLOs that are robust and aligned with national and international best practice.

Full details of how the TLOs were developed are provided in the final report on this project submitted to the Office for Learning and Teaching.¹⁰

¹⁰ B McBain, L Phelan, A Ferguson, P Brown, V Brown, I Hay, R Horsfield, R Taplin, *Learning and teaching academic standards (LTAS): Environment and sustainability*. Final Report 2015, Office for Learning and Teaching, Sydney, 2015. Accessible at www.olt.gov.au.

THE ENVIRONMENT AND SUSTAINABILITY FIELD

Environment and Sustainability is a coherent field of teaching, learning and research, but not in the traditional disciplinary sense. Environment and Sustainability as a field addresses concerns that are shared across many individual disciplines, spanning the full breadth of the natural and social sciences and the humanities (i.e. from environmental science and engineering through to human ecology and environmental management, planning, law, history and philosophy). The field has evolved in the context of growing awareness of human impacts on environments, and includes education *about* environment and sustainability, as well as education *for* environment and sustainability.¹¹

The Environment and Sustainability field is distinctive through its combination of three key characteristics. First, the field gives attention to relationships between human societies and environments. Education in this field involves: (i) learning fundamental aspects of society-nature interactions and interdependencies in relation to their present and future conditions; and (ii) supports learners to develop the skills required to influence the transformation of human societies towards a more sustainable

¹¹ P Brown, *Sustainability education and engagement for NSW: Learning for sustainability research synthesis*. Report prepared for Office of Environment and Heritage, NSW Department of Premier and Cabinet, 2012.

future.¹² The field addresses interconnections between social, environmental and ecological dimensions of social justice, sustainability and resilience.

Second, the field values transdisciplinarity. Transdisciplinarity (see definition in the notes for TLO 2.1) encourages a shift in perspective that includes and extends beyond single traditional disciplines: this approach recognises that effective responses to ‘wicked’¹³ sustainability challenges (challenges which are difficult to clearly define, constantly evolving, and have no clear resolution¹⁴) lie beyond individual disciplines.¹⁵ The field thus encompasses and synthesises the contributions of many disciplines and seeks to draw academic knowledge into dialogue with other forms of knowledge. Contemporary environment and sustainability thinking engages with complexity, uncertainty and cross-scale interdependencies, is creative, and searches for new, more integrative ways of understanding the world.¹⁶

¹² D Tilbury, *Education for sustainable development: an expert review of processes and learning*, UNESCO, Paris, 2011.

¹³ HWJ Rittel, MM Webber, *Dilemmas in a General Theory of Planning*, Policy Sciences, 1973, vol. 4, pp. 155-169.

¹⁴ HWJ Rittel, MM Webber, 1973, pp. 155-169.

¹⁵ VA Brown, JA Harris, JY Russell, *Tackling wicked problems through the transdisciplinary imagination*, Earthscan, London, 2010.

¹⁶ G Albrecht, N Higginbotham, S Freeman, *Transdisciplinary thinking in health social science research: definition, rationale, and procedures*. In N

Third, the field is characterised by its focus on futures. A key concern and intention of sustainability is ensuring the viability of human societies and ecological systems into the future. Decision-making for sustainability therefore makes links between our actions in the present and their impact in the future. It orientates the actions of those in the field to one of envisioning and negotiating more positive futures. The Environment and Sustainability field acknowledges uncertainty and seeks to prepare graduates with skills and attributes that are adaptable for decision-making across a broad range of possible futures.¹⁷

... the field gives attention to relationships between human societies and environments.

Higginbotham, G Albrecht, L Connor (Eds.), *Health social science: A transdisciplinary and complexity perspective*, Oxford University Press, South Melbourne, Australia, 2001.

¹⁷ S Stirling, *The future fit framework: teaching and learning sustainability with Plymouth University*, Centre for Sustainable Futures, The Higher Education Academy, 2012.

LEARNING AND TEACHING FOR ENVIRONMENT AND SUSTAINABILITY

Learning for Environment and Sustainability involves cognitive learning (knowledge and its application) as well as higher order affective learning (relating to the values, behaviour/actions and attitudes, which emotionally involves the learner).¹⁸ Affective learning progresses from basic skills (such as a willingness to listen, to read and to acquire information) to more advanced skills (such as self-reliance, an ability to cooperate and to lead).¹⁹

Learning for Environment and Sustainability also implies learning for change and transformation.²⁰ Graduates' capacities to think critically and to innovate and implement solutions will be essential in addressing complex current and future sustainability challenges. This requires deep learning – that which uses independent thinking and the ability to organise and structure a wide range of information types into a coherent whole as a result of comprehending underlying meanings.

For these reasons learning for Environment and Sustainability is active and

participatory.²¹ This approach challenges the concept of teacher or lecturer as the wholly authoritative source of knowledge, and realigns the role of educators as facilitators and participants in students' learning processes. The approach encourages students to create and contribute to collective²² or social learning²³ relationships and to acknowledge, understand and share multiple knowledges and perspectives. Active, participatory learning is reflective and encourages learners to question assumptions and dominant ways of thinking through their education journeys. Learning this way is interactive, experiential and learner-directed. Through such learning approaches, learners tackle authentic issues, thus modelling situations they are likely to encounter in their roles beyond graduation as professionals and citizens. Active, participatory learning supports students to critically and systematically engage with the world around them, and promotes active citizenship for transformational change.²⁴

Application of active, participatory learning is not limited to the Environment and Sustainability field. However, it is explicitly within this approach that the TLOs for

Environment and Sustainability are presented.

Learning for Environment and Sustainability implies learning for change and transformation.

18 LA Hidalgo, JMA Fuentes, *The development of basic competencies for sustainability in higher education: an education model*, US-China Education Review, 2013, vol. 3(6), pp. 447-458.

19 K Shephard, K *Higher education for sustainability: seeking affective learning outcomes*. Higher Education for Sustainability, 2008, vol. 9(1), pp. 87-98.

20 UNECE, *Learning for the future: competences in education for sustainable development*, UNECE, Geneva, 2012.

21 D Tilbury, 2011.

22 VA Brown, JA Harris, *The human capacity for transformational change*. Routledge, 2014.

23 M Keen, V Brown, R Dyball, *Social learning in environmental management: towards a sustainable future*, Earthscan, London, 2005.

24 UNECE, 2012.

THRESHOLD LEARNING OUTCOMES FOR ENVIRONMENT AND SUSTAINABILITY

Bachelor Degree

The bachelor degree qualifies individuals who apply a broad and coherent body of knowledge in a range of contexts to undertake professional work and as a pathway for further learning. Upon completion of a bachelor degree in the field of Environment and Sustainability, or a bachelor degree with a major in Environment and Sustainability, graduates will attain the following TLOs.

DOMAIN	THRESHOLD LEARNING OUTCOME
Transdisciplinary knowledge	1. Demonstrate a broad and coherent knowledge of: <ol style="list-style-type: none"> 1.1. environments at various scales, interdependencies between human societies and environments, and sustainability 1.2. key environmental and sustainability challenges and their drivers 1.3. holistic systems thinking and complexity.
Systemic understanding	2. Demonstrate an understanding of diverse approaches to environment and sustainability, including: <ol style="list-style-type: none"> 2.1. disciplinary and transdisciplinary approaches to identifying and conceptualising environmental and sustainability challenges 2.2. different frameworks for knowing 2.3. their own and others' values, knowledge, ethical positions and interests 2.4. the particular values, knowledge, ethical positions and interests of indigenous peoples globally.
Skills for environment and sustainability	3. Demonstrate well-developed cognitive, technical and communication skills through: <ol style="list-style-type: none"> 3.1. addressing research questions by identifying, synthesising and applying appropriate knowledge and evidence from diverse sources 3.2. thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures 3.3. applying tools, methods, skills and theoretical knowledge for environment and sustainability practice 3.4. working both independently and collaboratively 3.5. communicating with diverse groups in various contexts using a range of written, oral and visual means 3.6. engaging with Indigenous approaches to environmental and sustainability challenges.
Ethical practice	4. Demonstrate an ethical professional, public and personal conduct by having capacity to: <ol style="list-style-type: none"> 4.1. reflect on and direct their own learning and practice in the context of environment and sustainability 4.2. participate constructively in decision-making consistent with principles of sustainable development.

THRESHOLD LEARNING OUTCOMES FOR ENVIRONMENT AND SUSTAINABILITY

Bachelor Honours Degree

The bachelor honours degree qualifies individuals who apply a body of knowledge in a specific context to undertake professional work and as a pathway for research and further learning. These TLOs are intended to apply to honours degrees that are end-on-to or embedded in bachelor degrees in Environment and Sustainability. Upon completion of a bachelor honours degree in the field of Environment and Sustainability, graduates will attain the following TLOs.

DOMAIN	THRESHOLD LEARNING OUTCOME
Transdisciplinary knowledge	1. Demonstrate an advanced theoretical and technical knowledge of: <ol style="list-style-type: none"> 1.1. environments at various scales, interdependencies between human societies and environments, and sustainability 1.2. key environmental and sustainability challenges and their drivers 1.3. holistic systems thinking and complexity 1.4. research principles and methods relevant to environment and sustainability.
Systemic understanding	2. Demonstrate a coherent and advanced understanding of diverse approaches to environment and sustainability, including: <ol style="list-style-type: none"> 2.1. disciplinary and transdisciplinary approaches to identifying and conceptualising environmental and sustainability challenges 2.2. different frameworks for knowing 2.3. their own and others' values, knowledge, ethical positions and interests 2.4. the particular values, knowledge, ethical positions and interests of Indigenous peoples globally.
Skills for environment and sustainability	3. Demonstrate well-developed cognitive, technical and communication skills through: <ol style="list-style-type: none"> 3.1. planning and executing a research project with some independence by identifying, synthesising and applying appropriate knowledge and evidence from diverse sources 3.2. thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures 3.3. applying tools, methods, skills and theoretical knowledge for environment and sustainability practice 3.4. working both independently and collaboratively 3.5. communicating with diverse groups in various contexts using a range of written, oral and visual means 3.6. engaging with Indigenous approaches to environmental and sustainability challenges.
Ethical practice	4. Demonstrate an ethical professional, public and personal conduct by having capacity to autonomously: <ol style="list-style-type: none"> 4.1. reflect on and direct their own learning and practice in the context of environment and sustainability 4.2. participate constructively in decision-making consistent with principles of sustainable development.

Graduate Certificate

The graduate certificate qualifies individuals who apply a body of knowledge in a range of contexts to undertake professional/highly skilled work and as a pathway for further learning. Upon completion of a graduate certificate in the field of Environment and Sustainability, graduates will attain the following TLOs.

DOMAIN	THRESHOLD LEARNING OUTCOME
Transdisciplinary knowledge	<p>1. Demonstrate an advanced theoretical and technical knowledge of aspects of:</p> <ul style="list-style-type: none"> 1.1. environments at various scales, interdependencies between human societies and environments, and sustainability 1.2. key environmental and sustainability challenges and their drivers 1.3. holistic systems thinking and complexity.
Systemic understanding	<p>2. Demonstrate a specialised understanding of aspects of diverse approaches to environment and sustainability, including:</p> <ul style="list-style-type: none"> 2.1. disciplinary and transdisciplinary approaches to identifying and conceptualising environmental and sustainability challenges 2.2. different frameworks for knowing 2.3. their own and others' values, knowledge, ethical positions and interests 2.4. the particular values, knowledge, ethical positions and interests of Indigenous peoples globally.
Skills for environment and sustainability	<p>3. Demonstrate an advanced cognitive, technical and communication skills through:</p> <ul style="list-style-type: none"> 3.1. addressing research questions by identifying, synthesising and applying appropriate knowledge and evidence from diverse sources 3.2. thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures 3.3. applying tools, methods, skills and theoretical knowledge for environment and sustainability practice 3.4. working both independently and collaboratively 3.5. communicating with diverse groups in various contexts using a range of written, oral and visual means 3.6. engaging with Indigenous approaches to environmental and sustainability challenges.
Ethical practice	<p>4. Demonstrate an ethical professional, public and personal conduct by having capacity to autonomously:</p> <ul style="list-style-type: none"> 4.1. reflect on and direct their own learning and practice in the context of environment and sustainability 4.2. participate constructively in decision-making consistent with principles of sustainable development.

THRESHOLD LEARNING OUTCOMES FOR ENVIRONMENT AND SUSTAINABILITY

Graduate Diploma

The graduate diploma qualifies individuals who apply a body of knowledge in a range of contexts to undertake professional/ highly skilled work and as a pathway for further learning. Upon completion of a graduate diploma in the field of Environment and Sustainability, graduates will attain the following TLOs.

DOMAIN	THRESHOLD LEARNING OUTCOME
Transdisciplinary knowledge	1. Demonstrate an advanced theoretical and technical knowledge of: <ol style="list-style-type: none"> 1.1. environments at various scales, interdependencies between human societies and environments, and sustainability 1.2. key environmental and sustainability challenges and their drivers 1.3. holistic systems thinking and complexity.
Systemic understanding	2. Demonstrate an advanced understanding of diverse approaches to environment and sustainability, including: <ol style="list-style-type: none"> 2.1. disciplinary and transdisciplinary approaches to identifying and conceptualising environmental and sustainability challenges 2.2. different frameworks for knowing 2.3. their own and others' values, knowledge, ethical positions and interests 2.4. the particular values, knowledge, ethical positions and interests of Indigenous peoples globally.
Skills for environment and sustainability	3. Demonstrate advanced cognitive, technical and communication skills through: <ol style="list-style-type: none"> 3.1. addressing research questions by identifying, synthesising and applying appropriate knowledge and evidence from diverse sources 3.2. thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures 3.3. applying tools, methods, skills and theoretical knowledge for environment and sustainability practice 3.4. working both independently and collaboratively 3.5. communicating with diverse groups in various contexts using a range of written, oral and visual means 3.6. engaging with Indigenous approaches to environmental and sustainability challenges.
Ethical practice	4. Demonstrate an ethical professional, public and personal conduct by having capacity to autonomously: <ol style="list-style-type: none"> 4.1. reflect on and direct their own learning and practice in the context of environment and sustainability 4.2. participate constructively in decision-making consistent with principles of sustainable development.

THRESHOLD LEARNING OUTCOMES FOR ENVIRONMENT AND SUSTAINABILITY

Masters Degree (Coursework)

The coursework masters degree qualifies individuals who apply an advanced body of knowledge in a range of contexts for professional practice or scholarship and as a pathway for further learning. Upon completion of a coursework masters degree in the field of Environment and Sustainability, graduates will attain the following TLOs.

DOMAIN	THRESHOLD LEARNING OUTCOME
Transdisciplinary knowledge	1. Demonstrate an advanced and integrated knowledge of: <ol style="list-style-type: none"> 1.1. environments at various scales, interdependencies between human societies and environments, and sustainability 1.2. key environmental and sustainability challenges and their drivers 1.3. holistic systems thinking and complexity.
Systemic understanding	2. Demonstrate an advanced and integrated understanding of diverse approaches to environment and sustainability, including: <ol style="list-style-type: none"> 2.1. disciplinary and transdisciplinary approaches to identifying and conceptualising environmental and sustainability challenges 2.2. different frameworks for knowing 2.3. their own and others' values, knowledge, ethical positions and interests 2.4. the particular values, knowledge, ethical positions and interests of Indigenous peoples globally.
Skills for environment and sustainability	3. Demonstrate expert and specialised cognitive, technical and communication skills through: <ol style="list-style-type: none"> 3.1. addressing research questions by identifying, synthesising and applying appropriate knowledge and evidence from diverse sources 3.2. thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures 3.3. applying tools, methods, skills and theoretical knowledge for environment and sustainability practice 3.4. working both independently and collaboratively 3.5. communicating with diverse groups in various contexts using a range of written, oral and visual means 3.6. engaging with indigenous approaches to environmental and sustainability challenges.
Ethical practice	4. Demonstrate a high level of personal autonomy and accountability in ethical professional, public and personal conduct by having capacity to: <ol style="list-style-type: none"> 4.1. reflect on and direct their own learning and practice in the context of environment and sustainability 4.2. participate constructively in decision-making consistent with principles of sustainable development.

NOTES ON TLOs

The TLOs are structured to be consistent with the AQF categories of knowledge, skills and application, and are designed to be interpreted in the context of the nature and extent of the field of Environment and Sustainability, as described above. These notes provide explanations of key terms used in the TLOs in order to help stakeholders understand the meaning and intent of the TLOs.

TLO 1

Broad and coherent knowledge: *Broad and coherent knowledge* in the Environment and Sustainability field implies transdisciplinary knowledge of key environment and sustainability issues and an appreciation of different frameworks for exploring those issues (see TLO 2.2).

Broad and coherent [bachelor]: describes a general or extensive area of knowledge that is logically ordered and sound.

Advanced theoretical and technical [bachelor honours degree, graduate certificate and graduate diploma]: describes knowledge developed beyond the attainment of the bachelor level.

Advanced and integrated [masters (coursework)]: describes synthesised knowledge developed beyond the attainment of the bachelor level.

TLO 1.1

Environments: *Environment* can be defined in varied ways across the natural and social sciences and the humanities in order to bring focus or emphasis to particular aspects of environment and sustainability.

Scales: An appreciation of relevant *scales*, including spatial, temporal, geographic and organisational scales, and the role of cross-scale interactions, is important for understanding environment and sustainability concepts, principles and issues.

Interdependencies: Relationships between human societies and environments is a central concern, as noted in 'The scope of the field'. One common example is that of understanding human societies as wholly dependent on natural systems. Indigenous understandings can in contrast emphasise reciprocity, as expressed in the concept of 'caring for country'.

Sustainability: Sustainability refers to the capacity of particular environments and the earth system as a whole to support human societies. Social justice is implicit in the concept of sustainability.

TLO 1.2

Key environmental and sustainability challenges: Key content areas for programs in Environment and Sustainability include challenges such as climate change, waste, energy use, biodiversity loss and resource overuse.

TLO 1.3

Holistic systems thinking: *Holistic systems thinking* is about understanding complex wholes, including by understanding internal relationships amongst elements of a system, and external relationships between a system and its context. *Systems thinking* is inclusive of but extends reductionist thinking, which separates and seeks to understand discrete aspects of a particular issue.

Complexity: Complex systems are characterised by non-linear change, uncertainty, and the potential to evolve. Complex environmental and sustainability challenges are further characterised by contestation amongst stakeholders.

TLO 2

Coherent and advanced [bachelor honours degree]: describes an understanding that is logically ordered and sound, and developed beyond the attainment of the bachelor level.

Specialised [graduate certificate]: describes depth and specificity of comprehension.

Advanced [graduate diploma]: describes understanding developed beyond the attainment of the bachelor level.

Advanced and integrated [masters (coursework)]: describes synthesised understanding that is developed beyond the attainment of the bachelor level.

TLO 2.1

Transdisciplinarity: *Transdisciplinary approaches* are suitable for complex problems whose full understanding lies beyond individual disciplines. Transdisciplinary research develops new insights which synthesise a range of relevant disciplinary understandings; in this way, transdisciplinary approaches differ from single-, cross-, multi- and interdisciplinary approaches. Bounded transdisciplinarity describes inquiry limited to scholarly disciplines, whereas open transdisciplinarity may also draw on other types of knowledge including Indigenous, expert, lay and local knowledge.

TLO 2.2

Frameworks for knowing: There are different ways of knowing across disciplines and beyond disciplines including Indigenous, expert, lay and local knowledge. Knowing about the varied ways in which environment and sustainability is understood, and how this varied knowledge is generated and used and its limitations, is critical to transdisciplinary approaches. For example, scholarly, cultural, expert practitioner, lay and Indigenous knowledge can all contribute diverse perspectives on environment and sustainability issues. An awareness of their differences and their value is critical for synthesising new insights into environment and sustainability issues.

TLO 2.3

Values, knowledge, ethical positions and interests:

Interactions between human societies and their environments are strongly influenced by *values, knowledge, ethical positions and interests*. An awareness of one's own worldview, and the worldviews of others, is critical to understanding diverse concepts and approaches associated with environment and sustainability.

TLO 2.4

The particular values, knowledge, ethical positions and interests of Indigenous peoples:

The particular values, knowledge, ethical positions and interests of Indigenous peoples are a significant area of required understanding because of the connections to, and understandings of, land and environments that are unique to Aboriginal, Torres Strait Islander and other Indigenous peoples internationally. The expertise of Indigenous peoples and their obligation to care for country is also unique. Engaging effectively requires attention to continuing unequal power relationships between Indigenous peoples and others.

TLO 3

Advanced [graduate certificate and graduate diploma]: describes cognitive, technical and communication skills developed beyond the bachelor level.

Expert and specialised [masters (coursework)]: describes cognitive, technical and communication skills in a body of knowledge or practice to independently and critically engage with and communicate information, problems, concepts and theories.

TLO 3.1

Research: *Research* is used broadly to include identifying and defining problems through to responding to them appropriately, and can be applicable to scholarship and/or professional practice as appropriate.

Diverse sources: This can include knowledge and (qualitative and quantitative) evidence originating in diverse disciplines as well as other types of knowledge (e.g. Indigenous, expert, lay and local) as appropriate.

TLO 3.2

Thinking critically and creatively: *Thinking critically* includes the ability to analyse, to integrate, and to problem solve. *Thinking creatively* is important towards developing novel solutions to current environment and sustainability challenges and to be able to respond to highly uncertain and changeable futures.

Designing and evaluating sustainable alternatives: *Designing and evaluating sustainable alternatives* links the creative thinking to options for decision-making through the ability to investigate future consequences of a range of decisions taken in the present.

Envisioning sustainable futures: *Envisioning* is a higher order attribute that draws on creativity to strategically explore and reflect on a range of plausible futures. Approaches include future visioning, scenario building and modelling.

TLO 3.3

Tools, methods, skills and theoretical knowledge: Each of these will vary according to the focus and emphases of individual programs. *Tools* may include hardware such as field and/or laboratory equipment, software (e.g. geographic information systems) or legislation. *Methods* may include water and air sampling techniques, community engagement strategies, risk analysis, supply chain analysis, participatory decision-making, community engagement, scenario planning, statistical analysis, adaptive management, environmental impact assessment and cost-benefit analysis. *Skills* may include fieldwork, monitoring, facilitation, project management, strategic planning, information management, time management, workplace etiquette and policy analysis.

TLO 3.4

Working independently and collaboratively: Graduates are able to work both autonomously and with others, as appropriate.

TLO 3.5

Diverse groups in various contexts: Graduates need appropriate skills to communicate about complex environmental information with a wide range of *diverse groups* such as the general public, decision-makers, and Indigenous people. Graduates will be expected to be able to communicate in *various contexts*, such as small group meetings, community consultation processes, and briefings for decision-makers.

Written, oral and visual means: Ability to use appropriate *written, oral and visual* communication forms and tools for specific audiences is important when communicating complex environmental and sustainability information, knowledge and ideas. Written communication forms can be traditional (including reports, essays, literature reviews, media releases and speeches) or digital media forms of writing (including blog posts and tweets). Oral communication forms can include individual and group presentations and viva exams. Visual communication forms can include maps, plans and process diagrams.

TLO 3.6

Engaging with Indigenous approaches: Graduates from Australian tertiary Environment and Sustainability programs are likely to find themselves working closely with Aboriginal, Torres Strait Islander and other Indigenous people internationally, and will need to develop the capacity to work effectively in partnership. Being able to support authentic Indigenous participation in decision-making requires graduates to have sufficient cultural awareness and knowledge of appropriate approaches.

TLO 4.1

Reflect on and direct learning and practice: Graduates will be able to *reflect on* their own learning and practice, and *direct* their own lifelong learning, including being able to know where to access appropriate information and support. This is especially important for Environment and Sustainability graduates in a world characterised by growing rates of change, requiring continually evolving skills and expertise.

TLO 4.2

Principles of sustainable development: The 1992 *Rio Declaration on Environment and Development*, endorsed by United Nations member states, articulates broadly accepted and long-established principles of sustainable development, including the precautionary principle, intra- and intergenerational equity, and public participation in decision-making. These principles are also reemphasised by the Australian *National Strategy for Ecologically Sustainable Development* endorsed by the Council of Australian Governments. Principles of sustainable development continue to evolve in terms of their scope and how they are enacted (e.g. in 1996, the *Bellagio Principles* were designed to guide assessment of progress towards sustainable development and were endorsed by a broad, international group of stakeholders). Another key expression of sustainable development principles is found in the *Sustainable Development Goals*, which are being finalised (at the time of publication of this document) through a United Nations process that began formally at the 2012 United Nations Conference on Sustainable Development (Rio +20).



APPENDICES

APPENDIX 1

ALIGNMENT OF THE TLOS WITH OTHER SIGNIFICANT NATIONAL AND INTERNATIONAL BENCHMARKS

The TLOs presented in this statement align with national and international best practice in minimum standards for higher education. The table below demonstrates consistency between the Environment and Sustainability TLOs for bachelor degrees with: (i) the Australian Qualifications Framework (Level 7); (ii) the UK's Framework for Higher Education Qualifications; and (iii) the European Union's Dublin Descriptors. Given the emphasis on higher order learning in this field (see Learning and Teaching for Environment and Sustainability), the TLOs have also been aligned with: (iv) the revised Bloom's Taxonomy²⁵; and (v) Delors' 'Four Pillars of Education'.²⁶

Bachelor degree TLOs for Environment and Sustainability	Australian Qualifications Framework (Level 7)	Framework for Higher Education Qualifications (UK)	Dublin Descriptors (EU)	Revised Bloom's Taxonomy	Delors' Four Pillars of Education
1. Demonstrate broad and coherent knowledge of:	Graduates of a bachelor degree will have:	Bachelor's degrees with honours are awarded to students who have demonstrated:	Qualifications that signify completion of the first cycle are awarded to students who:		
1.1. environments at various scales, interdependencies between human societies and environments, and sustainability	<ul style="list-style-type: none"> a broad and coherent body of knowledge, with depth in the underlying principles and concepts in one or more disciplines as a basis for independent lifelong learning. 	<ul style="list-style-type: none"> a systematic understanding of key aspects of their field of study, including acquisition of coherent and detailed knowledge, at least some of which is at, or informed by, the forefront of defined aspects of a discipline. 	<ul style="list-style-type: none"> have demonstrated knowledge and understanding in a field of study that builds upon and their general secondary education, and is typically at a level that, whilst supported by advanced textbooks, includes some aspects that will be informed by knowledge of the forefront of their field of study. 	Remember.	Learning to know.
1.2. key environmental and sustainability challenges and their drivers					Learning to know.
1.3. holistic systems thinking and complexity.					Learning to know.

²⁵ LW Anderson, DR Krathwohl, *A Taxonomy for Learning, Teaching and Assessing: a Revision of Bloom's Taxonomy*, Longman Publishing, New York, 2001.

²⁶ J Delors et al., *Learning: The treasure within. Report to UNESCO of the International Commission on Education for the Twenty-First Century [The Delors Report]*, UNESCO, Paris, 1996.

APPENDIX 1 ALIGNMENT OF THE TLOS WITH OTHER SIGNIFICANT NATIONAL AND INTERNATIONAL BENCHMARKS

Bachelor degree TLOs for Environment and Sustainability	Australian Qualifications Framework (Level 7)	Framework for Higher Education Qualifications (UK)	Dublin Descriptors (EU)	Revised Bloom's Taxonomy	Delors' Four Pillars of Education
2. Demonstrate understanding of diverse approaches to environment and sustainability, including:	Graduates of a bachelor degree will have:	Bachelor's degrees with honours are awarded to students who have demonstrated:			
2.1. disciplinary and transdisciplinary approaches to identifying and conceptualising environmental and sustainability challenges	<ul style="list-style-type: none"> cognitive and technical skills to demonstrate a broad understanding of knowledge with depth in some areas. 	<ul style="list-style-type: none"> conceptual understanding that enables the student to devise and sustain arguments, and/or to solve problems, using ideas and techniques, some of which are at the forefront of a discipline. 	-	Understand.	Learning to know.
2.2. different frameworks for knowing		<ul style="list-style-type: none"> an appreciation of the uncertainty, ambiguity and limits of knowledge. 			Learning to know. Learning to live together.
2.3. their own and others' values, knowledge, ethical positions and interests	-	<ul style="list-style-type: none"> conceptual understanding that enables the student to describe and comment upon particular aspects of current research, or equivalent advanced scholarship, in the discipline. 			Learning to know. Learning to live together.
2.4. the particular values, knowledge, ethical positions and interests of Indigenous peoples.		-			Learning to know. Learning to live together.

APPENDIX 1 ALIGNMENT OF THE TLOS WITH OTHER SIGNIFICANT NATIONAL AND INTERNATIONAL BENCHMARKS

Bachelor degree TLOs for Environment and Sustainability	Australian Qualifications Framework (Level 7)	Framework for Higher Education Qualifications (UK)	Dublin Descriptors (EU)	Revised Bloom's Taxonomy	Delors' Four Pillars of Education
3. Demonstrate well-developed cognitive, technical and communication skills through:	Graduates of a bachelor degree will have:	Typically, holders of the qualification will be able to:	Qualifications that signify completion of the first cycle are awarded to students who:		
3.1. addressing research questions by identifying, synthesising and applying appropriate knowledge and evidence from diverse sources	<ul style="list-style-type: none"> cognitive skills to review critically, analyse, consolidate and synthesise knowledge 	<ul style="list-style-type: none"> deploy accurately established techniques of analysis and enquiry within a discipline 	<ul style="list-style-type: none"> have the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues 	Analyse.	Learning to do.
3.2. thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures	<ul style="list-style-type: none"> cognitive and creative skills to exercise critical thinking and judgement in identifying and solving problems with intellectual independence to adapt knowledge and skills in diverse contexts 	<ul style="list-style-type: none"> critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), to make judgements, and to frame appropriate questions to achieve a solution – or identify a range of solutions – to a problem 	<ul style="list-style-type: none"> can apply their knowledge and understanding in a manner that indicates a professional approach to their work or vocation, and have competences typically demonstrated through devising and sustaining arguments and solving problems within their field of study 	Evaluate. Create.	Learning to do.
3.3. applying tools, methods, skills and theoretical knowledge for environment and sustainability practice	<ul style="list-style-type: none"> cognitive and technical skills to demonstrate a broad understanding of knowledge with depth in some areas 	<ul style="list-style-type: none"> apply the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding, and to initiate and carry out projects 	-	Apply.	Learning to do.

APPENDIX 1 ALIGNMENT OF THE TLOS WITH OTHER SIGNIFICANT NATIONAL AND INTERNATIONAL BENCHMARKS

Bachelor degree TLOs for Environment and Sustainability	Australian Qualifications Framework (Level 7)	Framework for Higher Education Qualifications (UK)	Dublin Descriptors (EU)	Revised Bloom's Taxonomy	Delors' Four Pillars of Education
3.4. working both independently and collaboratively	<ul style="list-style-type: none"> cognitive and creative skills to exercise critical thinking ... with intellectual independence 	<ul style="list-style-type: none"> manage their own learning, and to make use of scholarly reviews and primary sources (for example, refereed research articles and/ or original materials appropriate to the discipline). 	-	Apply.	Learning to do. Learning to be.
3.5. communicating with diverse groups in various contexts using a range of written, oral and visual means	<ul style="list-style-type: none"> communication skills to present a clear, coherent and independent exposition of knowledge and ideas. 	<ul style="list-style-type: none"> communicate information, ideas, problems and solutions to both specialist and non-specialist audiences. 	<ul style="list-style-type: none"> can communicate information, ideas, problems and solutions to both specialist and non-specialist audiences. 	Apply.	Learning to do. Learning to live together.
3.6. engaging with Indigenous approaches to environmental and sustainability challenges.	-	-	-	Apply.	Learning to do. Learning to live together.

APPENDIX 1 ALIGNMENT OF THE TLOS WITH OTHER SIGNIFICANT NATIONAL AND INTERNATIONAL BENCHMARKS

Bachelor degree TLOs for Environment and Sustainability	Australian Qualifications Framework (Level 7)	Framework for Higher Education Qualifications (UK)	Dublin Descriptors (EU)	Revised Bloom's Taxonomy	Delors' Four Pillars of Education
4. Demonstrate ethical professional, public and personal conduct by having capacity to:	Graduates of a bachelor degree will demonstrate the application of knowledge and skills:	Bachelor's degrees with honours are awarded to students who have:	Qualifications that signify completion of the first cycle are awarded to students who:		
4.1. reflect on and direct their own learning and practice in the context of environment and sustainability	<ul style="list-style-type: none"> with responsibility and accountability for own learning and professional practice and in collaboration with others within broad parameters ... as a basis for independent lifelong learning 	<ul style="list-style-type: none"> the qualities and transferable skills necessary for employment requiring: <ul style="list-style-type: none"> the exercise of initiative and personal responsibility the learning ability needed to undertake appropriate further training of a professional or equivalent nature. 	<ul style="list-style-type: none"> have developed those learning skills that are necessary for them to continue to undertake further study with a high degree of autonomy. 	Apply. Evaluate.	Learning to be.
4.2. participate constructively in decision-making consistent with principles of sustainable development.	<ul style="list-style-type: none"> with initiative and judgement in planning, problem-solving and decision-making in professional practice and/or scholarship. 	<ul style="list-style-type: none"> the qualities and transferable skills necessary for employment requiring decision-making in complex and unpredictable contexts. 	-	Apply.	Learning to be. Learning to live together.

APPENDIX 2

COMPLEMENTARY DISCIPLINARY STANDARDS: SCIENCE AS AN EXAMPLE

Environment and Sustainability is a broad field that spans the humanities, social sciences and natural sciences. As such, there are many instances where tertiary qualifications will span both the Environment and Sustainability field and another discipline for which learning and teaching academic standards have been developed. For joint programs, double degrees and double majors, other disciplinary standards will complement this statement and student learning will be informed by both.

One of the most common cases of complementarity will be with the Science disciplinary standards²⁷; for example, for qualifications in environmental science. Other examples include (but are not limited to) environmental engineering, environmental law and environmental accounting, for which disciplinary TLOs for Engineering, Law and Accounting (respectively) will complement the standards specified through the TLOs for Environment and Sustainability.

The table to the right compares the bachelor TLOs for Environment and Sustainability with those for Science, and notes the extent of overlap across TLOs: significant, partial or none. Many TLOs have very similar intent and thus demonstrate substantial overlap. Other TLOs have some content or concepts in common and demonstrate partial overlap. However, both sets of TLOs also provide for distinct disciplinary learning, and for some TLOs there is little or no overlap.

²⁷ S Jones, B Yates, J-A Kelder, *Science – Learning and Teaching Academic Standards Statement*, Australian Learning and Teaching Council, Sydney, 2011.

COMPARISON OF DISCIPLINARY STANDARDS FOR ENVIRONMENT AND SUSTAINABILITY WITH SCIENCE		
ENVIRONMENT AND SUSTAINABILITY TLO	SCIENCE TLO	OVERLAP
1.1 Demonstrate a broad and coherent knowledge of environments at various scales, interdependencies between human societies and environments, and sustainability.	1.2 Demonstrate a coherent understanding of science by explaining the role and relevance of science in society.	partial
1.2 Demonstrate a broad and coherent knowledge of key environmental and sustainability challenges and their drivers.	—	none
1.3 Demonstrate a broad and coherent knowledge of holistic systems thinking and complexity.	—	none
2.1 Demonstrate an understanding of diverse approaches to environment and sustainability, including disciplinary and transdisciplinary approaches to identifying and conceptualising environmental and sustainability challenges.	2.1 Exhibit depth and breadth of scientific knowledge by demonstrating well-developed knowledge in at least one disciplinary area. 2.2 Exhibit depth and breadth of scientific knowledge by demonstrating knowledge in at least one other disciplinary area.	partial
2.2 Demonstrate an understanding of diverse approaches to environment and sustainability, including different frameworks for knowing.	1.1 Demonstrate a coherent understanding of science by articulating the methods of science and explaining why current scientific knowledge is both contestable and testable by further inquiry.	partial
2.3 Demonstrate an understanding of diverse approaches to environment and sustainability, including their own and others' values, knowledge, ethical positions and interests.	—	none
2.4 Demonstrate understanding of diverse approaches to environment and sustainability, including the particular values, knowledge, ethical positions and interests of indigenous peoples.	—	none
3.1 Demonstrate well-developed cognitive, technical and communication skills through addressing research questions by identifying, synthesising and applying appropriate knowledge and evidence from diverse sources.	3.1. Critically analyse and solve scientific problems by gathering, synthesising and critically evaluating information from a range of sources.	significant

APPENDIX 2 COMPLEMENTARY DISCIPLINARY STANDARDS: SCIENCE AS AN EXAMPLE

COMPARISON OF DISCIPLINARY STANDARDS FOR ENVIRONMENT AND SUSTAINABILITY WITH SCIENCE		
ENVIRONMENT AND SUSTAINABILITY TLO	SCIENCE TLO	OVERLAP
3.2 Demonstrate well-developed cognitive, technical and communication skills through thinking critically and creatively in designing and evaluating sustainable alternatives and envisioning sustainable futures.	3.2 Critically analyse and solve scientific problems by designing and planning an investigation.	partial
3.3 Demonstrate well-developed cognitive, technical and communication skills through applying tools, methods, skills and theoretical knowledge for environment and sustainability practice.	3.3 Critically analyse and solve scientific problems by selecting and applying practical and/or theoretical techniques or tools in order to conduct an investigation. 5.1 Be accountable for their own learning and scientific work by being independent and self-directed learners. 5.3 Be accountable for their own learning and scientific work by demonstrating knowledge of the regulatory frameworks relevant to their disciplinary area and personally practising ethical conduct.	significant
3.4 Demonstrate well-developed cognitive, technical and communication skills through working both independently and collaboratively.	5.1. Be accountable for their own learning and scientific work by being independent and self-directed learners. 5.2 Be accountable for their own learning and scientific work by working effectively, responsibly and safely in an individual or team context.	significant
3.5 Demonstrate well-developed cognitive, technical and communication skills through communicating with diverse groups in various contexts using a range of written, oral and visual means.	4.1. Be effective communicators of science by communicating scientific results, information, or arguments, to a range of audiences, for a range of purposes, and using a variety of modes.	significant
3.6 Demonstrate well-developed cognitive, technical and communication skills through engaging with Indigenous approaches to environmental and sustainability challenges.	—	none

APPENDIX 2
 COMPLEMENTARY DISCIPLINARY STANDARDS: SCIENCE AS AN EXAMPLE

COMPARISON OF DISCIPLINARY STANDARDS FOR ENVIRONMENT AND SUSTAINABILITY WITH SCIENCE		
ENVIRONMENT AND SUSTAINABILITY TLO	SCIENCE TLO	OVERLAP
4.1 Demonstrate ethical professional, public and personal conduct by having the capacity to reflect on and direct their own learning and practice in the context of environment and sustainability.	5.1. Be accountable for their own learning and scientific work by being independent and self-directed learners. 5.2 Be accountable for their own learning and scientific work by working effectively, responsibly and safely in an individual or team context.	partial
4.2 Demonstrate ethical professional, public and personal conduct by having the capacity to participate constructively in decision-making consistent with principles of sustainable development.	5.1. Be accountable for their own learning and scientific work by being independent and self-directed learners. 5.3 Be accountable for their own learning and scientific work by demonstrating knowledge of the regulatory frameworks relevant to their disciplinary area and personally practising ethical conduct.	partial
—	3.4. Critically analyse and solve scientific problems by collecting, accurately recording, interpreting and drawing conclusions from scientific data.	none

Learning and Teaching Academic Standards Statement website:
environmentltas.gradschool.edu.au



AUSTRALIAN
COUNCIL OF
ENVIRONMENTAL
DEANS AND
DIRECTORS