

# Postgraduate Education *for Sustainability at* Lincoln University, New Zealand

Anne Spicer  
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Land Environment & People



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## Forward

The invitation and opportunity to review this publication raised for me a number of general concerns about the role of universities, in developing Education for Sustainability in New Zealand. Internationally, many governments, businesses, tertiary institutions and informed citizens (including current and future university students) are either increasingly aware, or re-engaging with the realities, of the environmental, social and economic problems humanity now faces due to ongoing unsustainable practices. Understanding how to implement solutions will be the defining challenge for all generations over the next few decades. However, as we approach the end of the United Nations Decade of Education for Sustainable Development it appears that initial progress has slowed and far too many tertiary graduates still lack an urgently needed understanding of the connectedness of social, economic and environmental pressures. Furthermore, most are ill-equipped to cope with predicted twenty-first century issues. So how can universities better assist in developing Education for Sustainability in New Zealand?

Firstly, because New Zealand has politically re-embraced the word 'sustainability' there is an ideal opportunity for universities, with their independent academic freedom, to show leadership by including sustainability as a core learning concept. Therefore, all learning courses should explore the fundamental environmental, social and economic impacts of both current and future processes predicted for professional, technical and service work and personal lifestyles.

Secondly, we all need to remind ourselves of Einstein's quote "problems cannot be solved by the same level of thinking that created them" and as mentors of learners be challenged and encouraged to provide different, inter-linked and future-focused learning opportunities that also include appropriate personal action learning. Therefore, curricula committees need to ensure that all students have access to, and are encouraged (if not required) to engage with, sustainability concepts that have relevance to both their chosen focus of learning and the interconnectedness of that focus with the wider world.

Thirdly, all lecturers should be challenged to find ways to enable their students to be better equipped for adult entry into a society facing sustainability challenges. Therefore, courses need to include personal action components that help build resilience and confidence in seeking adaptations to rapidly changing situations within increasingly complex social, environmental, economic and cultural interactions within New Zealand society. There are many ways these opportunities could be encouraged, including cross-disciplinary research projects, especially for postgraduate learners.

We all, mindful of our role as educators, need to work together to ensure learning opportunities help motivate young people to remain positive and future-focused in their learning, knowing they face complex national and global environmental, social and economic issues that are projected to negatively impact their lives. We will need their enthusiasm, expanding knowledge and creative skills as we all seek to manage multiple issues looming both locally and globally.

This is a report that should be read by all academic and general staff in the New Zealand tertiary sector to see how they can consolidate or improve their own contributions to Education for Sustainability.

Meanwhile, I look forward to seeing Lincoln University make further and rapid transitions to become an acknowledged leader in tertiary learning for a more sustainable future.

*Pam Williams*

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Consultant & Researcher

Education for Sustainability

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## Chapter 1 Introduction

Sustainability is an inexact and contested term: – Jacobs (1999) places it in the same category as ‘social justice’ and ‘liberty’ i.e. concepts that are elusive but nonetheless vital to political functioning. Despite the drawbacks of the term, sustainability is part of our everyday language. Research in this area, for instance, is increasing (Schoolman *et al.*, 2012) and so are employment opportunities (Atkisson 2011; Sainty, 2007). This provides tertiary institutions with some interesting questions. How can they include sustainability in the curriculum given that there are multiple ways of assessing its meaning and importance, and given that the topic is highly interdisciplinary and that it involves a different world view (i.e. a network, systems approach) from currently dominant views (e.g. an individualistic approach)?

This report looks at the options for teaching sustainability at the postgraduate level at Lincoln University, New Zealand. It may be helpful to read this report in conjunction with LEaP Report 25 (Spicer *et al.* 2011) which considered the options for including Education for Sustainability in the undergraduate curriculum of the same University. However all material relevant to an Education *for* Sustainability at the postgraduate level that is common to both reports has been reproduced here.

This report is well-timed given that the year 2012 is the 40<sup>th</sup> anniversary of the first United Nations Earth Summit and is the 25<sup>th</sup> anniversary of the publication of the Brundtland Report. We are also approaching the end of the U.N. Decade of Education for Sustainable Development (2005-2014). The report will usefully inform thinking about the future directions of Lincoln's postgraduate programmes. The characteristics of a full postgraduate programme of Education *for* Sustainability identified here provide a clear benchmark from which Lincoln University can consider relevant programmes. One such relevant programme is the MRS, which is currently under review. This report's findings aim to inform that review. At the time of printing, the review is still in progress but early indications from the initial phase are that two courses in particular should be modified to incorporate more sustainability content.

The report does not present a blueprint for Education *for* Sustainability at Lincoln University at the postgraduate level but rather aims to explore the options for achieving this and offers suggestions for ways forward.

The report is based on a two month study, funded by Solid Energy, and is limited to Masters programmes and courses. As with the previous study, this report may not cover every facet of this complex issue or include all courses/programmes available at the surveyed universities. However, every effort has been made to capture the main relevant issues/programmes/courses and provide a useful resource to inform decision makers, students and staff at Lincoln University.

The first chapter of the report looks at sustainability in the literature. The second chapter reviews the Education *for* Sustainability literature and concludes with a list of topics identified as necessary for a complete curricula of Education *for* Sustainability for a post-graduate programme. The third chapter contains the results of a survey that was undertaken of Masters level programmes and courses that are currently available at Lincoln University, other New Zealand universities and in selected Australian Universities. The report concludes with opportunities that have been identified for Lincoln University, as a result of the survey, and makes recommendations for ways in which the University could “contribute to ensuring a sustainable environmental, social and economic future for New Zealand” (LU, 2009, p.3).



## Chapter 2

### Sustainability in the Literature

#### 2.1 Sustainability

Sustainability is a contested, multifaceted term that includes environmental, social and economic aspects but which is, fundamentally, an issue of human behaviour. Spicer *et al.* (2011, p.2) see it as “a holistic, integrative concept concerned primarily with the creation of a society that will be able to stay indefinitely within environmental limits” The authors do not, however, suggest how environmental limits should be defined and do not comment on factors such as technology that are influential in this regard.

Other authors see the components of sustainability in terms of ‘capital’. That is that sustainability is composed of environmental, social and economic capitals (Pearce and Atkinson, 1992; Goodland, 1996) or having environmental, social and economic aspects.

Jacobs (1999) reviewed the many definitions and visions of sustainability and concluded that there are core ideas that are common to most points of view:

- The need to integrate the economy and the environment
- Concern about the impact of current activity on future and current generations
- A commitment to reducing environmental degradation
- Quality of life – which is dependent on more than income growth
- The political involvement of all stakeholders in society

Spicer *et al.* (2011) have taken this a step further by listing the topics that are described in the literature as contributing to sustainability. A comparison of this list of topics with Jacob’s ‘core ideas’ shows that both are in broad agreement although, as can be seen in Table 1 below, Spicer *et al.*, (2011) do not specify the nature of the involvement of stakeholders or governments and Jacobs (1999) does not specifically mention the need for environmental limits.

**Table 1**  
**A comparison of the ‘Core ideas of sustainability’**

Core Ideas of Sustainability Literature (Jacobs, 1999)	Topics Relevant to Education for Sustainability (Spicer <i>et al.</i> , 2011, p. 15, Table 5)
Integration of the economy and the environment	Trade-offs <sup>1</sup> between environment and society Integrating human aspirations and social imperatives with ecological limits
Concern about inter and intra generational equity	Generational, gender, geographic and other perspectives; pluralism, equity
Commitment to reducing environmental degradation	Living within limits e.g. emphasis on total degradation reduction rather than on per unit reductions in resource use and/or pollution
Quality of life	Human wellbeing and how to measure it
Political involvement of all stakeholders	Not specifically covered in Spicer <i>et al.</i>

<sup>1</sup> Buhrs (2009) suggests that tradeoffs are ‘counterproductive’ and that integration of these two facets of sustainability is the most appropriate path. Consequently “tradeoffs between environment and society” should be changed to “integration” of these same factors.

Cultural sustainability has begun to be treated in the literature as a separate “composite pillar” of sustainability of equal standing to environmental, social and economic factors. It is a term introduced by Hawkes (2001) who suggests that (p. 38) “cultural vitality has to be treated as one of the basic requirements [of a healthy society]” since “shared meaning and purpose is a basic determinant of social existence”.

Sustainability remains a widely investigated topic based largely in the environmental sciences area. A search of the Science Citation and the Social Sciences Citation Indices using the keyword ‘sustainability’ showed that more papers (3428) were published on this topic in 2011 than for each of the years 1990-2010. Further, the topic mix of papers in 2011 remains the same as previous years with most publications being in the Environmental Sciences/Ecology subject area (see Table 2). A similar search on the Scopus citation database (Schoolman *et al.*, 2012) showed the same result for the period 1996-2009 i.e. 1230 sustainability publications were produced per year with the majority being in the environmental area. However Schoolman *et al.* (2012) also found that sustainability research is becoming more interdisciplinary and that (p. 80) “this trend cannot be explained by trends in scientific research as a whole”. Economics and social science research, the authors found, are the most likely areas to include all three (environmental, social and economic) pillars of sustainability but economics is also the subject area with the lowest number of sustainability-related papers published. Environmentally-based papers are published more frequently but they are least likely to include social and/or economic factors.

**Table 2**  
**The Subject Areas of Sustainability Papers Published Since 1990**

Subject Area	% of Total Published 1990-2010 N= 24344 (1217/year)*	% of Total Published 2011 N= 3428**
Environmental Sciences Ecology	31	28
Agriculture	15	11
Engineering	13	15
Business Economics	12	13
Water Resources	5	5
Public Administration	5	4
Geography	4	3
Energy Fuels	4	6
Other	6	7

\*adapted from Schoolman *et al.*, 2012

\*\*author’s search of the Science Citation and the Social Sciences Citation Indices using the keyword ‘sustainability’

While the subject matter hasn’t changed over the period 1990 to 2011 (as shown in Table 2 above the subject matter is still predominantly environmental) an area that has changed is that of sustainability indicators. A search of the Science Citation and the Social Sciences Citation Indexes showed that there were 20 papers per year which included the term ‘sustainability indicators’ over the period 1990 to 2010 but 42 produced in the year 2011 alone. This may be the result of an increase in the level of research into applying sustainability to specific situations or industries (e.g. Page, 2011; Davidson, 2011; Stamford and Azapagic, 2011) and could imply an acceptance of the implementation of sustainability (rather than contesting its relevance).

## 2.2 Education for Sustainability Literature

Wiek *et al.* (2011), in the U.S.A. undertook a review of the literature to determine the key competencies that graduating sustainability students should possess for research and problem

solving. Their findings are reproduced in Table 3 below and are compared with the topics that Spicer *et al.*, (2011) determined were important for a complete curriculum of Education for Sustainability.

**Table 3**  
**Comparison of Key Competencies for Graduates of an Education for Sustainability**

Competence	Concepts (abbreviated from Wiek <i>et al.</i> , 2011))	Equivalent concept in Spicer <i>et al</i> (2011, Table 5)
<b>Systems thinking</b>	Indicators	Sustainability indicators
	Feedback loops, resilience, adaptation	Systems thinking
	Multiple scales local to global	Systems thinking
	Coupled domains, society, environment, economy, technology	Trade-offs between environment and Society Integrating human aspirations and social imperatives with environmental limits
	People and social systems: values, preferences, needs, politics, institutions	Values, norms and attitude clarification The meaning of social sustainability
<b>Anticipatory competence</b>	Concept of time	Generational, gender, geographic and other perspectives
	Uncertainty, desirability of future states	Pluralism of views of sustainability and its solutions
	Path dependence, non-intervention consequences	Unsustainability drivers Consequences of Unsustainability
	Plausibility of future developments	Lifestyle and business changes required
	Risk, intergenerational equity	Generational, gender, geographic and other perspectives
<b>Normative competence</b>	Unsustainability	Unsustainability drivers
	Sustainability principles, goals, targets	Ecosystem services Allocation of resources Living within limits Methods and tools for sustainability
	Justice, fairness, happiness	Human values and aspirations Human wellbeing and how to measure it Generational, gender, geographic and other perspectives
	Risk, harm, damage	Human dependence on nature Human and nature interactions
	Reinforcing gains and trade-offs	Trade-offs between environment and Society
	Ethical concepts	Pluralism of views Human values and aspirations Generational, gender, geographic and other perspectives
<b>Strategic competence</b>	Intentionality	Solutions to unsustainability
	Transitions and transformation	Partnerships between business, community, NGOs etc.
	Transformative governance	Relevant current laws Social/political institutions
	Success factors	Sustainability indicators
	Adaptation and mitigation	Solutions to unsustainability
	Obstacles, resistance	Solutions to unsustainability Change management
	Instrumentation and alliances	Solutions to unsustainability Partnerships between business, community, NGOs etc.
Social learning	Pluralism of views	

	Social movements	Partnerships between business, community, NGOs etc.
<b>Interpersonal competence</b>	Collaboration Team functioning Concepts of leadership Cooperation and empathy Ethnocentrism	None of these are covered in the sustainability topics but they may be covered in the graduate profile

As can be seen from Table 3 above the key competencies of sustainability as determined by Wiek *et al.* (2011) are all included in the sustainability topics as specified in Spicer *et al.*, (2011). A comparison of the two lists, however, shows that in some categories the emphasis is different. In particular, there is less emphasis in Spicer *et al.* on resilience, adaptation and mitigation than in the key competencies determined by Wiek *et al.* One author sees resilience as offering “new energy and direction in the sustainability debate” (Sterling, 2010, p. 511) and others suggest that this “rapidly expanding area of scholarship” (Krasny *et al.*, 2010, p. 666) complements sustainability since it places emphasis on “adaptive capacity in resilient socio-ecological systems” as a way of dealing with change (Lundholm and Plummer, 2010, p. 476). Other areas that may be underemphasised by Spicer *et al.* include social learning, the role of institutions and transformative governance. These are all areas that could usefully contribute to a list of topics for a complete curriculum of education for sustainability. However, in general terms the two analyses are in agreement.

An historical area of concern that appears to be missing from these topics is the lack of progress over the last 40 years with regard to sustainable and equitable use of nature and the environment. For example the preambles to the earth summits of 1972, 1992, 2002 and 2012 are all very similar<sup>2</sup>. The same problems exist and workable solutions are not currently in place. The reasons for the lack of progress have yet to be agreed upon but there are projects underway that are investigating this<sup>3</sup> and their results would make a vital contribution to a curriculum of Education *for* Sustainability. This subject was not included by either Wiek *et al.* (2011) or Spicer *et al.* (2011) in their lists of topics for a complete curriculum of Education *for* Sustainability.

Several articles in the recent education for sustainability literature have focused on including sustainability in the curriculum of specific disciplines. These include the following:

- Borin and Metcalf (2010) have looked at including sustainability in a marketing curriculum and offer a body of materials that examiners could use to “retool” marketing courses so that they include a focus on sustainability.
- Hazelton and Haig (2010) describe two projects that aimed to include sustainability in an accounting curriculum at a postgraduate level. The paper describes the difficulties and successes that the authors encountered in implementing the projects and they conclude that “efforts to create permanent curriculum change were hampered by the predominantly vocational orientation of student cohorts” (p. 159) and that “engaged students are the exception” (p. 174).
- Frank *et al.* (2011), question why chemistry is taught as a purely logical, “intellectual” subject without (p. 8482) “the philosophy of empathy” which encourages students to think of “human needs and dreams”. The authors describe a course in applied ethics for chemistry.
- Von der Heide and Lamberton (2011) describe the problems encountered in introducing sustainability into a business studies curriculum. In particular they describe the tension between (p. 670) a business school as a “socialising agency for the intelligentsia of advanced capitalist societies” versus the need of sustainability to “critique the dominant capitalist paradigm and consider its alternatives”.

<sup>2</sup> See: <http://www.earthsummit2012.org/beta/background>

<sup>3</sup> See for example: <http://www.worldwatch.org/node/6096>



- Plumridge (2010) points out that the field of economics has many tools and concepts that could usefully be applied in the area of sustainability, for example he shows how cost/benefit analyses, the flow of income, externalities and social capital can all be applied in sustainability situations. He concludes that institutions often overlook this aspect of sustainability in their course design and draws attention to the extemporary initiatives undertaken by the Universities of York and Bath in the UK.
- Francis *et al.* (2011) argue that the focus of agricultural education is changing from (p. 226) “resource use efficiency” to “resilience of production systems in a less benign climate”. They describe seven case studies in the Nordic Region and the U.S. Midwest where a whole-system approach to teaching agricultural production has been taken. Lessons from these case studies include the need to recognise the amount of instructor time that these integrated, experiential courses require, the need to find less resource intensive ways of delivering such courses and that the methods for integrative analyses are “not well defined” in this domain.

### 2.3 Literature Review Conclusions

The review found that Spicer *et al.*'s list of topics for a complete curriculum of sustainability is largely complete. However, modifications to the list that could usefully be made are:

- An historical analysis would show that there has been little progress made with the implementation of sustainability. This raises questions about why this is so and how it can be remedied. Consequently, an account of the many attempts (particularly global endeavours) to institute sustainable development should be included along with discussion on the lack of results to date
- The role of political institutions and governance in general should be emphasised more than it is currently
- Changing the word “trade-offs” to “integration” so that the topic reads “integration of environment and society” and now is in accord with the topic “integrating human aspirations and social imperatives with ecological limits” in the sustainable futures section of the list of topics
- The addition of cultural capital as a separate “composite pillar” of sustainability would ensure its proper emphasis - instead of assuming that it is sufficiently covered under social sustainability
- Resilience and adaptation are areas that are becoming increasingly important and should be added under the ‘sustainable futures’ heading.

The review also showed that:

- The topic ‘Sustainability’ is increasing in importance in the area of research publications.
- Most published papers are in the domain of environmental sustainability and are unlikely to offer an integrated view of sustainability since they often do not include all of the traditional three pillars (i.e. social, economic and environmental) (Schoolman *et al.*, 2012).
- The least number of sustainability-related papers published is in the area of economic sustainability but these papers are most likely to include all three pillars. (Schoolman *et al.*, 2012).
- There are many case studies in the literature of embedding sustainability in the curriculum of higher education institutions. Among the recent examples highlighted in this report are courses in sustainability in agriculture, marketing, accounting and chemistry.
- Embedding sustainability in a curriculum is not without its challenges. Problems reported include lack of engagement by accounting students, the potential for tension between the predominant neo-liberal economic model and sustainability principles (e.g. systems thinking), the level of instructor time and commitment required for integrated, experiential courses (such as sustainability based courses) and the lack of tested methods for integrative analyses in the sustainability domain.



## Chapter 3

### A Complete Curriculum of Education for Sustainability for Post Graduate Degree Programmes

Table 4 below shows the list of topics that together provide a full understanding of sustainability. The topics are grouped in four categories<sup>4</sup>:

- Sustainability science – i.e. the underlying science that informs sustainability and points to possible drivers and solutions to unsustainability
- Questioning of current societal norms and values with a view to exploring their role in unsustainability
- Sustainable futures which includes tools, methods and approaches to building a sustainable future
- Sustainability practice which includes an analysis of progress to date and considers how a sustainable future could be politically, socially and culturally achieved.

A degree programme of education for sustainability would need to cover, at a minimum, the four aspects of sustainability shown in the table and preferably most of the topics listed in the table as well. However at a postgraduate level it could be expected that a student would achieve detailed knowledge about some of the listed topics but only be exposed to the content of others.

**Table 4**  
**List of topics required for a complete curriculum of Education for Sustainability**

Sustainability Aspect	Topics and skills, suggested by the literature, that could be included in each sustainability aspect
<b>Science of Sustainability</b>	<p><b>ENVIRONMENTAL/ECONOMIC/SOCIETAL TOPICS:</b>                      Ecosystem services, laws of physics (e.g. the prevailing principles of ecology (including nutrient cycles) and laws of thermodynamics), Renewable and non-renewable natural resources and their allocation                      Environmental sustainability indicators, ecological services                      Systemic thinking (e.g. the world is a complex web of relationships)                      Human dependence on nature, human/nature interactions                      Unsustainability, drivers (e.g. population growth, resource use) and consequences (e.g. water and food scarcity, biodiversity loss)</p> <p><b>SKILLS:</b>                      Knowledge of physical science                      Knowledge of human/nature interface</p>
<b>Questioning of current norms and social institutions</b>	<p><b>TOPICS:</b>                      Current economic models and their alternatives, consumerism                      Generational, gender, geographic and other perspectives; pluralism; equity                      Values, norms and attitude clarification, human values and aspirations  <i>Integration</i> of environment and society                      Human wellbeing and how to measure it                      The meaning of social and <i>cultural</i> sustainability  <i>Governance and political institutions</i></p> <p><b>SKILLS</b>                      Change management                      Critical thinking skills</p>

<sup>4</sup> Note that the report by Spicer et al. (2011) listed three categories but it is apparent from the literature review undertaken in this report that the fourth category noted in Table 4 is a significant component of a full curriculum and should be considered.

	Values clarification Successful communication
<b>Sustainable Futures</b>	<p>TOPICS:</p> <p>Integrating human aspirations and social/cultural imperatives with ecological limits Pluralism of views of sustainability and its solutions Relevant current laws and the contribution of social/<i>political</i> institutions Lifestyle and business changes that are more compatible with sustainability Indicators of sustainability Partnerships between business, community, NGOs etc. Living within limits Methods and tools for sustainability (e.g. risk analysis, systems analysis, model construction, life cycle assessment, pressure-state-response models, measurement of ecological services) Solutions to unsustainability (e.g. cradle to cradle design, technology, appropriate resource allocation/use, consumption patterns)</p> <p><i>Resilience and adaptation</i></p> <p>SKILLS:</p> <p>Application of methods and tools Reasoned enquiry</p>
<b>Sustainability Practice</b>	<p><i>History of attempts to implement sustainability (globally and locally)</i> <i>Analysis of reasons for lack of progress</i> <i>Governance and political institutions</i></p> <p>SKILLS</p> <p><i>Change Management</i></p>

Note: Modifications to the list that was suggested by Spicer *et al.* (2011) are shown in italics.

Courses offered at Monash University came to the attention of the authors and are noted below since they, in aggregate, demonstrate a currently available curriculum of education for sustainability and can therefore be used as a comparative case<sup>5</sup>. These courses can be credited towards Monash University's Master of Sustainability (Environment and Sustainability) programme. Students are required to take four compulsory courses, two elective courses and a research project. The compulsory courses are listed in Table 5 below.

There are areas where the typology above and the courses listed below are not consistent. These include:

- Setting sustainability in an historical context – the long list of (failed) international attempts to implement sustainability are pointers to why sustainability has only been adopted in a piecemeal way internationally. This contextual material is explicitly covered in the typology above but not in the Monash University approach
- Economic influences and concepts (such as externalities, the advantages and disadvantages of cost/benefit analyses, melding the social with the financial) are not specifically mentioned in the Monash programme although the topic “neoliberalism” may cover some of this material
- The need for ecological limits – this fundamental topic is not mentioned in the Monash programme but may be included (in part) in the ‘Frontiers in Sustainability and Environment’ course.

<sup>5</sup> Spicer *et al.* (2011) refer to a Masters programme at Lund University in Sweden that, in aggregate, offers a programme of Education for Sustainability that covers most of the topics listed in the typology developed here.

**Table 5**  
**Comparison of Master of Sustainability\* compulsory courses with the Typology Shown in Table 4**

Aspect of Complete Curriculum for Sustainability (Table 4 above)	Monash Course Title	Monash Course Content description
<b>Questioning</b>	Perspectives on Environment and Sustainability	People's approaches to environmental issues (what they see as problems and what they see as solutions) vary widely based on worldviews, assumptions, and value systems. This unit develops students' capacity to critically evaluate differing ideological, philosophical, and disciplinary approaches to environment and sustainability, such as positivistic science, technology, systems theory, social ecology, indigenous worldviews, deep ecology, bioregionalism, post structuralism, neoliberalism, and sustainability science. Throughout, it will explore the implications of these approaches for policymaking, disciplinary research, environmental management, and political processes and action.
<b>Science of Sustainability</b> <b>Integration of environment and society (from Questioning)</b>	Frontiers in Sustainability and Environment	Drawing on environmental expertise from inside and outside the university, this unit provides students with a fundamental technical understanding of a range of contemporary and emerging environmental issues such as loss of biodiversity, global warming, waste management, genetic engineering, water scarcity and management, and urban and rural sustainability. Throughout, the coordinator will ensure that social concepts and frameworks of sustainability are woven into a more comprehensive technical understanding of the environmental issues. The unit also considers responses proposed and/or implemented to address the various environmental issues.
<b>Solutions to Unsustainability (from Sustainable Futures)</b>	Environmental Analysis	This unit equips students with understanding of basic tools for environmental analysis and decision making for sustainability. It will look at a range of techniques for attributing value to the environment. These include environmental and social impact assessment, risk analysis, strategic and integrated assessment, life cycle analysis, state-of-environment reporting, modelling, auditing, monitoring and scenario building. Throughout, the dynamic interaction between scientists, policy makers and the broader community will be explored.
<b>Sustainable Futures</b> <b>Governance (from Questioning and also from Sustainability Practice)</b>	Environmental Governance and Citizenship	This unit explores social and institutional frameworks for environmental governance. It considers the role, structure and processes of government, market and civil society in relation to the environment and sustainability agenda. The emphasis is on exploring the nature of contemporary environmental governance, evaluating the assumptions on which it is based, and taking a critically informed view of its strengths and limitations. We will feature case studies e.g. waste management, climate change, water management, where multiple agencies and organisations work within a complex environmental system to implement a range of interesting and innovative approaches to environmental governance.

\*Compulsory courses for the Master of Sustainability (Environment and Sustainability) at Monash University, Australia



## Chapter 4

### Sustainability-Related Postgraduate Degree Programmes on Offer in Australasia

A survey of universities was undertaken in order to ascertain the level and types of sustainability-related programmes (i.e. degree programmes) that are on offer in Australasia. All eight New Zealand universities were surveyed but only selected Australian ones were included.

#### 4.1 Survey Method

The Australian universities were selected on the following criteria:

- The university is ranked in the top 21 Australian universities in the 2011/12 Times Higher Education World University rankings (Australian Universities, no date) and
- The university is a member of the Australian Campuses Towards Sustainability<sup>6</sup> group (ACTS, no date)

This method resulted in 15 (38%) universities being selected for inclusion out of the 39 universities that exist in Australia<sup>7</sup>.

A keyword search using 'sustainability' was made on the website of each of the New Zealand and selected Australian Universities. The results of this search were cross checked by examining the list of postgraduate subjects offered by the institution on their website. Finally the search results for the New Zealand Universities were forwarded to each University for comment and amendment.

For a programme to be included in the survey its outline, available on the website, had to mention at least one of the four pillars of sustainability (i.e. economic, environmental, social or cultural). Thus the word 'sustainability' did not have to be specifically mentioned for the programme to be included in the survey. The results of this survey can be found in Appendices 4 and 5.

Chapter 3 of this report suggests that a complete programme of education for sustainability should include four aspects of sustainability i.e. Sustainability Science, Questioning current norms Sustainable Futures and Sustainability Practice. This level of detail, however, was not available for postgraduate programmes other than from Lincoln University and consequently programme content was evaluated using the more traditional approach of the environmental, social and economic pillars of sustainability. In this report a fourth pillar, culture, has been added in order to emphasise the importance of cultural goals and aspirations since they are the expression of societal values (Hawkes, 2001).

The Spicer *et al.* (2011) typology can be matched to the traditional pillars (see Table 6 below) so that an estimate can be made of the number of programmes that offer a complete curriculum of education for sustainability. The categories below should not be regarded as definitive because

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6 From: <http://www.acts.asn.au/index.php/about-2/>

ACTS is a non-profit member based organisation representing higher and further education institutions within Australia and New Zealand. ACTS aims to inspire, promote and support change towards best practice sustainability within the operations, curriculum and research of the tertiary education sector. ACTS seeks to build community and business partnerships at the local, regional and international level, in order to bring together a network of people for positive engagement, capacity building and change.

7 From: <http://www.australian-universities.com/list/>

there are crossovers that result from e.g. the co-production of landscapes by humans and nature which cannot be adequately conveyed in the traditional 'silo' pillars.

**Table 6**  
**A Comparison of the Pillar and Topics of Sustainability Typologies.**

Typology from Chapter 3 of this report	Equivalent Pillar in the Traditional Sustainability Typology (environmental, social, economic and cultural)
Sustainability science	Predominantly environmental
Questioning	Predominantly social and cultural
Sustainable Futures	All four pillars
Sustainability Practice	Typically not covered by the pillars approach

## 4.2 Survey Results: Sustainability-Related Degree Programmes in Australian Universities

In Australia all of the selected universities are offering qualifications in sustainability either as a standalone programme or as a specialisation in a standard postgraduate degree. In Table 7 below the departments/broad subject areas under which sustainability-related programmes are taught is shown. Of the 65 degree programmes that are offered by the 15 Universities surveyed, 46 (30%) are marketed as environmental or science programmes and, as in New Zealand, most of these are in the area of environmental science or environmental planning. However there are 22 (14%) programmes offered that are specifically orientated to sustainability and half of these are in non-environmental areas such as commerce and arts.

**Table 7**  
**Broad Subject Areas under which Sustainability is taught in Selected Australian Universities**

University	Agriculture/ Hort.		Engineering/ Architecture		Arts		Commerce		Environmental/ Planning		Science	
	Sus	Non	Sus	Non	Sus	Non	Sus	Non	Sus	Non	Sus	Non
ANU						1			1	5		1
Curtin				1							2	2
Deakin										1	1	
Griffith										2		
La Trobe			1									1
Macquarie					1	3				3		1
Monash					1		1		2		1	
Adelaide									2	1		
Melbourne					1	2				1	1	6
Newcastle								1		1		
New South Wales					1					1		
Queensland							1		1	1		
Sydney	1		2			1					1	2
Tasmania										2		
Western Australia										1		2
<b>Total Programmes</b>	1		3	1	4	7	2	1	6	19	6	15



The programmes that explicitly refer to sustainability in their title include those listed in Table 8 below. Examples of non-environmental areas that are including sustainability within their programme offerings are the Master of Agriculture (Sustainable Agriculture) at Sydney University and the Master of Business (Sustainability) at Queensland University. Only Sydney and Adelaide Universities offer a standalone sustainability qualification (Master of Sustainability). In all other cases in the universities surveyed, the sustainability component is a specialisation (e.g. Master of Agriculture (Sustainable Agriculture)) or sustainability has been combined with another subject (e.g. Master of Sustainability and Climate Policy).

**Table 8**  
**Examples of Australian Programmes where Sustainability is Explicitly Mentioned in the Programme Title**

University	Programme Title	Home School/Broad Subject Area
<b>Curtin</b>	Master of Sustainability and Climate Policy	Science
<b>Adelaide</b>	Master of Sustainability	Science
<b>Macquarie</b>	Master of Sustainable Development	Arts
<b>Monash</b>	Master of Sustainability (Environment and Sustainability)	Environmental
	Master of Sustainability (Corporate and environmental sustainability management)	Environmental
	Master of Sustainability (International Development and environmental analysis)	Arts
<b>Sydney</b>	Master of Agriculture (Sustainable Agriculture)	Agriculture
	Master of Engineering (Sustainable Processing)	Engineering
	Master of Sustainability	Science
	Master of Sustainable Design	Engineering
<b>Queensland</b>	Master of Business (Sustainability)	Commerce
	Master of Environmental Management (Sustainable Development)	Environmental

Table 9 below lists the sustainability pillars that are covered by each of the programmes offered by the surveyed Australian universities. The table shows that, of the programmes on offer, most are focused on combinations of (a) environmental and social factors or (b) environmental, social and economic factors although there is a sizeable group that considers environmental aspects only. Few programmes in Australia explicitly include cultural factors. The two agricultural programmes that include sustainability include economic and/or environmental factors only. Neither of these latter programmes appears to include social or cultural factors.

**Table 9**  
**Selected Australian Masters Programmes and their Relationship to the Pillars of Sustainability**

Subject	Pillars of Sustainability Included (Ec=Economic, En =Environmental, S=Social, C=Cultural)						
	En only	S/C only	En/S	En/Ec	En/Ec/S	En/S/C	En/Ec/S/C
<b>Sustainability</b>	2		4	2	6		
<b>Architecture/Design</b>			2				
<b>Engineering</b>	1	1		2			
<b>Energy</b>			1				
<b>Environmental Law</b>			3				1
<b>Environmental St/Mgt/Planning</b>	8		2		6		1

Environmental Science/ Conservation/ecology Science (other)	8			1	2		1
Business/Commerce/Mgt	4			1	1		
Agricultural Science				2			
Development			1			1	
Education			1				
Indigenous Studies							
<b>Total Programmes</b>	<b>23</b>	<b>1</b>	<b>14</b>	<b>8</b>	<b>15</b>	<b>1</b>	<b>3</b>

### 4.3 Survey Results: Sustainability-Related Post Graduate Degree Programmes in New Zealand Universities

The programmes in New Zealand universities were considered in the same way as those from the Australian universities but the assessments were sent to the universities for confirmation or correction of the assessment. Replies were received from all of the Universities but not from all of the departments within each. Thus some caution, therefore, is needed in interpreting the results from Auckland and Otago Universities.

The survey found that there are 35 programmes available in total in New Zealand with sustainability-related content and the majority of these are located in the Environmental and Science areas, as shown in Table 10.

**Table 10**  
**Subject Areas of Postgraduate Sustainability-Related Programmes Available in New Zealand**

University	Agriculture	Engineering/ Architecture	Arts	Commerce	Environmental/ Planning	Science	Total
Auckland		4	1		1	3	9
AUT				2			2
Waikato				1	1		2
Massey	1		1		2		4
Victoria			1		1	4	6
Canterbury						1	1
Otago			1		2	1	4
<b>Sub-Total</b>	<b>1</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>7</b>	<b>9</b>	
<b>Lincoln</b>					3	4	7
<b>Total Programmes</b>	<b>1</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>10</b>	<b>13</b>	<b>35</b>

Sustainability is seldom explicitly referred to in the titles of programmes on offer in New Zealand. However programme outlines show that sustainability is often implied by the material that the programme covers. For instance an Environmental Science programme may refer to economic and social issues besides their central focus of environmental issues<sup>8</sup>. This also applies to Lincoln where in only two programmes is sustainability specifically mentioned, although the content of other programmes implies sustainability by offering courses that refer to economic and/or social factors in the course content.

<sup>8</sup> For example, the Master of Environmental Management at Massey University includes economic, social and environmental aspects. One exception where sustainability is used is in the Master of Management Studies (Management and Sustainability) at Waikato University.

The sustainability pillars covered by the programmes available in New Zealand are listed in Appendix 4 and are summarised in Table 11 below.

**Table 11**  
**Masters Programmes Offered by Universities in New Zealand**  
**(other than Lincoln University) that Relate to Sustainability**

Subject Area (Universities other than Lincoln)	Pillars of Sustainability Included (Ec=Economic, En =Environmental, S=Social, C=Cultural)						
	En only	S/C only	En/ S	Ec/ En	Ec/ En/ S	En/ S/C	Ec/ En/ S/C
<b>Sustainability</b>							
<b>Architecture</b>	1						
<b>Engineering</b>	2						
<b>Energy</b>			1				
<b>Environmental Law</b>							1
<b>Environmental St/Mgt/Planning</b>	1		1		4	1	
<b>Environmental Science/ Conservation/ecology</b>	4		1				
<b>Science (other)</b>	3					1	
<b>Business/Commerce/Mgt</b>					3		
<b>Agricultural Science</b>				1			
<b>Development</b>						1	1
<b>Education</b>							
<b>Indigenous Studies</b>		1					
<b>Total - Universities other than Lincoln</b>	<b>11</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>7</b>	<b>3</b>	<b>2</b>
<b>Subject Area (Lincoln University)</b>							
	En only	S/C only	En/ S	Ec/ En	Ec/ En/ S	En/ S/C	Ec/ En/ S/C
<b>Environmental St/Mgt/Planning</b>			2		1		1
<b>Environmental Science/ Conservation/ecology</b>	2				1		
<b>Total - Lincoln University</b>	<b>2</b>		<b>2</b>		<b>2</b>		<b>1</b>

Lincoln offers 7 programmes at the postgraduate level that are related to sustainability. These are:

- Master of Applied Science (Environmental Science)
- Master of Science (Environmental Science)
- Master of Environmental Policy
- Master of Resource Studies
- Master of Natural Resource Management & Ecological Engineering (MNaRM&EE)<sup>9</sup>
- Master of International Nature Conservation (MINC)
- Master of Science (Conservation and Ecology)

<sup>9</sup> The MNaRM&EE programme is considered by its Academic Programme Leaders to be a Masters in International Sustainability (Spellerberg *et al.*, 2007)

#### 4.4 Discussion: Survey of Sustainability-Related Programmes

Amongst the 15 Australian Universities that were surveyed, 39 sustainability-related degree programmes were identified. This equates to 4.4 programmes per University. In New Zealand the average is very similar, at 4.3 per University. This is a positive result for NZ since the Australian universities were selected on the basis that they are members of the Australasian Campuses Towards Sustainability group and therefore could be considered to be at the forefront of Institutions which include sustainability in their curricula.

In over half of the programmes in both countries the programme outline includes only one or two of the pillars of sustainability, although this applies less to New Zealand (57%) than the Australian universities included in the survey (70%). This result is supported by Schoolman *et al.* (2012) who found that most sustainability-related published papers are environmentally based and that these papers are unlikely to include social and/or economic factors. Economics based papers, on the other hand, were very likely to include all three pillars (although there were few such papers published). It appears that both environmental researchers and the surveyed Australian postgraduate university programmes are surprisingly narrowly focused. In New Zealand a higher percentage of programmes include three or more pillars (43% compared with 30% in Australia) but again it appears that sustainability is, perhaps, considered to be an environmentally based problem. Lincoln University follows a similar pattern with four programmes focused on one or two pillars and three which include three pillars (i.e. three programmes at Lincoln could be considered to offer a complete post graduate programme of Education for Sustainability).

Of the programmes (in both countries) that do include three or more pillars, most are in the area of environmental management or planning. The least number of programmes to include three or more pillars are in the areas of environmental/conservation science, engineering/architecture and primary industry (e.g. agriculture). There are few sustainability-related courses offered in commerce and law but where these do occur, they are likely to include three or more pillars. These findings follow the pattern described by Schoolman *et al.* (2012) in the sustainability-related published literature. In contrast, Lincoln offers no sustainability-related programmes that are outside of the environmental area. There is perhaps an opportunity therefore for Lincoln University to offer programmes in these less traditional areas. Examples of such existing programmes include the Master of Agricultural Science (Life Cycle Management) at Massey University, the Master in Management Studies (Management and Sustainability) at Waikato University, a Master of Agriculture (Sustainable Agriculture) at Sydney University and the Master of Business (Sustainability) offered by Queensland University.

In New Zealand the word sustainability is rarely used in a degree programme title. This does not mean, however, that sustainability is not taught in New Zealand universities. The survey found that there are 15 (42%) programmes that include three or more pillars in their programme content and three of these are offered at Lincoln. In contrast, amongst the surveyed Australian Universities, there were 19 (29%) programmes that included three or more pillars.

In Australia it appears that the term sustainability is relatively well accepted since there were 21 (32%) degree programmes that included the word sustainability in the programme title. However, of these only six included all three pillars of sustainability and thus were more likely to offer a complete curriculum of Education for Sustainability.

Of the surveyed Australian universities that offer programmes with the word sustainability in the programme title, most (62%) include sustainability as a specialisation rather than as a standalone programme. The exceptions to this include the Masters in Sustainability offered by both Sydney and Adelaide Universities and the Masters in Sustainability with specialisations in Environment and

Postgraduate Education for Sustainability at Lincoln University, New Zealand

Sustainability, Corporate and Environmental Sustainability Management or International Development and Environmental Analysis offered by Monash University.



## **Chapter 5**

### **Sustainability-Related Postgraduate Courses on Offer in New Zealand Universities**

A survey of the sustainability courses that are available at Lincoln University was undertaken in order to determine the level of sustainability-related course content that is currently available. This survey will assist in determining whether Lincoln University is currently able to offer programmes in sustainability and whether such a programme would offer a complete curriculum of Education for Sustainability. The typology listed in Table 4 of this report was used as the basis for this survey. Unfortunately this same definition could not be used to assess the courses that are on offer at New Zealand universities other than Lincoln because the level of detail required could not be obtained in the time available for this study. Consequently two assessment systems have been used in the assessment of the courses that are available and only a general comparison between Lincoln University courses and those of other universities can be made. However, this is not expected to impact on the overall aim of determining whether Lincoln University is able to offer a full programme of sustainability in the future.

#### **5.1 Survey Method**

A keyword search using 'sustainability' was made on the web-site of each of the New Zealand Universities to identify relevant subjects. For each of the identified programmes a search was made to find its component courses. Finally the search results were forwarded to each university for comment and amendment. Replies were received from all universities but not from all of the departments in each university. Consequently these course survey results are considered to be an indication only of the courses that are available in New Zealand.

Courses at universities other than Lincoln were assessed on the basis of the composite pillars (environmental, economic, social and cultural) since detailed course outlines were not available. Lincoln University courses on the other hand were assessed using the typology listed in Table 4.

Courses at Lincoln University were further categorised by:

- Whether sustainability was explicitly mentioned in the course content or whether it was implied by the inclusion of material referring to the sustainability pillars.
- The level of sustainability content. Courses were categorised as having a low (less than 30%), medium (between 30 and 60%) or high (over 60%) level of sustainability content. Courses with a low level of sustainability content were discounted as potential courses in a programme of education for sustainability because it was considered that with only six courses required for a Masters programme and sustainability being such a broad topic, each course would need to contribute substantially towards achieving a complete curriculum of education for sustainability.
- 'Specialist' or 'general' - depending on whether the course was open to most postgraduate students or whether an undergraduate background in the subject was required.
- The focus of the sustainability content of the course i.e. sustainability science, questioning, building a sustainable future or implementing sustainability.

These values, apart from the implementation of sustainability, were determined by the examiner concerned and are listed in Appendix 1.

## 5.2 Survey Results: Sustainability-Related Courses Available at New Zealand Universities other than Lincoln University

The survey showed that sustainability content is present in at least 84 postgraduate courses available in New Zealand with 25 of these offered by Lincoln University.

**Table 12**  
**Sustainability-Related Courses Available at New Zealand Universities by Subject Area**

University	Agriculture/ Primary Industry	Engineering/ Architecture	Arts	Commerce	Environmental/ Planning/ Landscape	Science	Total
Auckland		9	3	2	3	1	18
AUT				1			1
Waikato		1	3	3	1	1	9
Massey		2	7	2	2	1	14
Victoria			2		7		9
Canter- bury		2		1		1	4
Otago			1	1	2		4
<i>Sub-Total</i>	<b>0</b>	<b>14</b>	<b>16</b>	<b>10</b>	<b>15</b>	<b>4</b>	<b>59</b>
Lincoln	4		3	2	14	2	25
<b>Total</b>	<b>4</b>	<b>14</b>	<b>19</b>	<b>12</b>	<b>29</b>	<b>6</b>	<b>84</b>

As shown in Table 12, these courses are spread across a wide range of subjects and are not clustered in the environmental area as is the case with sustainability-related programmes (see Table 13 below).

One area where there is a notable lack of coverage is in the area of primary industry. The Masters of AgriScience (Life Cycle Management (LCA)) at Massey University does include a course on LCA case studies which can include the primary industry sectors, but no specifically primary industry courses at universities other than Lincoln were found in the survey. The four primary industry courses that Lincoln offers are in the areas of tourism, recreation and pasture ecosystems. There would appear to be an opportunity for Lincoln to offer further courses in this area since they are underrepresented at the other universities.

In comparison with the other universities, Lincoln is underrepresented in the areas of commerce, and arts (including social sciences).

The sustainability-related courses that are offered in New Zealand Universities are listed in Appendix 4 along with the course content outline that was available on the web. In Appendix 3 is a list of courses that are notable either because they cover many of the aspects of sustainability or they show sustainability being taught in non-traditional areas.

## 5.3 Survey Results: Sustainability-Related Post Graduate Courses Available at Lincoln University

The survey of postgraduate courses on offer at Lincoln University showed that there are a number of courses that could potentially contribute to a programme of education for sustainability. Thus of the

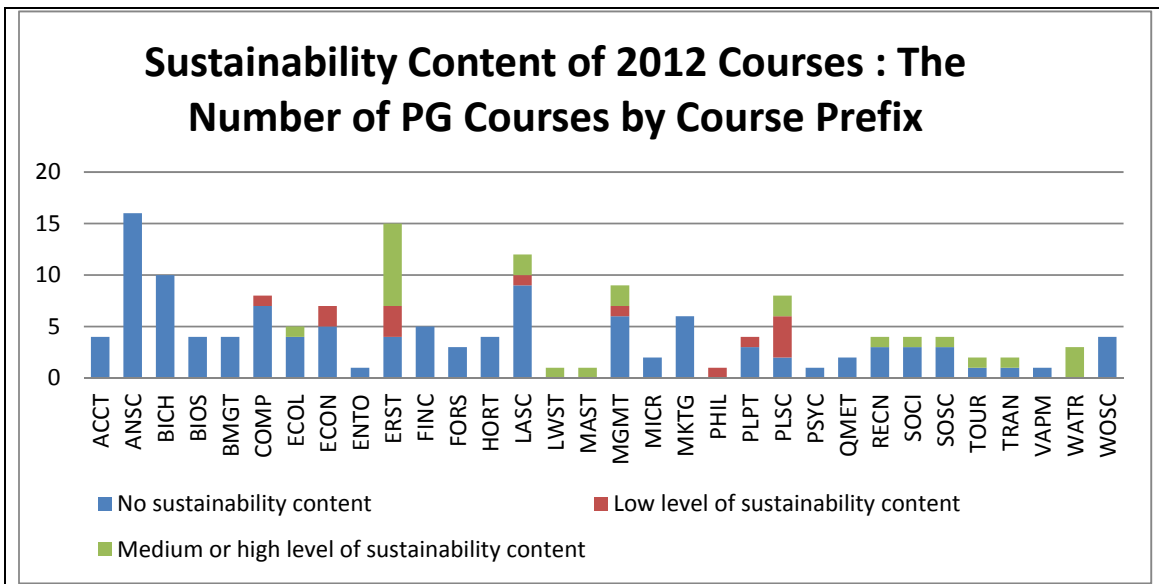


157 postgraduate (PG) courses<sup>10</sup> at Lincoln, 39 were considered to have some sustainability content and replies to the survey were received from 38 of the examiners of these. Details of the selected courses can be found in Appendix 1.

The survey showed that 25% of all of the taught Post Graduate courses on offer at Lincoln in 2012 have at least some sustainability content. However, when only those courses with a medium or high level of content of sustainability are considered then the percentage reduces to 16% (i.e. 25 courses out of the 157). Further, the courses with a medium or high level of sustainability are not well spread across the subjects available at Lincoln. Figure 1 shows the distribution of such courses and demonstrates how the majority of these are concentrated in the Environmental and Resource Studies and Water Resource Management areas. The Landscape, Management and Plant Science areas each have two courses with a high level of sustainability. The Plant Science, Economics and Environmental and Resource Studies areas all have two or more courses with a low level of sustainability content. Subjects with no courses that incorporate some sustainability content at the Postgraduate level include Animal Science, Business Management and Horticulture. All of these subjects have courses with some sustainability content at the undergraduate level (Spicer *et al.*, 2011).

While theses and dissertation courses have been excluded from this survey, the Landscape course LASC698 was included at the request of the examiner because two of the three research projects carried out in 2011 were on sustainability projects. The examiner commented that “the potential is there for a so-minded student”. This sentiment was echoed by other examiners who said that assignments in their courses could be based on a sustainability topic if the student so chose - but that the sustainability component of the assignment would be unlikely to be critiqued.

**Figure 1**  
**Sustainability content of taught postgraduate courses at Lincoln University in 2012**

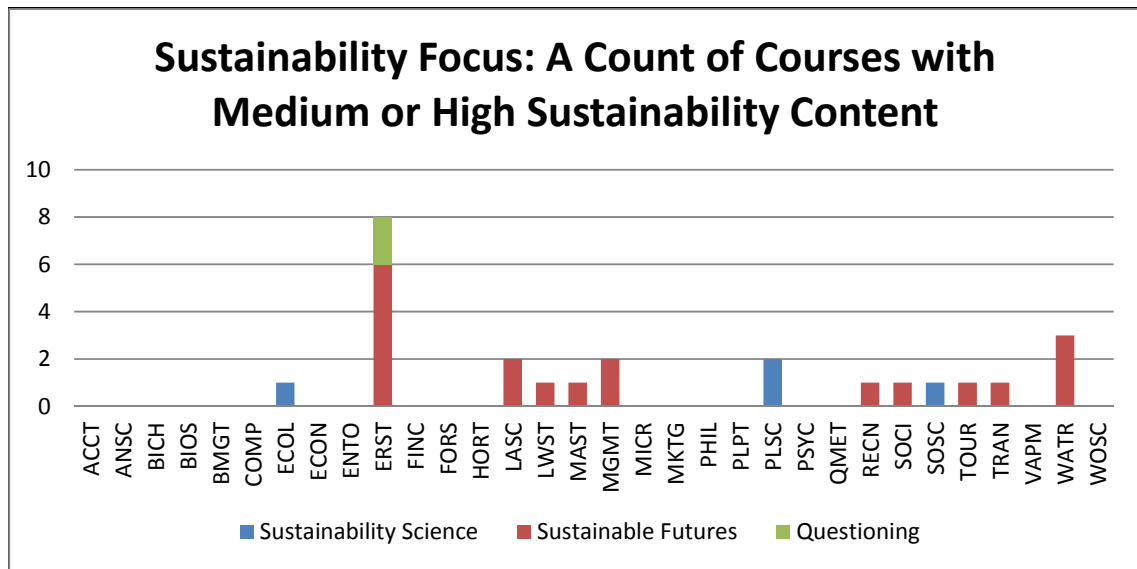


<sup>10</sup> Courses that were included are (a) 600 level, (b) being offered in 2012 and (c) taught courses (i.e. thesis and dissertation courses were excluded).

Spicer *et al.* (2011) discussed the topics that should be included in a curriculum of Education for Sustainability to ensure complete coverage of the subject at an undergraduate level. The topics were grouped under three headings: sustainability science, sustainable futures and questioning. The first, sustainability science, considers the underlying physical science that informs sustainability and points to possible drivers and solutions to unsustainability. The second area, questioning current norms, considers current societal and individual values and norms with a view to exploring their role in unsustainability. The third strand to sustainability looks at what sustainable future scenarios might look like and includes the tools that might assist in their development. In this report a fourth category, 'Sustainability Practice' has been added. This category considers the contextual factors (e.g. the history of international sustainability initiatives) that have an influence on the implementation of sustainability.

Figure Two shows the type of sustainability content of courses that have a medium or high level of sustainability content. Nineteen courses have a predominantly Sustainable Futures focus to their sustainability content although, as some examiners pointed out, aspects of the other categories might be covered as well. None of the courses were found to have a primarily Sustainability Practice focus although some courses include material that relates to this topic.

**Figure 2**  
**Type of sustainability content of taught postgraduate courses at Lincoln University in 2012**

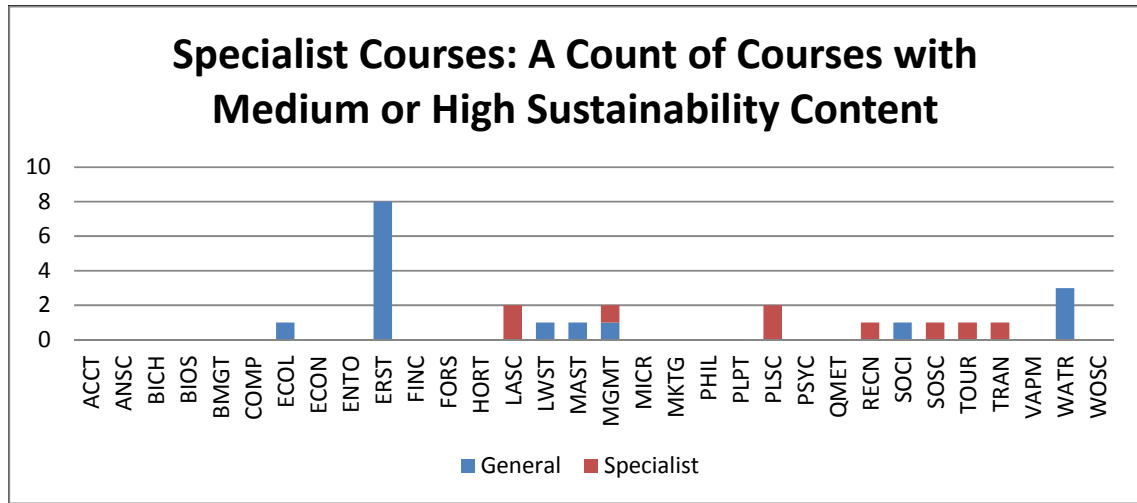


To offer a complete programme in sustainability at the Post Graduate level, all four aspects of sustainability would need to be covered by the combination of courses that made up a student's programme. Figure 2 shows that there is limited potential for this because of the restricted number of courses offered that include Sustainability Practice, Sustainability Science and/or Questioning topics.

The problem of lack of courses that cover the sustainability science, sustainability practice and questioning aspects of a complete curriculum of Education for Sustainability is further compounded by the need for previous undergraduate study in the subject. Figure 3 shows whether specialist knowledge is required for the courses that have a medium or high level of sustainability content. The figure shows that nine courses are only available to students that have specialised in the subject

and 16 are suitable for most Post Graduate students. Half of the latter are Environmental and Resource Studies Courses.

**Figure 3**  
**Number of Courses that have a Medium or High Level of Sustainability Content but Require Prior Knowledge of the Subject**



Courses that have medium or high sustainability content and that are available to most postgraduate students are listed in Appendix 2 according to their sustainability focus type.

#### 5.4 Discussion: Survey of Sustainability-Related Post Graduate Courses at New Zealand Universities

There are at least 59 sustainability-related courses available in universities other than Lincoln and a further 25 available at Lincoln that have a medium or high level of sustainability content. While Lincoln appears to offer more courses than other New Zealand universities, this may simply be the result of the methodology used. In particular there was insufficient information available on the websites regarding the content of courses at universities other than Lincoln to enable a full assessment of the level or type of sustainability-related content. Consequently some of the 84 courses may have been inappropriately included and other relevant courses may have been overlooked. In addition, there is at least one instance (Environmental Law at Auckland University) where sustainability has been embedded in each of the component courses and thus is not specifically referred to in the course content. Such courses will have been missed in the survey.

The survey found that the courses were spread across several subjects and were not clustered around the environmental area as is the case with the programmes that are offered. This suggests that some aspects of sustainability could be at least touched on (if the appropriate courses are chosen) in more degrees than the survey of programmes would suggest. Prominent broad subject areas are engineering/architecture, arts (including law and humanities), and commerce. Science, on the other hand, appears to offer few courses with sustainability related content.

In general, the course outlines suggest that the sustainability content is relatively high level and that the number of courses in each subject is small (see listings in Appendix 4). Examples of courses that are on offer are listed in Appendix 3.

Topics that received little mention in the course outlines include: pluralism of views and solutions, human values and aspirations, the integration of human aspirations and social imperatives with ecological limits, human wellbeing and its measurement, social sustainability, and methods and tools for sustainability. Consequently, it may be difficult for students to obtain a complete curriculum of education for sustainability (as defined in Table 4 of Chapter 3).

Lincoln University offers 39 courses that include sustainability related material. However, this number reduces to 25 courses once the level of sustainability content, and to 16 when the need for prior knowledge of the subject, are taken into account. Of these 16 courses half are in the subject area of Environmental Studies, three in Water Resource Management and one each in Māori Planning and Development, Management, Law Studies, Social Science and Ecology.

Of the nine courses that require specialist knowledge, two are in each of the subject areas of Landscape Architecture and Plant Science and one each in Management, Recreation, Soil Science, Tourism and Transport.

Subject areas that do not offer any courses that contain sustainability-related material include Accounting, Animal Science, Business Management, Finance, Horticulture and Marketing.

A comparison between courses offered at Lincoln and those offered by other universities in New Zealand is not possible because of the different assessment methodologies used in this report. However, the survey did show that Lincoln University is underrepresented in the areas of commerce and arts/humanities and that it appears to offer the only courses (four) that are available in New Zealand in primary production. These courses are in tourism, recreation/tourism and plant science.

## Chapter 6

### Programme and Course Survey Conclusions

#### 6.1 General Conclusions

Sustainability is a term that is commonly used in programme titles in Australia but is rarely used in New Zealand. However, this does not mean that sustainability is not being taught here. The survey of NZ programmes showed that there are 35 sustainability-related programmes in NZ and that of these 43% include three or four of the traditional pillars of sustainability (i.e. environmental, social, cultural and economic pillars) and therefore approximate (at the least) a complete curriculum of Education for Sustainability. In Australia only 30% of the surveyed programmes included more than two of the pillars. This is a surprising result given that the Australian universities were chosen on the basis that they are members of the Australasian Campuses Towards Sustainability group which promotes sustainability in all aspects of tertiary education.

The most common method of including sustainability within the curriculum in the Australian Universities was by offering it as a specialisation to degrees such as a master in commerce, business or environmental planning/studies. In NZ, the most common method of inclusion is by covering two or more of the pillars in some of the courses which can be included in a specified programme.

The inclusion of three or four pillars within a programme implies that students will have access to a complete curriculum of education for sustainability. However, we define a complete curriculum as needing to contain all of the topics listed in Table 4 (although only some would be covered in detail at the postgraduate level)<sup>11</sup>. Inclusion of all three or four pillars does not guarantee that all of the prescribed topics will be covered.

There are 39 sustainability-related courses at Lincoln and when the content of these is compared with the topics listed in Table 4, it was found that most courses cover the sustainable futures aspect of sustainability but few cover the implementation, questioning of current norms or sustainable science aspects. In addition, some of the courses offered require prior specialist knowledge and others have only a low level of sustainability content. When these factors are taken into account, Lincoln offers sixteen courses that could be used to build a programme that delivers a complete curriculum of education for sustainability. Of these 16 courses, eight are in the area of Environmental Studies, three in Water Resources Management and one each in Maori Planning and Development, Management, Law Studies, Social Sciences and Ecology. Areas with no courses that include sustainability content include Accounting, Animal science, Business Management, Horticulture and Marketing. This is despite some of these disciplines offering such courses at the undergraduate level.

A direct comparison with other universities in New Zealand is not possible because detailed information on course content was not available. However, course outlines accessed via the web showed that several of the topics listed in Table 4 are seldom mentioned and therefore are presumed to not be covered. These include human values and aspirations, methods and tools for sustainable solutions, the integration of human aspirations and social imperatives with ecological limits and social sustainability.

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<sup>11</sup> The literature review that was undertaken as part of this study confirmed that the list is in line with the current literature. See Chapter 3.

## 6.2 A Complete curriculum of Education for Sustainability at Lincoln University

While some postgraduate programmes appear to be teaching sustainability, the survey of Australasian universities showed that, in practice, many may not. For example, some programmes with sustainability in the title do not mention all three (or four) pillars of sustainability in the course outline. Such programme outlines tend to mention only (a) environmental and economic factors or (b) environmental and social (which may include cultural) factors.

Lincoln University aims to provide leadership in research and teaching “that will contribute to ensuring a sustainable environmental, social and economic future for New Zealand” (LU, 2010, p.3). Lincoln, therefore, aims to provide a complete curriculum of education for sustainability.

In order to offer a complete curriculum of education for sustainability a programme ought to cover all of the topics listed in Table 4. Some of these could be covered in depth (as is appropriate at the postgraduate level) but others could be covered quickly and at a high level. In essence a programme should include the four major aspects of sustainability i.e. sustainability science, questioning of current norms and institutions, building sustainable futures and practicing sustainability. A programme that delivered courses in only one or two of these categories could not be considered to cover a complete curriculum.

The survey of courses and programmes showed the following:

- Lincoln University offers three programmes<sup>12</sup> that cover the traditional sustainability pillars i.e. society (including culture), environment and economy and four<sup>13</sup> programmes that cover only two of these pillars.
- Analysis of the courses on offer at Lincoln showed that there is an emphasis on building sustainable futures and only a small number of courses in the areas of questioning and sustainability science.
- Lincoln has few post graduate sustainability courses in the subject areas of commerce, arts/humanities, science and primary production. Most of the sustainability-related courses on offer are in the area of Environmental Studies/Planning.
- Courses outside of the Environmental Studies/Planning area frequently require specialist knowledge prior to enrolment, and therefore are unavailable to most postgraduate students.
- Lincoln offers no equivalent postgraduate sustainability-related courses in several relevant subject areas despite offering courses at the undergraduate level. Examples include business management, horticulture, and physical science.

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<sup>12</sup> Master of Environmental Policy, Master of Resource Studies, Master of Natural Resource Management and Ecological Engineering

<sup>13</sup> Master of Nature Conservation, Master of Science (Nature Conservation), Master of Applied Science (the regulations allow for all pillars to be included but suitable courses are not currently available)

## **Chapter 7 Opportunities**

### **7.1 Opportunities Identified from the Survey**

- Environmental Science/Planning appears best placed to be able to offer a sustainability programme at the postgraduate level but analysis of the course content shows that six of these courses are focused on sustainable futures with only two courses in the areas of questioning of current practises and norms or sustainability science. This lack could be partially overcome by inclusion of the Law Studies course (primarily sustainable futures but covering all three facets), the Ecology course which focuses on sustainable science and the three Water Resource Management courses that also focus on sustainable science.
- None of the universities in NZ are offering a programme of 'primary production and sustainability' at the postgraduate level. Two of the Australian universities surveyed offer a masters in agriculture with a specialisation in sustainability but none selected for this survey offered a similar programme in tourism or horticulture. Primary production sustainability ought to offer an opportunity for Lincoln.
- None of the universities in NZ, other than Lincoln, overtly place sustainability within its historical context and Lincoln has only one course that includes such content. There is a national need, therefore, for a critical evaluation of environmental history indexed to sustainability. Lincoln is well placed to fill this gap. This lack could lead to a false impression of the how the issues around sustainability have arisen and mask the difficulties involved in implementing sustainable futures.

### **7.2 Opportunities for Delivering a Complete Post-Graduate Curriculum of Education for Sustainability at Lincoln University**

The survey of sustainability-related programmes at New Zealand and selected Australian Universities has shown that there are several ways that sustainability could be included in the curriculum at Lincoln. The paths revealed by the survey are to:

- Introduce a new sustainability qualification i.e. a Masters in Sustainability, as is offered by the Universities of Adelaide and Sydney
- Make sustainability a specialisation within a currently available qualification e.g. the University of Queensland offers a Master of Environmental Management (Sustainable Development) and the University of Sydney a Master of Agriculture (Sustainable Agriculture).
- Change current courses to include more material on sustainability and thus 'embed' sustainability within current programmes. This is the approach that has been used in the Master of Law (Environmental Law) at Auckland University and the University of Tasmania.
- Offer a standalone, optional course that a student could include in any current qualification without specific recognition
- Encourage students to base assignments on sustainability topics - as suggested by two examiners at Lincoln.

#### **A Masters of Sustainability**

Masters of Sustainability are offered by Adelaide and Sydney Universities (see Appendix 5). In line with the nature of sustainability, the programmes are multidisciplinary and draw on courses from all Faculties.

The Adelaide programme spans themes of “governance, technology and innovation, social and corporate responsibility, science and the environment and economics” and “explores key issues for sustainable futures including climate change, low carbon technologies, integrating sustainability and community engagement”<sup>14</sup>. An overview/scoping course that provides an introduction to sustainability concepts and applications is compulsory for all students.

The Master of Sustainability offered by Sydney University is advertised as a “truly multi- and cross-disciplinary qualification”<sup>15</sup>. It aims to produce graduates “with an appreciation of the technological, commercial, legal, governmental and societal imperatives underpinning sustainability issues” and major themes addressed include “biodiversity, energy conservation, emission management, sustainable building design, urban planning, public health, economic development and environmental, national and international treaty law”.

The survey of courses with sustainability content at Lincoln highlighted the fact that there were only eight courses available that do not require specialist background knowledge outside of the environmental area i.e. that could contribute to a multi or interdisciplinary degree. The non-specialist, non-ERST courses that have a moderate or high level of sustainability content found in the survey are listed in Table 13 below. The course content outline for these can be found in Appendix 1.

**Table 13**  
**Courses at Lincoln that have a medium or high level of sustainability content and do not require specialist background knowledge and are not ERST courses**

Course	Sustainability Focus	Course Title
ECOL609	Sustainability Science	Conservation Biology
LWST602	Sustainable Futures	Advanced Resource Management and Planning Law *NB This course contains aspects of all categories with SF the principle category.
MGMT615	Sustainable Futures	Managing International Development Programmes
MAST603	Sustainable Futures	Mana Kaitiaki
SOCI641	Sustainable Futures	Advanced Society and Environment
WATR601	Sustainability Science	Advanced Water Resources
WATR602	Sustainability Science	Determinants of Water Availability and Quality
WATR603	Sustainability Science	Water Management Policy and Planning

To offer a qualification in Sustainability, Lincoln University would need to be able to offer a wider range of relevant courses than is currently available, across several disciplines. This might require new courses to be developed or major modifications made to current courses.

Sainty (2007) states (in relation to employment in the corporate sustainability area in Australia) that (p.1), “there is no such thing as a typical career. Nor are there specific qualifications as yet required for this field. Because it is so new, transferable skills, experience and knowledge from other related specialisations such as environmental management, ethical finance, diversity, marketing, business administration, community partnerships, innovation, public affairs and HR are valued”.

Michele Ash, the Lincoln University Employment and Industry Liaison Officer, advises (pers. comm.) that a similar situation exists in NZ in that employers would prefer sustainability to be combined with specific skills such as agriculture, accounting or environmental planning. By way of example she

14 From [http://www.adelaide.edu.au/degree-finder/msus\\_msustain.html](http://www.adelaide.edu.au/degree-finder/msus_msustain.html)

15 From <http://sydney.edu.au/courses/Master-of-Sustainability>



points to a recent advertisement by Fonterra for an agricultural graduate with sustainability capacity. The position's role is to "make a positive contribution to our farmer's environmental sustainability".

Given these signals from the job market, and the small number of suitable courses currently offered, it could be concluded that offering a standalone sustainability qualification now would be difficult for Lincoln University. However, it should be noted that the international and jointly taught MNaRM&EE programme is considered by its Academic Programme Leaders to be a 'Masters in International Sustainability' (Spellerberg *et al.*, 2007).

### Sustainability as a Specialisation

The survey found that the most common method for including sustainability in the curriculum is to offer it as a specialisation to a current qualification.

Lincoln University currently offers the Masters in Natural Resources Management and Ecological Engineering with specialisations in Ecological Engineering, Nature Conservation and Wildlife Management, Risk Management and International Business and Sustainability. In addition the review of the MRS programme may recommend new specialisations that have enhanced sustainability content. However if the University chose to, sustainability specialisations could be developed for other degrees. Table 14 demonstrates how this could be undertaken using the Masters of Applied Science (MApplSc) as an example.

**Table 14**  
**MApplSc sustainability specialisations that could be offered at Lincoln University.**

Qualification	Specialisations	Taught Component
MApplSc	Environmental Management and Sustainability	ERST620, ERST604, ERST621, LWST602 (Required courses for the current environmental management specialisation) plus 40 credits @ 600 level (such as ERST633, ERST636, ERST632 or MAST603)
MApplSc	Environmental policy and Sustainability	ERST621, ERST630, ERST636 plus 60 credits @ 600 level (such as ERST631, ERST632, ERST623 or MAST603)
MApplSc	Water and Sustainability	WATR601, WATR602, WATR603, ERST636 plus 40 credits @ 600 level (such as MAST603, ERST631 or ERST630)
MApplSc	Agriculture, Development and Sustainability	PLSC610*, SOS630*, MGMT615, ECON603 plus 40 credits @ 600 level (such as SOCI608, ERST636, or ERST623)

\* Specialist course i.e. not available to most students

For this to be an appropriate course of action, the specialisations listed above would need to provide a complete curriculum of education for sustainability.

Eight of the twenty five courses at Lincoln University that were found to have a medium or high level of sustainability content are environmental courses and all of these are available to approved students without a background in the subject. Thus a qualification in Environmental Management and Sustainability would appear to be a logical first specialisation for Lincoln to offer. The table below lists the aspects of sustainability that are covered by the ERST courses that have a medium or high level of sustainability (plus ERST604 and LWST602 since they are required courses for the current Environmental Management specialisation and SOCI641 because it covers material that

other courses do not) in order to determine which courses are essential for the proposed specialisation.

**Table 15**  
**Aspects of Sustainability covered by selected courses**

Category of Sustainability	Sustainability Topic	Relevant Lincoln University Masters level Course
<b>Sustainability Science</b>	Ecosystem services, laws of physics (e.g. thermodynamics, nutrient cycles), Renewable and non-renewable natural resources and their allocation	ERST632 – Economics in Environmental Policy ERST636 – Aspects of Sustainability
	Environmental sustainability indicators, ecological services	ERST636 – Aspects of Sustainability
	Systemic thinking (e.g. the world is a complex web of relationships)	ERST614 – Risk and Resilience
	Human dependence on nature, human/nature interactions	ERST631 – Environmental Sciences in Environmental Policy ERST636 – Aspects of Sustainability
	Unsustainability, drivers (e.g. population growth, resource use) and consequences (e.g. water and food scarcity, biodiversity loss)	ERST630 – Environmental Policy and Planning ERST636 – Aspects of Sustainability
<b>Questioning</b>	Current economic models and their alternatives, consumerism	ERST632 – Economics in Environmental Policy
	Generational, gender, geographic and other perspectives; pluralism; equity	SOCI641 – Advanced Society and Environment
	Values, norms and attitude clarification, human values and aspirations	ERST630 – Environmental Policy and Planning ERST623 – International Environmental Policy SOCI641 – Advanced Society and Environment ERST601 Advanced Theory in Resource Studies
	Integration of environment and society with economic and cultural factors	ERST630 – Environmental Policy and Planning ERST632 – Economics in Environmental Policy
	Human wellbeing and how to measure it	
	The meaning of social sustainability	SOCI641 – Advanced Society and Environment
<b>Sustainable Futures</b>	Integrating human aspirations and social imperatives with ecological limits. Living within limits	ERST636 – Aspects of Sustainability
	Relevant current laws and the contribution of social/political institutions	LWST602 – Advanced Resource Management and Planning Law ERST604 – Advanced Urban Regional and Resource Planning ERST623 – International Environmental Policy ERST630 – Environmental Policy and Planning ERST636 – Aspects of Sustainability

Lifestyle and business changes that are more compatible with sustainability Indicators of sustainability	ERST623 – International Environmental Policy ERST636 – Aspects of Sustainability ERST632 – Economics in Environmental Policy
Pluralism of views of sustainability and its solutions	SOCI641 – Advanced Society and Environment ERST623 – International Environmental Policy
Partnerships between business, community, NGOs etc.	ERST636 – Aspects of Sustainability ERST620 – Environmental Management Systems
Methods and tools for sustainability (e.g. risk analysis, systems analysis, model construction, life cycle assessment, cradle to cradle processes, pressure-state-response models, measurement of ecological services)	ERST621 – Principles of Environmental Impact Assessment ERST636 – Aspects of Sustainability ERST620 – Environmental Management Systems
Solutions to unsustainability (e.g. cradle to cradle design, technology, appropriate resource allocation/use, consumption patterns)	ERST636 – Aspects of Sustainability ERST632 – Economics in Environmental Policy
<b>Sustainability Practice</b>	ERST636 – Aspects of Sustainability

In the listing above there is some apparent duplication in courses (i.e. the list of 12 selected courses could be reduced). In fact all of the courses have material that is important to sustainability that may not be covered by other courses. For example there are three courses listed as contributing towards the topic “Methods and tools for sustainability” however, each of them teaches different tools and knowledge of them all is important. It could be argued that more tools should be taught than is currently offered (e.g. cradle to cradle processes).

The aspects of sustainability that are either not dealt with or are only partially covered in current courses and that would need to be added into current courses are listed in Table 16 below.

**Table 16**  
**Aspects of sustainability that are not sufficiently covered in selected postgraduate courses**

<b>Sustainable Science</b>	<b>Ecosystem services, laws of physics (e.g. thermodynamics, nutrient cycles), Non-renewable natural resources and their allocation</b>
	Environmental sustainability indicators, ecological services
	Human dependence on nature, human/nature interactions
	Human wellbeing and how to measure it
<b>Questioning</b>	Alternatives to current economic models, consumerism
	Integration of environment, society and economic and cultural factors
<b>Sustainable Futures</b>	Solutions to unsustainability (e.g. cradle to cradle design, technology, consumption patterns)
<b>Sustainability Practice</b>	Understanding the reasons for the failure to implement sustainability to date
	Change management
	Governance and Political Institutions

In order to cover all of the topics listed in Table 15, 12 ERST, LWST and SOCI courses are required and even with this number of courses some aspects of sustainability are missed or only partially covered (Table 16). It is apparent that in order to deliver a complete curriculum of education for sustainability students would need to take more than the 120 credits of coursework required by the regulations. Alternatively, current courses would need to be altered to incorporate other aspects of sustainability. This may, however, alter the intent of a course and place pressure on already crowded syllabuses.

There may be benefit to students undertaking a specialisation to include a single sustainability course as a required course because it would help to add to aspects of sustainability that were not covered by other courses and ensure that students received a high level but holistic understanding of sustainability. ERST636 could fulfil this function.

Offering a specialisation in sustainability would give formal recognition to the sustainability content of the programme and could be of benefit when seeking employment. However, the number of suitable courses currently available is limited and those that are available do not offer a complete curriculum of sustainability without the inclusion of a large number of additional courses. In the case of Environmental Management and Sustainability it is calculated that 12 courses would be required to adequately cover the subject and even then some of the topics listed in Table 4 might not be included, particularly if ERST636 is not used to supplement these missed aspects. For a specialisation to be offered that presented a complete curriculum of sustainability in a specialised area, therefore, new courses would be required.

#### **Embed Sustainability in Course Content**

There are a small number of instances of Universities offering a qualification where sustainability has been fully incorporated into the programme.

The Master of Law (Environmental Law) programme at Auckland University is aiming to embed sustainability in all of its courses (rather than have individual courses that cover this material). Klaus Bosselmann<sup>16</sup> states that (pers. com.), “While lecturers of the programme have their own special expertise, there is a common understanding to follow the hierarchical strong sustainability model. Our strong sustainability approach means priority of environmental over social/cultural and economic aspects, but of course related to each other.”

The environmental department at Tasmania University has taken a different approach. It has developed a module that is available to all examiners in the department. As explained by one of the developers of the module (Davidson, no date):

*The intention is to develop postgraduate coursework material for a 12.5% unit [i.e. a 15 credit course weighting] that will be modularised and can either be adopted as a total package or can be disaggregated into its sub-components for integration into existing environmental and urban planning coursework structures. This flexibility will also allow the unit to be utilised in a continuing professional development delivery mode.*

This approach would also ensure a consistent stance to sustainability across all courses in the department as well as ensure a complete curriculum of education for sustainability.

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<sup>16</sup> Professor of Law, Faculty of Law, University of Auckland and Director of the New Zealand Centre for Environmental Law

Otago Polytechnic has taken a similar approach in embedding a sustainability theme in all of their (undergraduate) course offerings across all departments. This was noted in Spicer *et al.* (2011) but in summary<sup>17</sup>:

- The Polytechnic vision is that *“our graduates, our practitioners and our academics understand the concepts of social, environmental and economic sustainability in order for them to evaluate, question and discuss their role in the world and to enable them to make changes where and when appropriate. Our goal is that every graduate may think and act as a “sustainable practitioner”.*
- Although the Polytechnic has adopted one approach to sustainability (i.e. strong sustainability) they have left each department to determine how best to include this within their programmes, resulting in sustainability being “woven” into every programme of study that they offer. For example the Design school has integrated sustainability into existing courses, but the Health and Community school offers a standalone introductory course to all first year students, and then integrates sustainability into year two and three courses.
- All new programmes under development are required to include sustainability and all graduate profiles now include the requirement for graduates to be “action competent” as a sustainable practitioner in their field.

For Lincoln University to embed sustainability across all disciplines would be a large undertaking. It would include discussion and resolution of the following:

- Agreement around the definition of sustainability – either campus wide or within departments. It is suggested that Table 4 provides such a definition and since it is largely value free it applies equally to all sides of the sustainability argument. That is the list applies equally to those who argue that the environment is of prime importance in sustainability (strong sustainability proponents) as well as those who argue that social or economic factors should be of equal importance to environmental ones (weak sustainability proponents). Choosing the relative importance of each of the pillars of sustainability, as Otago Polytechnic and Klaus Bosselmann have done, is a highly contested area and thus agreement amongst Lincoln teaching staff is unlikely to be reached at least in the short term.
- An alternative is to have a list of concepts on which most examiners agree. Within these concepts there would be an acceptance of a plurality of views. As discussed in Chapter 2 Jacobs (1999) has developed a list of “core ideas”<sup>18</sup> and these could be used as the basis for a pan-campus view on the meaning of sustainability. If this approach was acceptable then these core values could be included in all graduate profiles and thus be embedded in all courses offered by Lincoln University.
- Programmes would need to cover all of the topics listed in Table 4 so that a student received a complete education for sustainability. This could place pressure on already crowded programmes.

It would need to be ascertained whether a programme of this nature was

- (a) acceptable to professional bodies such as the New Zealand Planning Institute, the Environment Institute of Australia and New Zealand and the Society of Chartered Accountants
- (b) to employers.

This aspect has not been addressed in this study due to time constraints.

Embedding sustainability within course content could be challenging but would also be likely to achieve Lincoln University’s aim of providing leadership in ensuring a sustainable future for New

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<sup>17</sup> From: <http://www.otagopolytechnic.ac.nz/about/sustainable-practice/education-for-sustainability.html>

<sup>18</sup> In brief the core ideas are: integration of two or more pillars, concern for the future, environmental protection, equity, quality of life, participation by all

Zealand. Students would not receive formal recognition for their sustainability studies if this approach was adopted. Rather, their expertise in sustainability would rest on the reputation of Lincoln University itself.

### **Sustainability as a Standalone Course**

Perhaps the easiest way to include sustainability within the postgraduate curriculum is to offer a single course that could be included in any programme. This would ensure that all of the aspects of sustainability are covered and therefore that the student receives a complete, if rudimentary, education for sustainability. It would also ensure that all students have the opportunity to be exposed to sustainability knowledge and issues.

ERST636 has historically attempted to do this and could be such a course for postgraduates.

If this approach were to be adopted, employers would be aware (from an academic record) that the student had some knowledge of sustainability – although there would be no formal recognition in the title of the programme.

### **Sustainability included in Course Assignments**

During the survey of Lincoln University PG courses some examiners commented that students could easily include sustainability in their programme by choosing a sustainability-related topic for their assignments. Examples of such non-ERST courses include:

- MGMT608 Management Information Systems
- MGMT610 Professional Consulting Practise
- LASC615 Advanced Landscape Planning and Policy
- LASC698 Research Placement

Comments received from examiners include:

- *“Although sustainability may not be listed in a course outline that does not mean that the principles are not addressed to some degree. Sustainability is a concept that has multiple ways of being expressed. It incorporates long established ideas... so we need to avoid reinventing wheels we already have turning. One way to deal with this might be to prepare a short statement about sustainability as a guiding principle, which we can share with students, alongside others such as resilience and regeneration. There can be benefit in highlighting sustainability as an integrating theme across courses since it has contemporary policy relevance”.*
- *“I think projects at senior and graduate level should be real, topical and of interest to the student involved. Sustainability issues are real, topical, and of interest to a number of students so rather than have the University encourage or dictate that students should undertake/lecturers should provide sustainability projects, I think the University should encourage/dictate that senior and graduate projects should be real and topical”.*
- *“This course has seen two of the three research projects carried out this year being on sustainable projects. So the potential is very much there for a so minded student”.*

It is unlikely that the sustainability content of such projects would be explicitly assessed. As one examiner noted, “there are no marks for sustainability issues per se. The marking is based on how well I believe the student has identified objectives ....and how well those objectives are met”. Two possible ways of resolving this are:

- The sustainability content could be commented on by a third person and thus even if the sustainability content did not contribute to the overall mark learning about sustainability would result; or

- Examiners could be encouraged to engage in learning about sustainability and therefore be in a position whereby they are able to assess a student's understanding. Perhaps a series of courses run by Lincoln or by examiners from other tertiary institutions that are currently engaged in teaching sustainability would provide sufficient knowledge.

If Lincoln wished to offer a complete curriculum of education for sustainability, this avenue is unlikely to achieve that result unless examiners are encouraged to assess the sustainability content of assignments. However, this avenue could be used to raise the profile of sustainability across all disciplines – particularly in areas not normally associated with the subject.

### **7.3 Summary of Opportunities for Including Sustainability in the Curriculum at Post Graduate Level**

The options that have been identified for including sustainability in the postgraduate curriculum at Lincoln are:

- 1) A new programme of sustainability e.g. a Masters of Sustainability.  
While some universities in Australia are offering sustainability as a subject in its own right, use of the term in programme titles does not seem to find favour in New Zealand even though programme outlines suggest that sustainability-related material is being covered. We note the MNaRM&EE degree programme is about sustainability but is not named as such.

There is evidence of a growing demand for sustainability knowledge in the job market (Sainty, 2007; Atkisson, 2011; Earl-Goulet (pers. comm.)<sup>19</sup>, O'Reilly<sup>20</sup>) but this knowledge needs to be combined with knowledge from other domains such as primary industry, commerce or environmental management (Sainty, 2007). Further, the analysis of courses on offer at Lincoln shows that the number and subject-spread of suitable courses is small. Consequently course content would need to be changed or new courses developed if this option was to be chosen.

- 2) Sustainability as a specialisation e.g. a Masters of Applied Science (Water Management and Sustainability)  
Offering a specialisation in sustainability would give formal recognition to the sustainability content of the programme and could be of benefit when seeking employment. However, the number of suitable courses currently available is limited and those that are available do

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<sup>19</sup> Judith Earl-Goulet, Extension Services Manager, Resource Management Group, Environment Canterbury. December 2011, "There are increasing expectations within the Canterbury region, but also nationally, that primary industry sector groups take greater responsibility in leading their members to understand and incorporate methods to mitigate the range of environmental consequences associated with their land use activities. It is worrying that the standard agricultural degree does not seem to provide students with basic skills to understand the inter-relationships between production and sustainable land use and likewise an environmental degree does not seem to provide its students with the skills to balance environmental outcomes with good primary industry activities. As a result the number of people equipped with a suite of skills, and experience, to successfully inform, educate and evaluate sustainable land management activities on farms (e.g. with respect to irrigation, soils, nutrient and riparian/wetland management) are very limited. Yet this is a suite of skills that is going to be in ever increasing demand over the coming years as land users are asked to demonstrate how they are managing their resource use activities in sustainable ways".

<sup>20</sup> Phil O'Reilly, Excerpt from "Address to Blue Green Conference on launch of Greening New Zealand's Growth" <http://www.nzbcso.org.nz/>, March 2012. "In the future - thirty to fifty years out and beyond - the reality is that we will be less carbon intensive and more sustainable. We will be doing things in new ways and those companies and countries that take account of that and move towards that in a sensible and constructive fashion over the next few years will be in a better position to take advantage of those opportunities than countries and companies that do not."

not offer a complete curriculum of sustainability within a 120 credit limit. In the case of a theoretical Environmental Management and Sustainability specialisation, it is calculated that 11 courses would be required to adequately cover the subject and even then some of the topics listed in Table 4 would not be included. For a specialisation to be offered that presented a complete curriculum of sustainability, therefore, new courses would be required or a consolidation of existing courses undertaken. Specialisations would achieve the University's stated aim of contributing to New Zealand's sustainable future by providing the experience of applying sustainability to an area of knowledge and would also provide the applied knowledge required by the job market (Sainty, 2007).

- 3) A programme that has sustainability embedded in all of its component courses e.g. a Masters of Sustainable Agriculture with sustainability included in the Graduate Profile of the programmes and thus embedded in all of the programme courses

To embed sustainability within course content could be challenging but it would also be very likely to achieve Lincoln University's aim of providing leadership in ensuring a sustainable future for New Zealand. Two options for achieving this are suggested: that a module be developed for each department/subject area that examiners could use in full or in part in their courses or that the University sanction a set of underlying principles (such as suggested by Jacobs, 1999) that all examiners agreed with and that these principles be included in the content of all courses. However, the effect of the lack of formal recognition for their sustainability studies on a student's opportunities in the job market remains unknown since the student would be reliant on the reputation of Lincoln University itself as an institution that promotes sustainability for credibility for the sustainability component of their degree.

- 4) Sustainability as a standalone course that can be included in any PG programme. Offering sustainability as a standalone course such as ERST636 ensures that a complete and holistic understanding of sustainability can be taught – although time constraints would require that it be a somewhat superficial treatment of the subject. Employers, however, would be aware (from an academic record) that a student had some knowledge of sustainability. However, there would be no formal opportunity to use this knowledge experientially.

#### **Sustainability included in course assignments**

If Lincoln wished to offer a complete curriculum of education for sustainability, this avenue is unlikely to achieve that result unless examiners are encouraged to assess the sustainability content of assignments. In addition, this approach is unlikely to achieve the University's aim of contributing to the sustainable future of New Zealand although it would give students the opportunity to apply sustainability principles to a given specialist field.



## Chapter 8

### Conclusions

As we approach the end of the UN Decade of Education for Sustainable Development (2005-2015) it is timely that considered thought be given to the teaching of sustainability in postgraduate education.

However, the notion of sustainability and the meaning of its component pillars is strongly contested in the literature (Jacobs, 1999; Wiek *et al.*, 2011) and consequently a more comprehensive definition of sustainability was developed in Spicer *et al.* (2011) as a basis for a complete curriculum for Education *for* Sustainability. This 'definition' was confirmed by recent work undertaken by Wiek *et al.* (2011) and therefore (with some modifications based on the literature) was used as a basis of assessment of the post graduate courses that are offered at Lincoln University in the current study. It could not, however be used to assess the completeness of the programmes that are on offer in Australasian universities because the required level of detail was not available. Instead, these programmes were assessed on the basis of the numbers of pillars of sustainability (environmental, social, cultural and economic) that are mentioned or implied in the programme outline that is available on the web. This methodology does not allow an accurate picture of the inclusion of sustainability in the curricula of the surveyed universities (except perhaps in New Zealand where the information was forwarded to the university concerned for confirmation and correction) but it did point to some general conclusions. These are:

- Over half of the programmes in both countries include only one or two pillars in their programme outlines. The most usual combinations are (a) economic and environmental pillars or (b) environmental and social pillars. This finding mirrors the findings of Schoolman *et al.* (2011) who established that published sustainability-related research is primarily environmentally based and unlikely to include social and/or economic factors. This finding suggests that many programmes are not offering a complete curriculum of Education *for* Sustainability.
- In Australia use of the term sustainability is common in the programme title but this is not the case in New Zealand where the term is rarely used – even in cases where the programme outline demonstrates that sustainability is an important part of the programme.
- Most sustainability-related programmes are in the area of environmental management. Commerce, environmental science and engineering also offer a number of programmes while primary industry offers very few programmes.
- In Australia sustainability tends to be offered as a specialisation rather than as a standalone programme.

The survey of sustainability-related courses showed that courses are relatively evenly spread across environmental management, engineering/architecture, arts (including law and development) and commerce. Science, on the other hand, appears to offer few courses with sustainability content. At Lincoln University, thirty nine courses are offered that include sustainability content. However, this number reduces to sixteen once the level of sustainability content and the need for specialist prior knowledge is taken in to account. Half of these courses are located in the environmental studies area with three in Water Resources Management and one each in Maori Planning and Development, Management, Law Studies, Social Science and Ecology. Of the nine courses that require specialist knowledge, two are in each of the subject areas of Landscape Architecture and Plant Science and one each in Management, Recreation, Soil Science, Tourism and Transport. Subjects that do not offer any courses with sustainability-related material include Accounting, Physical Science, Business Management and Horticulture, and this is despite all of these subjects offering courses at the undergraduate level with substantial sustainability content. Compared with other universities in

New Zealand, Lincoln is underrepresented in the areas of commerce and arts/humanities. Lincoln, on the other hand, appears to be the only University to offer material covering questions based around the implementation of sustainability (i.e. sustainability practice). We believe that there is scope for expanding this aspect with the addition of e.g. material on environmental history and the lack of progress towards sustainability over the last 40 years.

The survey of Lincoln University courses showed that there appears to be limited options for building a 'full' programme for sustainability. The most obvious area to begin is with Environmental Studies because that is where the majority of suitable courses are located. However, this limits the implementation of Lincoln University's stated aim of contributing to New Zealand's sustainable environmental, social and economic future to one small industry sector. There may be an opportunity for Lincoln to offer sustainability-related programmes in the area of primary industry (e.g. agriculture or tourism), particularly as there are few such programmes currently on offer in Australia and only one similar programme in New Zealand.

Determining a suitable method by which to incorporate sustainability into the post graduate curriculum, while providing a complete Education *for* Sustainability, is not a simple task. We suggest five options for further discussion:

- 1) Offer sustainability as a standalone programme (e.g. a Masters of Sustainability)
- 2) Include sustainability as a specialisation to current qualifications (e.g. Master of Applied Science (Agriculture, Development and Sustainability))
- 3) Embed sustainability within the course content of all programmes (e.g. include a set of campus wide agreed principles of sustainability in the graduate profile)
- 4) Offer a standalone course in sustainability that can be included in every qualification (e.g. ERST636 could provide the basis for such a course for postgraduates)
- 5) Include options in course assignments to include sustainability subject matter (e.g. projects that are current, topical and of interest to students often include sustainability issues).

The option of offering a standalone sustainability programme (e.g. a Masters of Sustainability) was discounted on the basis that Lincoln currently has too few courses to build such a programme and, in addition, there is evidence that such a qualification is currently not desired by the job market (Sainty, 2007; see also<sup>21</sup>).

- 1) Most of the surveyed universities are incorporating sustainability as a specialisation to their normal qualifications. Lincoln University could take a similar path but an analysis of the 2012 courses showed there are currently insufficient courses available to form a programme – particularly outside of the Environmental Studies area. Even here, it is estimated that some 11 of the current courses would be required to deliver most of a complete curriculum for sustainability for an Environmental Management and Sustainability specialisation to a Masters in Applied Science programme. Clearly some radical changes to current courses would be required, perhaps along with the introduction of some new courses. We note however, the International jointly taught MNaRM&EE programme as a possible model.
- 2) An alternative would be to incorporate sustainability into the content of all taught courses. This has been done by the Master of Law (Environmental Law) at Auckland University and by the Environmental Department at Tasmania University. In Tasmania a modularised course has been developed that can be used in whole or in part by examiners. This might provide a suitable model for Lincoln since different modules for each department/subject area would provide an experiential view of sustainability tailored to a particular subject area. It might, however, present problems in the job market since there would be no formal recognition of the

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<sup>21</sup> Report of the Green Growth Advisory Group, 2011, "Greening New Zealand's Growth", Ministry of Economic Development, Wellington.

sustainability aspect of the programme in the title or on an academic transcript. Despite this drawback, this path could be a viable option for Lincoln – particularly if the University became known for its promotion of sustainable land use.

- 3) The other options are considered here together. They are to offer a standalone course in sustainability (such as ERST636) that can be included in any of the current programmes and to encourage students to apply such knowledge in the assignments that they undertake in other courses. This alternative ensures that a complete curriculum of education for sustainability is available (albeit at a somewhat superficial level because of time constraints), as well as enabling an experiential approach to the subject. The potential drawbacks to this include lack of formal recognition for the assignments that have been undertaken (i.e. for the experiential aspects) and the likelihood that the sustainability content of an assignment would not be assessed by the examiner. These do not, however, seem insurmountable and therefore this, too, appears to be an approach that could be relatively easily adopted by Lincoln University.

Which option or options is deemed to be the best method for implementing sustainability into the curriculum at Lincoln University depends on the importance placed on factors such as acceptance in the job market, the importance of achieving Lincoln University's aim of contributing to a sustainable future for New Zealand, the willingness of examiners to accommodate sustainability within their current courses and the need to provide skills that are, combined with another subject (such as agriculture), reportedly more in demand in the marketplace.

Deciding on the relative importance of these (and possibly other) factors is outside of the scope of this report and therefore no specific recommendation is made for a particular path for implementation of a complete curriculum of Education *for* Sustainability. However, it is hoped that the material presented in this report will assist the University to come to a decision on how it should proceed.

Lincoln University, with its long history in land use training is undoubtedly well placed to provide the skill set that businesses are requiring<sup>22</sup> and that will enable New Zealand to achieve a sustainable future.

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<sup>22</sup> Sainty, 2007; Atkisson, 2011; Earl-Goulet (pers. comm.)<sup>19</sup>, O'Reilly<sup>20</sup>



## **Chapter 9**

### **Recommendations**

It is recommended that:

- 1) The University resolve to investigate the delivery of a complete curriculum of Education for Sustainability at the Post Graduate level.
- 2) The Sustainability Advisory Group for our Environment (SAGE) be asked to begin discussion with examiners and administrators about the types of development which would allow Lincoln University to implement a curriculum of Education for Sustainability at the Post Graduate level.
- 3) SAGE promotes discussion on the inclusion of sustainability as a specialisation within suitable programmes.
- 4) SAGE promotes discussion on a campus wide view of sustainability (or set of underlying principles) so that, if agreement can be reached that this is an appropriate course of action, in the medium term these principles can be included in the post graduate profile and thus included in all courses that are taught at Lincoln.
- 5) The feasibility of suggesting to examiners that they including sustainability within course assignments be investigated with a view to raising the profile of sustainability across the campus.



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## Appendix 1

### Post Graduate Courses with Sustainability Content at Lincoln University

Subject heading in Course Information Guide 2012	Course code in Course Information Guide 2012	Examiner listed in Course Information Guide 2012	Source of Information*	Availability (Specialist or Generalist)	Focus (Sus. Science, Sus. Futures, Questioning, sus. practice)	Percent of course devoted to Sus.	Sus. Content (explicit or implicit)	Content relevant to Sus. (from Course Information Guide 2012, and Course Outline)
Accounting	nil							
Animal Science	nil							
Biochemistry	nil							
Biological science	nil							
Business Management	nil							
Computing	COMP 622 – Computer Modelling of Environmental Systems	Don Kulasiri (Ag and Life Sciences)	CE	Sp	SS	<30	Im	The study of environmental (e.g. freshwater) systems by implementing and experimenting with computer models. The sustainability aspect appears to be implicit but the whole point of the course is the protection of groundwater from various contaminants through modelling studies. As the testing of groundwater is prohibitively expensive, computational models provide us with tools to make intelligent decisions taking real world constraints into account. Sustainability aspects of aquifers, especially in Canterbury, is the foci of the discussions.
<b>Subject</b>	<b>Course</b>	<b>Examiner</b>	<b>Sorc.</b>	<b>Av</b>	<b>Foc</b>	<b>%Sus</b>	<b>Sus</b>	<b>Content</b>
Ecology	ECOL609 Conservation Biology	Glenn Stewart	CE	Gn	SS	50	Ex	The ecological, genetic and biogeographical principles underlying conservation biology. Application to conservation management.

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Economics –	ECON 603 – Development Economics	Nazmun Ratna	CE	Gn	SF	30	Ex	The focus is on low and lower-middle income countries. Economic growth theories Inequality and poverty Sustainable development Environment & Climate Change
	ECON 606 Natural Resource Economics	Katie Bicknell -	CE	Sp	SF	30	Ex	Natural Resource and Energy Economics. Advanced economic (dynamic) analysis of natural resource and energy use issues including the discount rate and theories of non-renewable and energy resources. One module on sustainability indicators. Multi criteria analysis.
Engineering	Nil							
Entomology	nil							
Environmental Studies	ERST 604 – Advanced Urban Regional and Resource Planning	Ali Memon	PC	Gn	SF	20	Im	Planning theory, practice and politics. The RMA and urban planning.
	ERST 611 – Advanced environmental monitoring	Glenn Stewart	CE	Sp	SS	30	Im	Legislation, monitoring and management. State of the environment. Environmental indicators.
	ERST 620 – Advanced environmental management systems	Lin Roberts	CE	Gn	SF	100	Ex	Application of EMS in a variety of environmental, resource and organizational contexts. The role and practice of environmental auditing. Integration within industry and with policies at local and central government level. Questioning of current mental models, norms, and production practices and exploring their role in unsustainability. Brief overview of the underlying science.
<b>Subject</b>	<b>Course</b>	<b>Examiner</b>	<b>Sorc</b>	<b>Av</b>	<b>Foc</b>	<b>%Sus</b>	<b>Sus</b>	<b>Content</b>
	ERST 621 – Principles of environmental impact assessment.	Geoff Kerr	CE	Gn	SF	100	Im	This subject provides an introduction to theory and practice of environmental impact analysis as practiced in New Zealand and elsewhere. It provides a practical tool for the implementation of procedures used worldwide for assessing the merits of projects that affect the environment.  NB: Some sustainability issues, e.g. intergenerational equity are not covered and e.g. cultural issues may not be covered in all of the cases but all of the EIA course is aimed at achieving sustainable

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								development (as per the RMA)
	ERST614 Risk and Resilience	Sue Vallance	CE	Gn	SF	50	Im	Course includes: The basic tenets of systems theory Comparing and contrasting resilience and sustainable development/sustainability Defining resilience and describe some of the key attributes of a resilient system Comparing and contrast two approaches to 'risk' and 'vulnerability' Describing some 'credible threats' Interrogating the notion of a 'natural disaster' Case study (e.g. the community, the compact city, a business, a farm, an individual)
	ERST 623 International Environmental Policy.	Ton Buhrs	CE	Gn	Q*	90	Im	The analysis of international environmental policy formation and implementation, the role of international actors and institutions, the evaluation of particular international environmental regimes Social, cultural and economic factors covered under trade, policy in general and development *NB This course contains aspects of all categories with Q the principle category.
	ERST 630 Environmental Policy and Planning	Ton Buhrs	CE	Gn	Q*	90	Im	History of environmental policy analysis and planning. Environmental policy development. The environmental problematique, sustainability, and the environmental integration challenge. Economic systems and environmental policy. Socio-cultural systems and environmental policy. Science, scientists and environmental policy *NB This course contains aspects of all categories with Q the principle category.
<b>Subject</b>	<b>Course</b>	<b>Examiner</b>	<b>Sorc</b>	<b>Av</b>	<b>Foc</b>	<b>%Sus</b>	<b>Sus</b>	<b>Content</b>
	ERST 631 – Environmental Sciences in Environmental Policy	Ian Spellerberg	CE	Gn	SS	<30	Im	A critique of science, scientists and scientific approaches and their links to environmental policy. Key ecosystem processes, including connections between cycles and human interactions with the natural environment
	ERST 632 – Economics in Environmental	Geoff Kerr	CE	Gn	SF	60	Im	Economic Models of Environmental decisions. Co-dependency of economics, ecology and human behaviour. Modelling dynamic interactions between economic, natural and social aspects of the

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	Policy							environment
	ERST 633 – Integrated environmental management	Ken Hughey	CO11	Gn	SF	?100	Im	Aims to produce graduates capable of using interdisciplinarity to develop and implement an Integrated Environmental Management (IEM) approach to a variety of resource management problems. Presumably includes social and cultural?
	ERST 636 – Aspects of sustainability	Ian Spellerberg	CE	Gn	SF*	100	Ex	The concepts of sustainability in both national and international contexts. A broad introduction to sustainability (all pillars). The course assumes that there is an issue – and therefore goes straight into discussing what is meant by sustainability. The course also covers global agreements, international agencies in respect of what they are doing for sustainability, available tools (e.g. TBL, TNS, EMS, - indicators and measures), local initiatives and actions to achieve sustainability *NB This course contains aspects of all categories with SF the principle category.
Finance	Nil							
Forestry	Nil							
Horticulture	Nil							
Landscape Architecture	LASC 615 - Advanced Landscape Planning and Policy	Simon Swaffield	CE	Sp	SF	30	Im	Sustainability included in the reading list (e.g. “Regenerative design for sustainable development”) and scope for inclusion in projects.
<b>Subject</b>	<b>Course</b>	<b>Examiner</b>	<b>Sorc</b>	<b>Av</b>	<b>Foc</b>	<b>%Sus</b>	<b>Sus</b>	<b>Content</b>
	LASC620 – Landscape assessment	Simon Swaffield	CE	Sp	SF	50	Im	Assessment of landscape under the RMA
	LASC 698 - Research Placement	Neil Challenger	CE	Sp	SF	Nil or 100	Ex	Two of the three research projects carried out this year were on sustainable projects. So the potential is very much there for a so minded student
Law Studies	LWST 602 – Advanced Resource Management and Planning	Hamish Rennie	CE	Gn	SF*	100	Im	An introduction to resource management and planning law and its context. The purpose, principles, duties and restrictions of the Resource Management Act 1991. Special topics including resource allocation, environmental protection, aquaculture management areas, designations for public works, heritage orders, and water

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	Law							conservation orders as time permits. Key provisions in Local Government Act, Biosecurity Act, Hazardous Substances and New Organisms Act, Marine and Coastal Area (Takutai Moana) Act, Conservation Act, Environment Canterbury Temporary Commissioners and Water Improvement Act. Questioning of provisions in the various Acts and current societal norms. Use of case studies to illustrate sustainable development outcomes. *NB This course contains aspects of all categories with SF the principle category.
Management	MGMT608 – Management Information Systems	Tony Bywater	CE	Gn	SF	0-30	Im	Management and use of information technology on primary producing properties. Students may choose a sustainability-related topic for their major assignment.
	MGMT610 Professional consulting practice	Guy Trafford	CE	Sp	SF	Nil or 100	Im	Physical and financial analysis of case study farms. Analysis of alternatives. Students may choose to investigate an issue that involves sustainability but it is not taught explicitly.
<b>Subject</b>	<b>Course</b>	<b>Examiner</b>	<b>Sorc</b>	<b>Av</b>	<b>Foc</b>	<b>%Sus</b>	<b>Sus</b>	<b>Content</b>
	MGMT615 – Managing International Development Programs - Planning	Michael Lyne	CE	Gn	SF	50	Ex	To introduce and critically analyse concepts and techniques used in the identification, design and review of rural development interventions; to identify best practices for sustainable development interventions. Sustainability is covered both explicitly as well as being implied in other material.
Maori Studies	MAST 603 – Mana Kaitiaki	Simon Lambert	CE	Gn	SF	80	Ex	Maori environmental values and attitudes, customary and contemporary approaches to managing natural resources
Philosophy	PHIL602 – History and philosophy of science	Grant Tavinor	CE	Sp	SS	20	Im	Issues concerning the history of science: scientific explanations and laws of nature; realism and anti-realism; the ontology of natural and social kinds. Students develop their own research topic (with guidance) and it would be conceivable that the student could formulate a topic that was related to or focused on the concept sustainability in the history of science.
Marketing	Nil							
Microbiology	Nil							

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Physical science	Nil							
Plant Protection	PLPT611 – Integrated plant protection	Marlene Jaspers	CE	Sp	SS	20	Im	Understanding of population ecology, sampling, economics and interactions with other management procedures
Plant Science	PLSC601A & B Agronomy	Bruce McKenzie George Hill	CE	Sp	SS	30	Im	Topics in agronomy and in particular crop agronomy. Almost everything the course includes revolves around sustainability in one way or another e.g. N fixation reduces fertiliser, crop water use studies maximise yield and minimises water use, simulation modelling studies ensure crops are grown to maximise yield and reduce inputs, same for plant population studies etc.
	PLSC610 – Pasture Ecosystems	Derrick Moot	CE	Sp	SS	75	Im	Temperate pasture ecosystems including soil plant animal environmental and management interactions. We teach about parasites, weeds, insects etc. – and all about how understanding their life cycle allows you to minimize their impact through targeted cultural (non chemical) control and as a last resort chemical control. We also teach how plants require nutrients and that understanding these requirements allows us to develop fertilizer regimes that make nutrients available when required by plants and thus minimize the application of excess nutrients – i.e. it is all about sustainable production systems from a dispassionate scientific (evidence based) stance. The course definitely includes economic, environmental, social sustainability but does not include cultural factors.
<b>Subject</b>	<b>Course</b>	<b>Examiner</b>	<b>Sorc</b>	<b>Av</b>	<b>Foc</b>	<b>%Sus</b>	<b>Sus</b>	<b>Content</b>
	PLSC 611A & B – Plant and Crop Physiology	Mitchell Andrews	CE	Sp	SS	30	Im	Physiology of whole plants crops and pastures.
Psychology	Nil							
Quantitative methods	Nil							
Recreation	RECN 626 – Natural Resource Recreation & Tourism	Stephen Espiner	CE	Sp	SF	75	Im	Advanced study and analysis of natural resource-based recreation and tourism. The sociological, social-geographical, and social-psychological components of these phenomena. Impacts of recreation and tourism activities on natural resource areas..
Social science	SOCI 641 Advanced	Harvey Perkins	CE	Gn	SF	75	Ex	At the completion of SOCI 641 students should be able to speak and write about the following ideas central to the social scientific study

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	society and environment							<p>of society and environment:</p> <ol style="list-style-type: none"> <li>1. Nature</li> <li>2. Globalisation</li> <li>3. Restructuring, commodification and consumption</li> <li>4. Sustainability, the city and growth</li> <li>5. Place, place-making, sense of place and identity</li> <li>6. Home</li> </ol> <p>This course is a bridge between the Lincoln social science; landscape architecture; environmental management; planning; and parks, recreation, tourism and sport programmes because ideas about, and critiques of, various approaches to sustainability are central the course.</p>
<b>Subject</b>	<b>Course</b>	<b>Examiner</b>	<b>Sorc</b>	<b>Av</b>	<b>Foc</b>	<b>%Sus</b>	<b>Sus</b>	<b>Content</b>
Soil science	SOSC 630	Keith Cameron	CE	Sp	SS	80	Ex	Advanced methods of soil management. Sustainable soil management practices. Advanced principles and practices of soil and fertiliser management in agriculture
Tourism	TOUR603 – Tourism Management –	David Simmons	CE	Sp	SF	100	Ex	<p>Sustainable tourism aims:</p> <ol style="list-style-type: none"> <li>1. To examine the construction and definitions of tourism systems.</li> <li>2. To review major factors and processes that contribute to tourism's economic, bio-physical and social impact.</li> <li>3. To examine policy and management models to alleviate tourism's negative impacts and methods to achieve sustainable tourism development.</li> <li>4. To understand tourism's role within the wider context of the economy and other forms of land use.</li> <li>5. To understand tourism's role in national and global economies and society</li> </ol>
Transport	TRAN601 – Transport and Environment	Jean-Paul Thull	CE	Sp	SF	80	Ex	<p>At the end of the course students will:</p> <ul style="list-style-type: none"> <li>• have a sound and holistic understanding of transport related strategies and organizations in New Zealand that relate to sustainability.</li> <li>• be able to compile a submission related to a substantial New Zealand policy document in the transport area.</li> <li>• To understand the trends in policy development in New Zealand and worldwide and various approaches to solving transport and environmental problems</li> </ul>

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Subject	Course	Examiner	Sorc	Av	Foc	%Sus	Sus	Content
Valuation	nil							• To comprehend the trend towards triple bottom line approaches for solving transport problems.
Water management	WATR601 – Advanced water resources	Jenny Webster Brown	CE	Gn	SS	80	Im	Impacts of exploitation and management or mitigation. Values, (including cultural) associated with water bodies, anthropogenic stresses, ecosystem processes, impact assessment
	WATR602 - Determinants of water availability and quality	Jenny Webster Brown	CE	Gn	SS	50	Im	Methods for environmental impact control and mitigation. Measuring flow, quality and ecosystem health, national standards, indicators for water quantity and quantity, non-point source contamination
	WATR603 – Water Management Policy and Planning	Bryan Jenkins	CE	Gn	SS	100	Ex	Resource management models, policy and planning, within the context of environmental legislation and sound resource management. Topics will include; Resource management models for integrating environmental, social, economic and cultural water values; Legislative frameworks for water governance and management, including local, regional, national and international policy development and water management strategies; Hazard risk assessment and management for resilience; Professional ethics; RMA policy, planning and consenting procedures, using case studies of water use; Projections of future issues, alternative sustainable management and legislative strategies
Wool science	Nil							

\*Source of Information: CIG = Course Information Guide 2012, C010 or C011 = 2010 or 2011 Course Outlines, PC = Personal Communication, CE = Confirmed with Examiner



## Appendix 2

### Sustainability Focus of Selected Courses at Lincoln University

The following table shows courses with medium or high sustainability content that are available to most postgraduate students at Lincoln University, showing sustainability focus

\*Sustainability Focus Key: SS= Sustainability Science, SF = Sustainability Futures, Q=Questioning, SP = Sustainability Practice

**Table 17**  
**Courses with medium or high sustainability content that are available to most postgraduate students at Lincoln University**

Course Code	Sustainability Focus*				Course Content
	SS	SF	SP	Q	
ECOL609	✓				The ecological, genetic and biogeographical principles underlying conservation biology. Application to conservation management.
ERST 620		✓			Application of EMS in a variety of environmental, resource and organizational contexts. The role and practice of environmental auditing. Integration within industry and with policies at local and central government level. Questioning of current mental models, norms, and production practices and exploring their role in unsustainability. Brief overview of the underlying science.
ERST 621		✓			This subject provides an introduction to theory and practice of environmental impact analysis as practiced in New Zealand and elsewhere. It provides a practical tool for the implementation of procedures used worldwide for assessing the merits of projects that affect the environment. NB: Some sustainability issues, e.g. intergenerational equity are not covered and e.g. cultural issues may not be covered in all of the cases but all of the EIA course is aimed at achieving sustainable development (as per the RMA)
ERST614		✓			Course includes: <ul style="list-style-type: none"> <li>• The basic tenets of systems theory</li> <li>• Comparing and contrasting resilience and sustainable development/sustainability</li> <li>• Defining resilience and describe some of the key attributes of a resilient system</li> <li>• Comparing and contrast two approaches to 'risk' and 'vulnerability'</li> <li>• Describing some 'credible threats'</li> <li>• Interrogating the notion of a 'natural disaster'</li> </ul> Case study (e.g. the community, the compact city, a business, a farm, an individual)
ERST 623	✓		✓	✓	The analysis of international environmental policy formation and implementation, the role of international actors and

					institutions, the evaluation of particular international environmental regimes Social, cultural and economic factors covered under trade, policy in general and development?
<b>ERST 630</b>	✓	✓	✓	✓	History of environmental policy analysis and planning. Environmental policy development. The environmental problematique, sustainability, and the environmental integration challenge. Economic systems and environmental policy. Socio-cultural systems and environmental policy. Science, scientists and environmental policy
<b>ERST 632</b>		✓			Economic Models of Environmental decisions. Co-dependency of economics, ecology and human behaviour. Modelling dynamic interactions between economic, natural and social aspects of the environment
<b>ERST 633</b>		✓			Aims to produce graduates capable of using interdisciplinarity to develop and implement an Integrated Environmental Management (IEM) approach to a variety of resource management problems. Presumably includes social and cultural?
<b>ERST 636</b>	✓	✓	✓	✓	The concepts of sustainability in both national and international contexts. A broad introduction to sustainability (all pillars). The course assumes that there is an issue – and therefore goes straight into discussing what is meant by sustainability. The course also covers global agreements, international agencies in respect of what they are doing for sustainability, available tools (e.g. TBL, TNS, EMS, - indicators and measures), local initiatives and actions to achieve sustainability
<b>LWST 602</b>	✓	✓		✓	An introduction to resource management and planning law and its context. The purpose, principles, duties and restrictions of the Resource Management Act 1991. Special topics including resource allocation, environmental protection, aquaculture management areas, designations for public works, heritage orders, and water conservation orders as time permits. Key provisions in Local Government Act, Biosecurity Act, Hazardous Substances and New Organisms Act, Marine and Coastal Area (Takutai Moana) Act, Conservation Act, Environment Canterbury Temporary Commissioners and Water Improvement Act. Questioning of provisions in the various Acts and current societal norms. Use of case studies to illustrate sustainable development outcomes. *NB This course contains aspects of all categories with SF the principle category.
<b>MGMT615</b>		✓			To introduce and critically analyse concepts and techniques used in the identification, design and review of rural development interventions; to identify best practices for sustainable development interventions. Sustainability is covered both explicitly as well as being implied in other material.
<b>MAST 603</b>		✓			Maori environmental values and attitudes, customary and contemporary approaches to managing natural resources
<b>SOCI 641</b>		✓			At the completion of SOCI 641 students should be able to speak and write about the following ideas central to the social scientific study of society and environment: 1. Nature 2. Globalisation 3. Restructuring, commodification and consumption 4. Sustainability, the city and growth 5. Place, place-making, sense of place and identity 6. Home

					This course is a bridge between the Lincoln social science; landscape architecture; environmental management; planning; and parks, recreation, tourism and sport programmes because ideas about, and critiques of, various approaches to sustainability are central the course.
<b>WATR601</b>	✓				Impacts of exploitation and management or mitigation. Values, (including cultural) associated with water bodies, anthropogenic stresses, ecosystem processes, impact assessment
<b>WATR602</b>	✓				Methods for environmental impact control and mitigation. Measuring flow, quality and ecosystem health, national standards, indicators for water quantity and quantity, non-point source contamination
<b>WATR603</b>	✓				Resource management models, policy and planning, within the context of environmental legislation and sound resource management. Topics will include; Resource management models for integrating environmental, social, economic and cultural water values; Legislative frameworks for water governance and management, including local, regional, national and international policy development and water management strategies; Hazard risk assessment and management for resilience; Professional ethics; RMA policy, planning and consenting procedures, using case studies of water use; Projections of future issues, alternative sustainable management and legislative strategies



### Appendix 3

## Notable Examples of Sustainability Post Graduate Courses Available in New Zealand

Below is a list of courses that are notable either because they cover many of the aspects of sustainability or they show sustainability being taught in non-traditional areas. These courses have been selected from Appendix 4.

University	Course Code	Course Content
Auckland	MGMT 737 Sustainability	Review of the development of the global interest in a more sustainable society, international issues related to sustainable development, corporate leadership in the area of sustainability, and social issues linked to stewardship, systems thinking and 'beyond the horizon' approaches to planning.
	LAWENVIR 724 Water Law	Study of the legislative and institutional framework for water management in New Zealand, regulations relating to the allocation of surface water and groundwater, water quality control, the common law doctrine of riparian rights, the concept of total catchment management and river basin and coastal management schemes.
	ENVMGT 741 Social Change for Sustainability	How social change happens and how to improve the uptake of sustainability. Covers the theoretical frameworks that contribute to our understanding of how social change occurs, and their use in the development of sustainability programmes. Includes the methodologies used to gain insight into attitudes, behaviour and values, and their use as a basis for decision-making in environmental management.
Massey	131.704 Sustainable Development	This paper addresses what is meant by sustainable development and presents case studies of its implementation. Critical analysis of sustainable development practice may include examples such as nature conservation and eco-tourism, climate change, sustainable urban development, indigenous sustainable agricultural systems and issues such as mining and corporate social responsibility.
	235.703 Maori Resource and Environmental Management - Fresh Water	A paper that offers the opportunity for postgraduate students to learn about the Maori concepts, values and science processes associated with the management of fresh water. Particular emphasis is placed on the importance of Maori values as they apply to sustainable fresh water management. These values will be discussed in context with Te Tiriti o Waitangi and present day legislation. Case studies will be undertaken to develop skills in the management of Maori fresh water resources
	152.704 Business and Sustainability	An examination of the global debate on environmental issues, the literature on sustainability and the implications of sustainability for business policy and management.
Waikato	ACCT407 Accounting for Sustainability	A study of how business organisations might integrate sustainable development into their decision making and performance evaluation. Emphasis is placed on understanding the wider environments in which the organisation exists.
	STMG580 Strategies for	This paper aims to enhance students' understanding of sustainability issues confronting today's managers and to develop ability in analysing situations and in formulating strategies where sustainability business concerns are implicated. Topics

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Sustainability	include the development of sustainability, the legal framework and principles of environmental management, codes of practice and techniques for managing sustainability issues from a strategic perspective. Students are encouraged to take ownership of topics, develop expertise in particular areas of interest and to take a critical approach to the sustainability debate, becoming aware of the inherent and specific problems of business adoptions of environmentalism and sustainability as well as, where possible, offering creative solutions. A wide range of organisational situations is investigated including manufacturing, retail, service, small, medium and large enterprises, private, public and not-for-profit as well as local and international examples of best practice. The emphasis is on ensuring that organisations are not only operating within legal requirements, but also that they are appropriately oriented to maintain competitive advantage and meet and respond to stakeholder concerns. The paper encourages student participation and incorporates guest lecturers, invited speakers, a site tour and a stakeholder negotiation exercise
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## Appendix 4

### Sustainability-related Post Graduate Programmes and Courses at New Zealand Universities

#### Auckland University

**Table 18**  
**Summary: Sustainability Programmes and Courses, Auckland University**

University	Programme	Sustainability Explicit or Implicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Auckland	Master of Public Health (Environmental Health)	Explicit		✓	✓✓	✓
	Master of Architecture in Sustainable Design	Explicit		✓✓		
	Master of Engineering Master of Engineering Studies (Environmental Engineering)	Implicit		✓✓		
	Master of Energy (Energy, sustainability and the environment)	Explicit		✓✓	✓	
	Master of Law (Environmental Law)	Explicit	✓	✓✓✓	✓✓	✓✓
	Master of Science (Environmental Management)	Implicit	✓	✓✓	✓	
	Master Science (Environmental Science)	Implicit		✓✓		
	Masters of Science (Marine Science)	Implicit	✓	✓✓	✓	
	<b>Individual sustainability courses</b>	<b>Sustainability Explicit or Implicit</b>	<b>Aspect of Sustainability</b>			
			<b>Economic</b>	<b>Environ.</b>	<b>Social</b>	<b>Cultural</b>
	MGMT 737 Sustainability	Explicit	✓	✓	✓✓	
	ECON 771 Economics of Development	Explicit	✓✓	✓	✓	✓
	ENVENG 704 Sustainable Resource Management	Explicit		✓✓		
	ENVENG 750 Sustainability Engineering	Explicit		✓✓		
	ENVENG 751 Sustainable Technologies and Processes	Explicit	✓	✓✓		
	ENVENG 752 Risk, LCA and Sustainability	Explicit	✓	✓	✓	✓
	ENVENG 753 Sustainable Engineering Design	Explicit		✓✓		
	ENVENG 754 Sustainability Engineering Seminar	Explicit	✓	✓✓	✓	
	LAWENVIR 723 Climate Change Law	Implicit	✓	✓✓	✓	✓

	LAWENVIR 724 Water Law	Implicit	✓	✓✓	✓	✓
	LAWENVIR 725 Corporate Environmental Governance	Implicit	✓	✓	✓✓	✓
	ENVMGT 741 Social Change for Sustainability	Explicit			✓✓	
	ENVMGT 742 Ecosystem Complexity and Adaptive Management	Implicit		✓	✓	
	ENVMGT 747 Current Issues in Sustainability	Explicit	✓	✓	✓	
	ENVSCI 738 Water and Society	Implicit		✓	✓	
	ARCHTECH 704B Sustainability of the Built Environment	Explicit		✓	✓	
	ARCHTECH 705B Energy and the Built Environment	Implicit		✓✓		
	URBDES 700 Sustainable Development	Explicit	✓	✓	✓	✓

From: <http://www.auckland.ac.nz/uoa/home/for/future-postgraduates/postgraduate-tour>

## Sustainability Programmes

### ***Master of Architecture in Sustainable Design***

New Zealand's environmental safeguards and renewable energy resources make it an ideal country in which to study the application of sustainable design principles to a western lifestyle.

The MArch in Sustainable Design is a specialisation within the Master of Architecture, offering advanced studies of sustainable design in architecture, urban design and building performance. In this programme you will have the opportunity to study alongside and be supervised by experts in the field of sustainable design who bring both practical and theoretical experience to research and teaching. You can choose a solely research-based programme, requiring the writing of a supervised thesis, or a combination of some formal taught courses together with group or individual research.

### ***Master of Energy (Energy, sustainability and environment)***

The Master of Energy (MEnergy) is an interfaculty postgraduate degree that enables students with undergraduate backgrounds in Engineering, Science or Commerce to undertake graduate studies in energy.

### ***Master of Engineering Studies and Master of Engineering (Environmental Engineering)***

Environmental engineering plays an important role in protecting the environment from the harmful effects of human activity, looking at issues such as global warming, ozone depletion and increasing levels of pollution. As an environmental engineering student, you will learn how to design, develop and evaluate structures, equipment and systems to provide practical solutions to problems caused by increasing consumption, increasing waste and the potential threats to biodiversity.

Areas of study: Research specialisations include hydrodynamics, hydraulics, hydrology, treatment technologies, water systems modelling and sustainability. Primary areas of research are river erosion around bridge foundations, remediation and treatment technologies, physical modelling of river/urban/coastal processes, rough-boundary hydrodynamics, storm water management and environmental systems modelling.



### ***Master of Public Health (Environmental Health)***

There is growing realisation of the importance of the mechanisms behind environmental hazards causing damage to human health. The global burden of disease attributable to environmental hazards has been estimated at 25-33%. Infection, radiation, air, land and water pollution, and environmental disease alone account for over 3000 deaths per year in New Zealand. Furthermore a range of environmental factors account for up to 20% of paediatric and adolescent mortality in Europe. These estimates do not include the effects of more recently recognized environmental hazards, such as urban design and housing conditions. Changing our environment therefore provides a potentially important and largely untapped opportunity to prevent illness and promote well-being.

### ***Master of Laws (Environmental Law)***

#### ***Master of Legal Studies (Environmental Law)***

The Faculty of Law offers courses at the undergraduate and postgraduate level in the areas of planning and environmental law, resource management, mining and energy resources law and international environmental law.

### ***Master of Science (Environmental Management)***

Environmental Management emphasises the use of interdisciplinary knowledge to move toward sustainable development. The goal is to provide students with a sound understanding of the ecological, social, economic and institutional factors that underlie environmental problems and drive change.

The programmes offer a comprehensive range of environmental management courses that look at the knowledge, tools and methods that can solve environmental problems and monitor success. The core courses and some of the electives are taught in modular form to encourage participation by people already in the workforce.

### ***Master of Science (Environmental Science)***

Environmental Science is the interdisciplinary study of natural and managed environments, with an emphasis on the scientific approach to environmental problem-solving. We are dedicated to the need to protect and restore our natural heritage, to minimise our personal and collective ecological 'footprints'; and, where necessary, to remediate past environmental degradation. Our central philosophy is a commitment to interdisciplinary teaching and research that will better enable our society to manage our environment and resources.

### ***Master of Science (Geography)***

#### ***Master of Arts (Geography)***

Our postgraduate programmes offer the opportunity for students to extend their studies and engage in specialised research. Our teaching builds upon our research in areas such as physical and biological systems, resource management, economic and social structures, spatial organisation, cultural landscapes and geographical information science.

### ***Master of Science (Marine Science)***

Marine Science is an interdisciplinary/multi-disciplinary endeavour encompassing the physical, biological and some social and economic dimensions of the marine environment.

## **Sustainability Courses**

### ***MGMT 737 Sustainability***

Review of the development of the global interest in a more sustainable society, international issues related to sustainable development, corporate leadership in the area of sustainability, and social issues linked to stewardship, systems thinking and 'beyond the horizon' approaches to planning.

### ***ECON 771 Economics of Development***

Contemporary issues in development economics. Topics include: the way economists' approaches to leading development issues have evolved to the present; and leading development issues, including sources of economic growth, the role of population, human capital and innovation, labour and migration, international trade and foreign aid, and strategies for sustainable economic development. There is emphasis on the 'Newly Industrializing Countries' and other Third World developing countries.

### ***ENVENG 704 Sustainable Resource Management***

Wide-ranging review of the issues and techniques required for the sustainable management of resources.

### ***ENVENG 750 Sustainability Engineering 2***

An in-depth understanding of sustainability and engineering. The concept of sustainability engineering and engineering's relationship to global issues such as limitations on material and energy resources, pollution and global warming. Tools that engineers need to assist in resolving such problems, including design for environment, servicing, clean technologies and industrial ecology will be covered.

### ***ENVENG 751 Sustainable Technologies and Processes***

Pollution prevention and clean engineering. Resource, waste and energy auditing, resource management, cost/benefit analysis of sustainable technologies, technology and process assessment and design and management of sustainable technologies and processes.

### ***ENVENG 752 Risk, LCA and Sustainability***

The objectives of this course are to provide students with an understanding of sustainability, life cycle assessment, impact assessment and risk assessment and how these can be used to measure sustainability. The format will include discussions on sustainability, assessment methods and sustainability assessment, including scoping, sustainable levels, inventory, impact and risk assessment and mitigations measures.

### ***ENVENG 753 Sustainable Engineering Design***

The principles of sustainable design, including design for environment, design for recycling, design for duration and design for reuse. Assessment of product design, appropriate product function, level of quality and life cycle. Students will be expected to provide input into effective, efficient and sustainable product design.

### ***ENVENG 754 Sustainability Engineering Seminar***

A variety of relevant and current topics relating to sustainability engineering, including the impact of information technologies, GM engineering, nanotechnologies and other new engineering initiatives on society and means of ensuring that those technologies encourage sustainability. Students will assess such issues and discuss the relevance to engineering, sustainability and future development of technology and society.

***LAWENVIR 723 Climate Change Law***

Explores the interconnected science, policy and legal issues involved in addressing climate change.

***LAWENVIR 724 Water Law***

Study of the legislative and institutional framework for water management in New Zealand, regulations relating to the allocation of surface water and groundwater, water quality control, the common law doctrine of riparian rights, the concept of total catchment management and river basin and coastal management schemes.

***LAWENVIR 725 Corporate Environmental Governance***

Takes a comparative and global perspective exploring the regulatory and governance frameworks that shape how corporations address environmental and related social issues.

***ENVMGT 741 Social Change for Sustainability***

How social change happens and how to improve the uptake of sustainability. Covers the theoretical frameworks that contribute to our understanding of how social change occurs, and their use in the development of sustainability programmes. Includes the methodologies used to gain insight into attitudes, behaviour and values, and their use as a basis for decision-making in environmental management.

***ENVMGT 742 Ecosystem Complexity and Adaptive Management***

A review of the evolution in governance and knowledge systems for addressing environmental uncertainty. Learning objectives emphasise the socio-ecological complexity and scientific dilemmas in the determination of performance standards, the management of environmental risk and the assessment of ecosystem services and their capacities.

***ENVMGT 747 Current Issues in Sustainability***

A topical review of approaches to sustainability as applied within a particular industry or sector. Consult the postgraduate handbook (Environmental Management) for information about this year's topic.

***ENVSCI 738 Water and Society***

The effects of modern lifestyles on water resources are explored to develop ideas for sustainable infrastructure in future settlements. The importance of human behaviour in water system function is examined, along with the mechanisms used to influence those behaviours.

***ARCHTECH 704B Sustainability of the Built Environment***

Evolution of sustainable settlements and buildings, and the technologies used both past and present. Analysis of examples in terms of flows of resources and energy. Defining sustainability quantitatively.

***ARCHTECH 705B Energy and the Built Environment***

Contemporary achievements in low-energy building design. Methods of prediction and assessment of building energy performance. Energy modelling as a design tool for the sustainable built environment.

***URBDES 700 Sustainable Development***

A critical exploration of the concepts, principles and indicators of sustainable urban development.

## Auckland University of Technology

**Table 19**  
**Summary: Sustainability Programmes and Courses, Auckland University of Technology**

University	Programme	Sustainability Explicit or Implicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
AUT	Master of Business Administration	Explicit	✓✓	✓✓	✓	
	Master of Business Studies (forthcoming sustainability specialisation)	Explicit	✓✓	✓	✓	
	Individual sustainability courses	Sustainability Explicit or Implicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
AUT	Tourism and Community Development	Implicit	✓		✓	
	Social and Environmental Accounting and Reporting	Unknown				
	Environmental Management and Sustainability	Unknown				
	Business and Sustainability	Unknown				

From: <http://www.aut.ac.nz/study-at-aut/study-areas/business/qualifications/postgraduate/postgraduate-programmes-overview>

### Sustainability Programmes

#### ***MBA in Sustainability***

Sustainability is a critical area for business leaders globally, with environmental issues making regular headlines in major business magazines and newspapers. Social responsibility issues arising from events such as the Copenhagen summit on climate change, and the BP oil spill continue to galvanise the world's attention.

Sustainability has a solid academic standing, practical tools and exemplars and AUT is proud to launch the Sustainability specialisation in the MBA. The MBA will offer 5 sustainability courses for students to select from, which can be studied in any order.

- Climate Change and Carbon Strategies
- Global Environmental Issues for Business
- Environmental Management and Sustainability
- Stakeholder Engagement and Reporting

### Sustainable Design and Marketing

#### ***Master of Business Studies and Master of Professional Business Studies***

Includes the following courses (details not available on website). AUT advise that individual courses in sustainability are currently being 'repackaged' into a coherent sustainability specialisation.

- Social and Environmental Accounting and Reporting
- Environmental Management and Sustainability
- Business and Sustainability

### Sustainability Courses

Tourism and Community Development - Provides students with insights into the tools and mechanisms that can be used to enhance the sustainable economic performance of the industry.

### Massey University

From: [http://www.massey.ac.nz/massey/learning/programme-course-paper/programme.cfm?key\\_word=sustainability&progCollege=&progQualification=&progLocation=&study\\_year=2012&action=show\\_results&submit=Search&bSubmit=Search](http://www.massey.ac.nz/massey/learning/programme-course-paper/programme.cfm?key_word=sustainability&progCollege=&progQualification=&progLocation=&study_year=2012&action=show_results&submit=Search&bSubmit=Search)

**Table 20**  
**Summary: Sustainability Programmes and Courses, Massey University**

University	Programme	Sustainability Explicit or Implicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Massey	Master of Agricultural Science (Life Cycle Management)	Implicit	✓	✓✓		
	Master of Environmental Management	Explicit	✓	✓✓	✓	
	Master of Resources & Environmental Planning	Implicit		✓✓		
	Master of Arts (Development Studies)			✓	✓✓	✓
	Individual sustainability courses	Sustainability Explicit or Implicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
	<a href="#">131.704</a> Sustainable Development	Explicit	✓	✓	✓	✓
	<a href="#">228.750</a> Renewable Energy and Sustainable Development	Explicit		✓✓	✓	
	<a href="#">132.735</a> Natural Resource Planning	Implicit		✓✓		
	<a href="#">150.715</a> Taonga Tuku Iho: Heritage Aotearoa	Implicit		✓	✓	✓✓
	<a href="#">152.704</a> Business and Sustainability	Explicit	✓✓	✓	✓	
	<a href="#">178.762</a> Natural Resource and Environmental Economics for Non-Economists	Implicit	✓✓	✓		
	<a href="#">188.751</a> Advanced Zero Waste for Sustainability	Explicit	✓✓	✓✓		
	<a href="#">189.758</a> Advanced Soil Water Management	Implicit		✓✓		
	<a href="#">228.740</a> Energy Policy	Implicit		✓✓		
	<a href="#">235.701</a>	Explicit		✓✓		✓✓

	Maori Values and Resource Management					
	<a href="#">235.702</a> Maori Resource and Environmental Management – Whenua	Explicit			✓✓	✓✓
	<a href="#">235.703</a> Maori Resource and Environmental Management - Fresh Water	Explicit		✓✓		✓✓
	<a href="#">235.704</a> Maori Resource and Environmental Management - Flora and Fauna	Explicit		✓✓		✓✓
	<a href="#">235.705</a> Maori Resource and Environmental Management - Foreshore and Oceans	Explicit		✓✓		✓✓

### Sustainability Programmes

#### **Master of Environmental Management**

From: [http://www.massey.ac.nz/massey/learning/departments/institute-natural-resources/environmental-management/environmental-management\\_home.cfm](http://www.massey.ac.nz/massey/learning/departments/institute-natural-resources/environmental-management/environmental-management_home.cfm)

Environmental Management centres upon society’s impact on the environment and the management choices available to reduce or mitigate this impact. Given the interconnectedness between living species and their habitats, environment management decisions address both living and non-living elements of the bio-physical environment.

Environment management recommendations must reflect the relationship between society’s social, institutional and economic environment with the bio-physical environment.

The demand for people with environment management skills is growing in New Zealand and overseas. The programmes reflect the growing awareness for the need to protect the environment and use resources of land, water, soil, plants and animals in a balanced and sustainable way.

#### **Master of Resource and Environmental Planning**

From: <http://www.massey.ac.nz/massey/learning/departments/school-people-environment-planning/postgraduate-study/resource-and-environmental-planning.cfm>

The MRP is a postgraduate degree for people who want to work at the highest levels of professional planning practice. It enables you to assume a leadership role in a variety of fields from planning to policy making, economic development, nature conservation and international development. Students may enrol in this programme with first degrees in any related discipline, including planning.

The MRP meets the accreditation requirements of the New Zealand Planning Institute (NZPI), an internationally recognised professional body for planners.

- The MRP is renowned for providing an excellent, practically based planning education. It has a number of distinctive features:

- The MRP fosters skills in critical thinking, independent research and collaborative work settings. Students work with others in an integrated manner on challenging projects in a variety of team settings. Students also develop an ethical and theoretical foundation that serves them well for professional practice.
- The MRP emphasises the importance of practical experience and builds real-world problem solving skills through field and studio work, workshops, role-plays, case studies, and close interaction with lecturers and leading practitioners.

While rooted in the New Zealand context, the MRP draws on international experience and planning approaches. MRP graduates from Massey University can therefore apply their training locally or overseas in a variety of professional and applied environments.

### ***Master of AgriScience (Life Cycle Management)***

From: [http://www.massey.ac.nz/massey/learning/programme-course-paper/programme.cfm?major\\_code=2832&prog\\_id=93428](http://www.massey.ac.nz/massey/learning/programme-course-paper/programme.cfm?major_code=2832&prog_id=93428)

Life Cycle Management (LCM) is a recently introduced endorsement to the MAgriScience. The global push for solutions to major environmental problems such as climate change has resulted in increased emphasis being placed on the resource requirements (footprint) of consumer goods, including food and fibre products. LCM encompasses a broad range of disciplines including agribusiness, logistics and supply chain management, agricultural and horticultural systems and sustainable processing technologies. Research opportunities for postgraduate students include the environmental impact of primary production systems, resource use efficiency, environmental certification, trade policy and market access issues.

### ***Master of Arts (Development Studies)***

From: [http://www.massey.ac.nz/massey/learning/departments/school-people-environment-planning/subject-areas/development-studies\\_home.cfm?~wwpep/Development/](http://www.massey.ac.nz/massey/learning/departments/school-people-environment-planning/subject-areas/development-studies_home.cfm?~wwpep/Development/)

Development Studies is concerned with the understanding and analysis of processes which are transforming people's lives throughout the world. In the past, it was concerned only with the poorer countries of the world and with the ways largely Western solutions could be applied to solve development problems. More recently, it has recognised that the large economic, political and social forces at work are universal, embracing and connecting us all, though our different cultures, environments and resources lead to differing contexts and outcomes. Similarly, there has been a realisation not only that the solutions suggested need to recognise cultural, social and environmental differences but also that Western science and technology has to work with, and learn from, indigenous knowledge systems.

### **Sustainability Courses**

#### ***131.704 Sustainable Development***

This paper addresses what is meant by sustainable development and presents case studies of its implementation. Critical analysis of sustainable development practice may include examples such as nature conservation and eco-tourism, climate change, sustainable urban development, indigenous sustainable agricultural systems and issues such as mining and corporate social responsibility.

#### ***228.750 Renewable Energy and Sustainable Development***

Addresses the challenges of assessing, designing, introducing and maintaining small scale renewable energy technologies in developing countries, particularly in their rural areas. It is here that the big increases in global population and energy demand are predicted to occur over the coming two

decades. The problem is viewed in a holistic rather than a purely technical way. A broad description of what constitutes renewable energy technology is adopted since most energy in the rural areas of developing countries is currently derived from traditional renewable sources.

**132.735 *Natural Resource Planning***

Natural resource planning principles and practice. Application of the concept of sustainable development to the management of biophysical resources and systems. Case studies will focus on the integration of planning and ecological principles in resolving resource management problems. Specialised techniques and methods to advance natural resource planning practice

**150.715 *Taonga Tuku Iho: Heritage Aotearoa***

An examination of the dynamics of Maori culture and custom as part of the Aotearoa/New Zealand heritage. Particular emphasis is placed on the significance of land, language, oral tradition, the marae, art, and the Treaty of Waitangi, as well as an examination of the role of government in heritage through a study of legislation, policy and programmes. Case studies will focus on conservation, maintenance, sustainability and revitalisation

**152.704 *Business and Sustainability***

An examination of the global debate on environmental issues, the literature on sustainability and the implications of sustainability for business policy and management.

**178.762 *Natural Resource and Environmental Economics for Non-Economists***

Economic analysis of policy management issues in the use of natural resources and the environment. The paper will cover such topics as market failure and the need for intervention in the market system, property rights, the application of economic instruments, policy evaluation using benefit-cost analysis and non-market valuation approaches, and sustainability and natural resource or environmental accounting. The concepts and principles will be discussed and applied to resource and environmental issues concerned with, among others, fisheries, land, water, biosecurity, climate change and mining.

**188.751 *Advanced Zero Waste for Sustainability***

An in-depth exploration of the life cycle and environmental issues of solid material resources upon which all economic production depends. Zero Waste is examined as a resource management paradigm shift in philosophy, policy, technology and practices focused on sustainable development.

**189.758 *Advanced Soil Water Management***

Advanced studies on the distribution and movement of water in soils. Design of drainage systems. Techniques for measuring soil physical properties. Indicators of sustainable land use. Models of water use and movement in soil.

**228.740 *Energy Policy***

The factors that influence energy policy at an international and national level are placed in the context of ecologically sustainable development. A key goal is to understand how contemporary pressures such as greenhouse emissions, air pollution and resource depletion can affect energy policy measures. Energy policy instruments such as demand side management, carbon taxes, the promotion of new energy technologies, least cost analysis and pricing structures which can be used to create a sustainable pattern of energy use world-wide are examined.

**235.701 *Maori Values and Resource Management***

In this applied paper students will learn about Māori concepts and values associated with the management of natural resources. Students will gain an appreciation of the importance of



indigenous values, and in particular Māori values and management approaches to sustainable resource management. Case studies will be undertaken to develop skills in the management of natural resources.

**235.702 Maori Resource and Environmental Management – Whenua**

This paper offers the opportunity for postgraduate students to learn and apply Maori concepts, values and science processes to the management of whenua or land and whenua sustainability. These values will be discussed in context with Te Tiriti o Waitangi and present day legislation. Case studies will be undertaken to develop skills in the management of Maori whenua or land resources.

**235.703 Maori Resource and Environmental Management - Fresh Water**

A paper that offers the opportunity for postgraduate students to learn about the Maori concepts, values and science processes associated with the management of fresh water. Particular emphasis is placed on the importance of Maori values as they apply to sustainable fresh water management. These values will be discussed in context with Te Tiriti o Waitangi and present day legislation. Case studies will be undertaken to develop skills in the management of Maori fresh water resources

**235.704 Maori Resource and Environmental Management - Flora and Fauna**

This paper offers the opportunity for postgraduate students to learn about the Maori concepts, values and science processes associated with the management of native flora and fauna. Particular emphasis is placed on the importance of Maori values and practices as they apply to sustainable management of native flora and fauna resources. These values will be discussed in context with Te Tiriti o Waitangi and present day legislation. Case studies will be undertaken to develop skills in the Maori component of management of native flora and fauna.

**235.705 Maori Resource and Environmental Management - Foreshore and Oceans**

A paper that offers the opportunity for postgraduate students to learn about the Māori concepts, values and science processes associated with the management of the foreshore and ocean resources. Particular emphasis is placed on the importance of Māori values and practices as they apply to sustainable management of foreshore and ocean resources. These values will be discussed in context with Te Tiriti o Waitangi and present day legislation. Case studies will be undertaken to develop skills in the Māori component of management of foreshore and ocean resources.

## Waikato University

**Table 21**  
**Summary of Sustainability Programmes and Courses, Waikato University**

University	Programme	Sustainability Implicit or explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
	Master of Environmental Planning	Implicit	✓	✓✓	✓	
	Master of Management Studies (Management & Sustainability)	Explicit	✓✓	✓	✓	
	Individual sustainability courses	Sustainability Implicit or explicit	Aspect of Sustainability			
	Environmental Politics and Public Policy	Explicit		✓	✓	

	Environmental and sustainability education	Explicit		✓	✓	✓
	Ecosystem sustainability	Explicit	✓	✓	✓	
	Environmental evaluation	Explicit		✓	✓	
	Design for energy and environment	Explicit	✓	✓		
	DEVS502 - Sustainable Resource Issues	Explicit		✓		✓
	ACCT507 - Accounting, Sustainability and a Changing Environment	Explicit	✓	✓	✓	✓
	ECON539 - Environmental and Resource Economics	Implicit	✓	✓		
	STMG580 - Strategies for Sustainability	Explicit	✓	✓	✓	✓

## Sustainability Programmes

### ***Masters of Environmental Planning***

From: <http://www.waikato.ac.nz/wfass/subjects/geography/envp/#mep>

The Environmental Planning programme (EP) aims to help you deepen your knowledge about the natural world and human use of the natural environment. It aims to give students the knowledge and skills that are needed to make sure that New Zealanders use their natural resources with care and with as little harm as possible. You will learn the latest knowledge and ideas about sustainable development and an ethic of care for our environment.

Because environmental problems usually include a human aspect as well as a natural element, EP involves courses from the subjects of Biology, Economics, Political Science, Earth Science and Geography, plus Environmental Ethics from Philosophy. These courses give students depth of knowledge about environmental issues as well as a good grounding in each of the core subjects. It helps if you have done one or another of the subjects at high school but is not necessary.

### ***Masters of Management Studies (Management and Sustainability)***

From: [http://mngt.waikato.ac.nz/education/subjects/subjects.asp?subject\\_code=J10](http://mngt.waikato.ac.nz/education/subjects/subjects.asp?subject_code=J10)

In a world of scarce resources we need passionate managers with the skills to make a difference. Management and Sustainability focuses on issues of environmental management, corporate social responsibility and the activities of firms, government organisations and non-government organisations. You'll gain knowledge necessary for management at the interface between organisations, the environment and society. This subject provides a sound basis for a career as an analyst or manager committed to a sustainable world.

## Sustainability Courses

### ***BIOL564 - Ecosystem Sustainability***

This paper focuses on aspects of the health, vitality, resilience and restoration of ecosystems. Topics covered include restoration principles, theory and practice, lake restoration, river and stream restoration, wetland restoration and forest restoration.

### ***POLS537 - Environmental Politics and Public Policy***

This paper introduces students to the complexities and challenges of environmental policy processes, and develops skills in scholarly research on environmental policy making. A significant

focus of the paper is on analysing and understanding the complex intersections of institutions, culture, science and technology, and systems of governance that shape the way modern societies attempt to cope with environmental and natural resource problems.

***DEVS502 - Sustainable Resource Issues***

This paper examines contemporary issues facing natural resource management among indigenous peoples with a particular focus on the experiences of Maori and Pacific peoples.

***ACCT407 -Accounting for Sustainability***

A study of how business organisations might integrate sustainable development into their decision making and performance evaluation. Emphasis is placed on understanding the wider environments in which the organisation exists.

***ACCT507 - Accounting, Sustainability and a Changing Environment***

A study of the potential role(s) of accounting in the journey to a sustainable civilisation. A key theme in the paper is change with a particular focus on how changes in thinking must inform changes in action.

***ECON539 - Environmental and Resource Economics***

This paper covers selected topics in resource and environmental economic with a focus on policy analysis. The resource economics component concentrates on optimal allocation of renewable and non-renewable resources over time. The environmental economics component focuses on the economics and policy analysis of environmental issues, including conversation, non-market valuation and pollution abatement.

***STMG580 - Strategies for Sustainability***

This paper aims to enhance students' understanding of sustainability issues confronting today's managers and to develop ability in analysing situations and in formulating strategies where sustainability business concerns are implicated. Topics include the development of sustainability, the legal framework and principles of environmental management, codes of practice and techniques for managing sustainability issues from a strategic perspective.

Students are encouraged to take ownership of topics, develop expertise in particular areas of interest and to take a critical approach to the sustainability debate, becoming aware of the inherent and specific problems of business adoptions of environmentalism and sustainability as well as, where possible, offering creative solutions. A wide range of organisational situations is investigated including manufacturing, retail, service, small, medium and large enterprises, private, public and not-for-profit as well as local and international examples of best practice. The emphasis is on ensuring that organisations are not only operating within legal requirements, but also that they are appropriately oriented to maintain competitive advantage and meet and respond to stakeholder concerns. The paper encourages student participation and incorporates guest lecturers, invited speakers, a site tour and a stakeholder negotiation exercise

***STER513 - Environmental and Sustainability Education***

This paper aims to provide an opportunity for in-service and pre-service teachers, and community educators to enhance their knowledge and skills in environmental/sustainability education.

***BIOL564 - Ecosystem Sustainability***

This paper focuses on aspects of the health, vitality, resilience and restoration of ecosystems. Topics covered include restoration principles, theory and practice, lake restoration, river and stream restoration, wetland restoration and forest restoration.

**ENV524 - Environmental Evaluation**

This paper explores the interface between science and environmental planning. Insight into the resource consent process and the role of science in supporting sustainable resource management under the RMA is developed.

**ENMP542 - Design for Energy and the Environment**

This interdisciplinary paper focuses on the important aspects of science and technology related to new and existing energy resources and energy efficiency. Topics covered reflect the trend of current development in energy technology.

**Victoria University**

From: <http://www.victoria.ac.nz/sgees/subjects/default.aspx>

Victoria have an Environmental Studies and Sustainability Research Group which introduces itself as follows: “We live in times of drastic environmental changes triggered by human actions. These changes have the potential to have a profound effect on the future of our species and countless others. Our research group examines a wide variety of different policies and management tools that seek to mitigate the impact that human actions have on the environment. This research centres on four main themes: climate change policy and mitigation, human dimensions of biodiversity conservation, Māori environmental management, and urban environmental sustainability”. The members of this group lecture courses that are listed below.

**Table 22  
Summary of Sustainability Programmes and Courses, Victoria University**

University	Programme	Sustainability Implicit or explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Victoria	Master of Science (Ecology and Biodiversity)	Implicit		✓✓		
	Master of Science (Ecological Restoration)	Implicit		✓✓		
	Master of Science (Conservation Biology) Master of Conservation Biology	Implicit		✓✓		
	Master of Environmental Studies	Implicit		✓✓	✓	✓
	Master of Development Studies	Implicit	✓	✓	✓✓	✓
	<b>Individual sustainability courses</b>	<b>Sustainability Implicit or explicit</b>	<b>Aspect of Sustainability</b>			
			Economic	Environ.	Social	Cultural
	PHYG 420 WATER RESOURCES	Implicit		✓✓	✓	
	ENVI 527 THE POLITICS OF ENVIRONMENT AND DEVELOPMENT	Implicit		✓	✓✓	
	ENVI 529 – Special Topic: Sustainable Energy	Implicit	✓	✓✓	✓	

	ENVI 528 – Climate Change Issues	Implicit		✓✓		
	ENVI 505 – Maori Environmental and Resource Management	Implicit		✓		✓✓
	ENVI 526 – Human Dimensions of Conservation	Implicit		✓✓	✓	
	ENVI 504 – Environmental Economics and Public Policy	Implicit	✓✓	✓	✓	
	ENVI 520 – Environmental Management	Implicit		✓✓		
	DEVE 511 DEVELOPMENT THEORY	Implicit			✓✓	✓

### Sustainability Programmes

#### ***Master of Environmental Studies (MEnvStud)***

Issues concerned with the environment, conservation and sustainable development are of key importance from a local to a global scale. Never have these issues been more pressing or more important for our future. Victoria University has recognised the demand from students, business, civil society, iwi and government for teaching and research in this area, and responded with an interdisciplinary programme of undergraduate and postgraduate courses. Placed alongside Geography and Development Studies, Environmental Studies connects naturally to Geology and Geophysics, Public Policy, Law and Management

The environmental studies theme focuses on the inter-relationships between the biophysical and built environments and the human activities which shape and affect them, both in New Zealand and at the global scale. Courses involve the study of policy, management processes, natural hazards, conservation management, Maori and indigenous issues, and resource law and economics.

Throughout this programme the aim is to provide a sound understanding of how natural systems behave within the context of human use and how our institutions and management systems have developed and need to evolve to provide sustainable management of resources.

#### ***Masters in Science – Ecology and Biodiversity***

From: <http://www.victoria.ac.nz/sbs/study/default.aspx>;

No further information available on web site

#### ***Masters in Science – Ecological Restoration***

From: <http://www.victoria.ac.nz/sbs/courses/default.aspx>;

<http://www.victoria.ac.nz/sbs/study/default.aspx>

Theory and process behind the restoration of flora and fauna to degraded sites. Successful ecological restoration and conservation practice.

## ***Masters in Science – Conservation Biology***

### ***Master of Conservation Biology***

From: <http://www.victoria.ac.nz/sbs/study/postgraduate-study/specialist-masters-programmes/mcon-bio/default.aspx>

This professional Masters programme offers a unique programme of study. Conservation biology is rapidly becoming an area of key importance, particularly as the impacts of climate change become known. Human impacts, loss of biodiversity and a growing awareness of environmental change link the fields of conservation, ecology and biodiversity.

### ***Master of Development Studies***

Development Studies seeks to explain the enormous differences in peoples' living standards across the world and to do something about the inequality.

The programme examines the theories and practices associated with inequalities in world development, using multi-disciplinary techniques. It is concerned with the processes and relationships between people and institutions at different scales – from local, small-scale communities, through to national government agencies and international organisations.

Particular attention is paid to the relationships between 'developed' and 'developing' societies, the roles played by various institutions within them and their effects on processes of social, political, economic and environmental transformation.

Development studies concerns issues of contemporary relevance to the world today including:

- Poverty
- Inequality
- Globalisation
- Gender
- Environmental crises
- International aid

## **Sustainability Courses**

### ***DEVE 511 DEVELOPMENT THEORY***

This course aims to introduce students to the wide range of theories about development that have appeared over the past 60 years and more. It involves an examination of "development" and its various interpretations as well as its theoretical and ideological underpinnings. The course will cover the evolution of ideas about development and span a broad range of thinking about development and related concepts such as poverty, underdevelopment and inequality. Topics covered include Western and non-Western perspectives and the historical context of development, market-based development theories, radical theories of dependency and world systems, alternative development including participation, gender and sustainability, and post development theories. Throughout, the links between development theory and policy will be explored.

### ***ENVI 520 – Environmental Management***

This course provides an overview of issues in and institutional approaches to, contemporary environmental management, both in general and in the New Zealand context. Environmental management is seen as including 'resource management'; and the concepts of management and governance are distinguished. the course provides a view of relevant conceptual frameworks (for

example, 'rational choice', the precautionary approach; property rights), tying these to the development of thinking about environmental governance and management.

***ENVI 504 – Environmental Economics and Public Policy***

Concentrated treatment for students with no economics or public policy background. The course will develop an understanding of the essential elements of policy theory and practice and the core of microeconomic theory as applied to the environment. The mechanics and limitations of the market and government will be explored. Insights into private and collective choice making in relation to the environment will be provided. The course draws on economics, policy and political theory, law, ethics and other disciplines.

***ENVI 526 – Human Dimensions of Conservation***

An examination of the fundamental techniques currently employed in conservation management. These include reserve-based, community-based and policy-focussed conservation management methods, using both local and global case studies.

***ENVI 505 – Maori Environmental and Resource Management***

Analysis of traditional vs. contemporary Maori values relating to natural resources and the environment; of the implications of the Treaty of Waitangi for resource management in New Zealand; and of the means of responding to the requirement to take account of the principles of the Treaty within the context of resource management practice.

***ENVI 528 – Climate Change Issues***

An examination of the history and science of climate change, conceptualising the policy issues, climate policy and action.

***ENVI 529 – Special Topic: Sustainable Energy***

This interdisciplinary course surveys energy technologies, resources, economics, environmental impacts, and public policies, with an emphasis on renewable energy and energy efficiency for the power, transport, and building sectors. Comparative assessments among clean energy technologies and conventional fossil fuel technologies lead to analysis of policy options at local, national, and international levels. Options for long-term sustainable energy futures for New Zealand and globally are discussed.

***ENVI 527 THE POLITICS OF ENVIRONMENT AND DEVELOPMENT***

This course uses a political ecology approach to explore issues at the interface of environmental conservation and development. Following an introduction to the foundations of political ecology, the course focuses on key themes which will be explored through integrating theory with case study analyses from around the globe.

Key themes may include:

- environmental degradation and associated social, political and economic marginalization;
- gender based dimensions of resource use;
- conservation and control;
- environmental conflict; and
- identity and social movements.

The course focuses on how factors such as socio political context, political economy, governance, environmental pressures and various identities interact in complex webs of relations. These relations present opportunities, challenges and constraints to how solutions are posed for environmental conservation and development projects.

### **PHYG 420 WATER RESOURCES**

This course aims to provide the skills necessary to undertake an analysis of the water resources of a region or catchment. It covers three broad areas. First, it explores the concepts of rights, ownership, types of usage, and planning mechanisms with respect to water resources. Second, it focuses on the assessment, measurement, and quantification of surface and subsurface water resources, together with the methods and requirements of data acquisition. Issues relating to the assessment, quantification, and monitoring of water quality will also be studied. Finally, the course looks at the effects, both physical and social, of manipulating water resources and the mechanisms available for resolving conflicting usage requirements.

## **Canterbury University**

**Table 23**  
**Summary of Sustainability Programmes and Courses, Canterbury University**

University	Programme	Sustainability implicit or explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Canterbury	Master of Science (Environmental Science)	Implicit		✓✓	✓	
	Individual sustainability courses	Sustainability Implicit or explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
	ECON655 Environmental Economics	Implicit	✓✓	✓		
	ENCH605 Biological Waste Processing	Implicit		✓✓		
	ENCH623 Environmental Management Systems	Unknown				
	ENTR614 Planning and Design of Sustainable Transport	Implicit	✓✓	✓		
	FORE616 Restoration Ecology	Implicit		✓✓		
	LAWS644 Law and the Environment	Unknown				
	LAWS636 Indigenous People's Rights	Unknown				
	LAWS629 Natural Resource Law	Unknown				

### **Sustainability Programmes**

#### ***Masters in Science – Environmental Science***

From: <http://www.canterbury.ac.nz/subjects/envr/>

Environmental Science is an interdisciplinary approach to the study of the environment, incorporating its structure and functioning, and human interactions with the environment.



Environmental Science is an integrative subject that builds on a strong disciplinary base in a major subject such as Biological Sciences, Chemistry, Geography or Geology, with additional study in areas including Antarctic Studies; Forestry; Mathematics; Science, Māori and Indigenous Knowledge; and Statistics (see Related subjects below).

### **Sustainability Courses**

#### ***ECON655 Environmental Economics***

This course will apply microeconomic theory and welfare economics to the management and stewardship of the environment. We will begin by reviewing the ethical framework of welfare economics and its relation to concepts of sustainability. We will use welfare economics to frame the problems posed by public and common property goods, and by externalities more generally. We will see how welfare economics is applied to the problems posed by such goods using cost-benefit analysis. This framework will enable us to address diverse environmental problems. For example, how can we place a comparable value on environmental benefits? How much pollution of the air and water should we tolerate, and how can we reduce pollution to such levels in the least costly way? Can there be effective pollution control when individual contributions cannot be observed? What is economics contributing to the study of global warming, or the effects of trade liberalisation on the environment?

#### ***ENCH605 Biological Waste Processing***

Engineering aspects of the use of biological methods used to treat waste solid, liquid and gas streams including composting, land farming, bioventing, activated sludge, anaerobic digestion, trickle beds, biofiltration and bioscrubbing.

#### ***ENCH623 Environmental Management Systems***

No further information available on the web site

#### ***ENTR614 Planning and Design of Sustainable Transport***

Pedestrian planning and design; Cycle planning and design; Public transport operations and network design; Travel behaviour change and travel plans.

#### ***FORE616 Restoration Ecology***

General principles of restoration ecology, assessment of restoration success; restoration planning; conservation in productive landscapes.

#### ***LAWS629 Natural Resource Law***

No further information available on the web site

#### ***LAWS636 Indigenous People's Rights***

No further information available on the web site

#### ***LAWS644 Law and the Environment***

No further information available on the web site

## Lincoln University

**Table 24**  
**Summary of Sustainability Programmes, Lincoln University**

University	Programme (Courses are in App. 1)	Sustainability implicit or explicit	Aspect of Sustainability			
			Economic	Environ	Social	Cultural
Lincoln	Master of Applied Science (Environmental Science) Master of Science (Environmental Science)	Implicit		✓✓	✓	
	Master of Environmental Policy	Explicit	✓	✓✓	✓	✓
	Master of Resource Studies	Implicit	✓	✓✓	✓	
	Master of Natural Resource Management & Ecological Engineering	Explicit	✓	✓✓	✓	
	Master of Nature Conservation Master of Science (Conservation and Ecology)	Implicit		✓✓		

### Sustainability Programmes

#### ***Master of Applied Science (Environmental Science)***

#### ***Master of Science (Environmental Science)***

Over the last three decades, environmental issues have been the subject of growing concern in most countries around the world. Concerns include the decline of biodiversity, the impacts of many forms of pollution, the degradation and decline of resources such as water, indigenous forests, and fisheries, urban environmental issues, and global warming.

Environmental policy/planning analysts and environmental managers play a central role in advising and assisting governments, businesses and other organisations, from the local to the global level, to develop responses to such issues. Doing so requires an ability to take a trans-disciplinary approach, to develop an understanding of decision-making processes and institutions, and personal and professional skills.

#### ***Master of Environmental Policy***

People throughout the world increasingly have to deal with environmental issues that threaten our environmental and cultural integrity, community security, efficiency and equity, raising questions of sustainability and conflicts of values and ethics in general.

These problems present great challenges to the management of the environment and natural resources.

#### ***Master of Resource Studies***

The study and interpretation of environmental issues requires an understanding of the fluid, contestable relationships between the economic, social and ecological dimensions of environmental decision-making and practice.

The Master of Resource Studies focuses on the theoretical, intellectual and holistic aspects as opposed to the direct application of technical and managerial skills undertaken in other areas of Environmental Management.

***Master of Natural Resource Management & Ecological Engineering***

Natural Resources Management is about being committed to the wise use of natural resources. Sustainability demands internationalisation of environmental management. There is a need for people trained in an international setting.

That is why Lincoln University has joined with BOKU University, Vienna, Austria to produce the innovative Master of Natural Resources Management and Ecological Engineering. Graduates will become part of the next generation of environmental managers who will play an important role in developing sustainable lifestyles.

***Master of Nature Conservation***

***Master of Science (Conservation and Ecology)***

One of the great challenges of conservation is the wise adaptation of techniques and approaches developed in one part of the world to another.

Lincoln University has joined with the University of Göttingen, Germany, to offer this jointly awarded Masters Degree. This initiative came from the Centre for Nature Conservation (University of Göttingen) and the Isaac Centre for Nature Conservation (Lincoln University).

The University of Göttingen and Lincoln University both have strong ecological research programmes and share a common interest in nature conservation. At Lincoln University nature conservation is focused on the natural landscape, endangered species and the impact of human colonisation. The University of Göttingen has expertise with conservation in the cultural landscape, tropical ecology and forestry.

The Master of International Nature Conservation exposes students to conservation problems and solutions in two very different countries in different hemispheres with contrasting cultures.

**Sustainability Courses**

A listing of sustainability-related courses at Lincoln can found in Appendix 1

**Otago University**

**Table 25  
Summary of Sustainability Programmes and Courses, Otago University**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Otago	Master of Applied Science (Environmental Management)	Implicit		✓✓	✓	?
	Master of Science (Environmental Science)	Implicit		✓✓		
	Master of Planning (Social and cultural aspects included as special topics)	Implicit		✓✓	✓	✓

	Master of Indigenous Studies	Implicit			✓	✓✓
	<b>Individual sustainability courses</b>	<b>Sustainability Implicit or Explicit</b>	<b>Aspect of Sustainability</b>			
			<b>Economic</b>	<b>Environ.</b>	<b>Social</b>	<b>Cultural</b>
	PACI 402: Pacific Environments	Masters level?	✓	✓	✓	✓
	GEOG471 Environmental Impact Assessment	Masters level?		✓✓	✓	
	GEOG472 Developments in Environmental Management	Masters level?		✓✓	✓✓	
	BMBA510 Leading Sustainable Enterprises	Explicit	✓✓	✓	✓	

### Sustainability Programmes

#### **Master of Applied Science (MAppSc) in Environmental Management**

From: <http://www.otago.ac.nz/courses/subjects/envm.html>

We are all aware of the environmental crises that are plaguing the world. From global warming and deforestation, to soil erosion and landfills, it seems like a catalogue of disasters that no one is doing anything about. The good news is that there are now increasing numbers of people on the case. Environmental Management is about coordinating these efforts - investigating problems, developing solutions, and working in multi-disciplinary teams to get things done.

Environmental Management is about coordinating environmental efforts - investigating problems, developing solutions, and working in multi-disciplinary teams - to address the environmental crises that are plaguing the world. This includes numerous areas, from global warming to deforestation, soil erosion to landfills

#### **Master of Planning**

From: [http://planning.otago.ac.nz/mplan\\_degree/about\\_mplan](http://planning.otago.ac.nz/mplan_degree/about_mplan)

The objectives of the MPlan Programme are to provide an understanding and appreciation of:

- the philosophical and theoretical underpinnings of planning;
- approaches to resource management in modern and traditional societies, with particular reference to New Zealand and countries in the Asia-Pacific Region;
- approaches towards urban planning;
- Community participation in the planning process;
- the environmental consequences of human activity and how to manage these;
- the political, legal and administrative context within which the activity of planning is carried out (with specific reference to the Resource Management Act in New Zealand);

The two-year MPlan programme has a broad-based curriculum - a particular strength of the course in view of the knowledge and skills that planners require to be effective planning professionals. The structure of the course is designed to give students competence in core planning skills and the opportunity to specialise in areas in which they are particularly interested. These specialisms are usually related to the teaching and research interests of academic staff members at Otago, which include:

- Urban planning in a changing society
- Sustainable development

- Local knowledge and environmental management
- Environmental impact assessment
- Cultural Health and Wellbeing
- Sustainable rural communities
- Natural resource management
- Climatology and climate change

***Master of Science (Environmental Science)***

From: <http://www.otago.ac.nz/envscience/>

The world's population numbers approximately six billion and is projected to grow to at least 10 billion people. Population pressure and increasing resource demands are causing serious global problems. Environmental science provides the scientific basis for quantifying environmental problems, and finding solutions to them.

**Sustainability Courses**

***BMBA510 Leading Sustainable Enterprises***

Concepts and approaches to provide an appreciation of sustainability and sustainable development in relation to business, and the legal, institutional, national and global contexts of sustainability.

Limited to: MBA

***GEOG471 Environmental Impact Assessment***

The origins and principles of EIA; the international state of EIA; recent changes in New Zealand; methodology and EIA; problems with EIA practice, their causes and possible remedies.

***GEOG472 Developments in Environmental Management***

Advanced study of the interaction between socio-political and biophysical dimensions of contemporary environmental issues.

***PACI 402: Pacific Environments***

This paper critically examines Pacific environments and aims to bring to students an in-depth understanding of the complex issues surrounding management of island environments and pressures brought about by issues such as climate change, urban growth, economic development, political tension and differing expectations.



## Appendix 5

### Sustainability-related Post Graduate Programmes at Major, Sustainability-Promoting<sup>23</sup> Australian Universities

#### Australia National University

From: <http://studyat.anu.edu.au/interests/24>

**Table 26**  
**Summary of Sustainability Programmes, Australia National University**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
ANU	Master of Climate Change	Implicit	✓	✓✓	✓	?
	Master of Environment (Environment and Landscape Science)	Implicit		✓✓	✓	?
	Master of Environment (Environmental Studies)	Implicit	✓	✓✓	✓	✓
	Master of Environment (Natural Resource Management)	Implicit		✓✓		
	Master of Environment (Sustainability Science)	Implicit		✓✓		
	Master of Environmental Law	Implicit	✓	✓	✓✓	✓
	Master of Environmental Management & Development	Implicit	✓	✓✓	✓	?
	Master of Science (Environmental Science)	Implicit		✓✓		

#### Master of Climate Change

The Master of Climate Change is an interdisciplinary coursework or coursework and research degree that allows students to develop a program of advanced learning suited to their individual interests and skills in the area of climate change. The degree is jointly offered by the Crawford School of Economics and Government and the Fenner School of Environment and Society.

The program comprises a minimum of three compulsory courses in core topic areas covering climate impacts, vulnerability and adaptation, climate change economics and policy, and methodological approaches; elective courses can be selected from a wide range of topics to meet individual student needs and interests. The Master of Climate Change program allows students to take courses from across the ANU, to draw from the University's breadth and strength in the science, economics, law, policy and governance aspects of climate change vulnerability, adaptation and mitigation

<sup>23</sup> The Universities were selected on the basis of their high ranking in the 2011/12 Times Higher Education World University rankings plus their membership in the Australian Campuses Towards Sustainability group.

### **Master of Environment**

The Master of Environment is a flexible interdisciplinary coursework degree which allows students to develop a program of advanced learning suited to their individual interests and skills in environment and sustainability. The program comprises 18 units in a suite of core topic areas, and 30 units focused on an individual specialisation of the student's choice.

- [Environmental and Landscape Sciences](#)
- [Environmental Studies](#)
- [Forest Science](#)
- [Geography](#)
- [Mathematical Modelling](#)
- [Natural Resource Management](#)
- [Sustainability Science](#)

### **Master of Environmental Law**

The Master of Environmental Law is designed for graduates with no previous legal background who wish to gain a postgraduate law qualification. Since its inception a decade ago, the program has attracted hundreds of students from around Australia and internationally with very different backgrounds, undergraduate degrees and work experience. While many are just beginning their careers, many are well established in them. This comprehensive program in environmental law includes an array of specialist courses covering key areas ranging from biodiversity to water, environmental planning and land use to effective business regulation and enforcement. The program's aim is not only to provide students with a sophisticated understanding of the law but also to explore its origins and implementation, strengths and weaknesses. The program has interrelationships between environmental law and policy, science, economics and culture.

### **Master of Environmental Management and Development**

The Master of Environmental Management and Development is an interdisciplinary degree comprising coursework or coursework and research, that allows students to develop a program of advanced learning. The program comprises compulsory courses in core topic areas covering environmental governance, environmental economics, environmental assessment and research methods. Elective courses can be selected from a wide range of topics to meet individual students' needs and interests, including economics and business, water management, biodiversity conservation, natural resource management, governance and policy, climate change, society and the environment, and law and policy. The courses focus on the theoretical and practical decision aspects of achieving the goals of economic viability, social acceptability and environmental sustainability within differing social and political contexts.

### **Master of Science (Environmental Science)**

This program offers a flexible platform for those wishing to develop breadth in environmental science and resource management, or depth in specific aspects. The scope of this program is broad, reflecting the Australian National University's diverse strengths in the environmental sciences and their applications. The flexibility of course requirements for the degree allows programs to be structured to meet individual interests.



## Curtin University

**Table 27**  
**Summary of Sustainability Programmes, Curtin University**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Curtin	Master of Engineering Science (Renewable Energy Electrical Power Systems)	Implicit	✓	✓✓		
	Master of Science (Sustainability)	Explicit	✓	✓	✓	
	Master of Science (Dryland Agricultural Systems)	Implicit	✓	✓✓		
	Master of Science (Sus Aquaculture)	Explicit		✓✓		
	Master of Sustainability & Climate Policy	Explicit		✓✓	✓✓	

### **Master of Engineering Science (Renewable Energy Electrical Power Systems)**

In light of recent debate over climate change and a growing need for renewable energy sources, there's never been a better time to upgrade your qualifications in this field and tap into the growing industry. This course will introduce you to power conditioning aspects of major renewable energy technologies including wind, photovoltaic and small hydro. You will also evaluate other alternative energy sources such as fuel cells. You will explore the use of electrical equipment required for power transmission and conditioning, including storage, and understand their workings. We will provide you with knowledge of standards so you can design, analyse, simulate and implement stand alone and grid connected renewable or hybrid energy systems on both a small and large scale.

Optional courses include:

- [306832 Cleaner Production Tools 603](#)
- [306831 Eco-Efficiency 603](#)

### **Master of Science (Sustainability)**

Sustainability management aims to make measurable contributions to economic development, social advancement and environmental protection. Is it more than managing only the negative environmental and social implications of an organisation's operations. Sustainability management is concerned with utilising proven organisational concepts and business tools in a widened sustainability context, to achieve more sustainable outcomes.

### **Master of Science (Dryland Agricultural Systems)**

This course will provide you with a comprehensive understanding of dryland (rain-fed) agricultural systems. Your examination of farming systems in southern and south-western Australia will equip you with knowledge applicable to Mediterranean environments around the world, and you will also learn about the emerging technologies for precise management of crops and livestock, and the role of these technologies in ensuring sustainable and environmentally sound production systems into the future. The program covers science and technology for crop, pasture and livestock production (including the roles of genetics and management in achieving optimum production against environmental constraints), and their integration into viable farming systems.

### Master of Sustainability and Climate Policy

This course will provide you with skills and knowledge to bring to your professional life an understanding and appreciation of contemporary social issues, and heightened skills in social research and analysis. Throughout the course you will apply your developing skills and understanding to real-life issues in your professional work and community engagements.

Courses include:

- [SS 522 Pathways to Sustainability](#)
- [SS 541 Urban Design for Sustainability](#)
- [SS 542 Sustainability through Deliberative Democracy](#)
- [SS 543 Sustainable Cities](#)
- [SS 544 Leadership in Sustainability](#)

### Master of Science (Sustainable Aquaculture)

An internationally accepted program based on environmentally sustainable aquaculture technologies

### Master of Urban and Regional Planning

Optional course is [Planning for Sustainability 511](#)

## Deakin University

From: <http://www.deakin.edu.au/scitech/courses/postgrad/index.php>

**Table 28**  
**Summary of Sustainability Programmes, Deakin University**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Deakin	Master of Applied Science (Environmental Management)	Explicit	✓	✓✓	✓	?
	Master of Applied Science (Sustainable Water Management)	Explicit		✓✓		

### Master of Applied Science (Environmental Management)

The Environmental Management stream involves a multi-disciplinary approach to examining why environmental impacts occur and developing appropriate solutions to managing these impacts. Today, approaches to environmental management tend to be based on the concept of the "triple bottom line", which is the management of the environmental, social and economic issues. Balancing resources and employment against environmental impacts requires a range of specialist skills and knowledge. Environmental managers need to understand government policy direction and legislative compliance issues while analysing environmental risk. This course provides students with an understanding of the necessary skills and knowledge to be able to relate these issues to their organisations and the broader industry sectors. As well as the broad directions of contemporary environment management, such as sustainability and the triple bottom line approach to decision

making, this course provides specific skills in analysing impacts and determining the most appropriate action to minimise impacts.

### Master of Applied Science (Sustainable Water Management)

Managing our water resources and working effectively as a Sustainable Water Management professional requires an understanding of the complex, interdisciplinary aspects of the field. This program addresses the complex, interdisciplinary aspects of managing water resources by helping students integrate the biological and physical sciences with engineering. You'll gain an understanding of cutting-edge developments in water and wastewater treatment processes, water supply and sewerage infrastructure, and water recovery and reuse.

## Griffith University

From: <http://www.griffith.edu.au/programs-courses/>

**Table 29**  
**Summary of Sustainability Programmes, Griffith University**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Griffith	Master of Environment (Climate Change Adaptation)	Implicit	✓	✓✓	✓	?
	Master of Environment (Economics and Policy)	Explicit	✓✓	✓	✓✓	?

### Master of Environment

There are two specialisations in this programme:

#### 1) Climate Change Adaptation

This specialisation introduces students to the physical science basis for climate change and its ecological and human health impacts. It examines the different economic instruments and legal tools available or proposed, both nationally and internationally, to mitigate and adapt to climate change, and analyses the various emissions trading regimes. Legal and policy decisions in different sectors, such as renewable energy and transport are examined. Society's vulnerability to climate change impacts and possible adaptive strategies, with various foci such as human health, biodiversity, natural disaster management (e.g. bushfires and droughts) and urban systems are explored. There is the opportunity to gain practical experience by exploring a theme in climate change via an applied project, possibly in conjunction with an industry partner or one of Griffith's research centres.

#### 2) Economics and Policy

One of the most profound challenges faced by society is how to become sustainable. Addressing this challenge has created exciting careers in environmental economics and policy making across the business, government and community sectors. This specialisation provides training in these professions for people who wish to: upgrade their qualifications, change careers, help to make society more sustainable, or undertake further postgraduate study. The programs are designed for graduates from any discipline. The Masters and Masters Advanced programs provide a stepping stone for people who want to move into more senior management positions. The Masters with Honours and Masters Advanced with Honours programs provide further training in running research projects.

## La Trobe University

From: <http://search.latrobe.edu.au/search/search.cgi?collection=find-a-course>

**Table 30**  
**Summary of Sustainability Programmes, La Trobe University**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
La Trobe	Master of Civil Engineering (Sustainable Infrastructure)	Implicit			✓	
	Master in Science (Environmental Management and Ecology)	Implicit		✓✓		

### Master of Civil Engineering (Sustainable Infrastructure)

There is a worldwide need for sustainable infrastructure to ensure future prosperity, but also a critical shortage of skilled professionals for these projects. Our electronic engineering coursework program enhances the knowledge of graduates and integrates learning with industry-based work experience and project opportunities. Study electronic engineering, and specialise in biomedical, communication, electronic systems or optical engineering.

### Master in Science (Environmental Management and Ecology)

Our research specialities include aquatic research, functional morphology, taxonomy and phylogeny, population ecology, community ecology, alpine ecology, and environmental modelling. We are a member of the Australian CRC eWater and collaborate with the Murray- Darling Freshwater Research Centre and the Research Centre for Applied Alpine Ecology. Collaborate with the best minds in your field locally and internationally. We are a member of Innovative Research Universities (IRU) Australia that attracts more than A\$340 million in annual funding.

## Macquarie University

From:

[http://www.mq.edu.au/future\\_students/postgraduate/what\\_course\\_to\\_study/search\\_courses\\_by\\_interest/](http://www.mq.edu.au/future_students/postgraduate/what_course_to_study/search_courses_by_interest/)

**Table 31**  
**Summary of Sustainability Programmes, Macquarie University**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Macquarie	Masters in Sustainable Development	Explicit			✓✓	
	Master of Environmental Education	Explicit			✓✓	
	Master of Environmental Law	Implicit		✓	✓✓	
	Master of Environmental Management	Implicit		✓✓		
	Master of Environmental Planning	Implicit		✓✓	✓✓	
	Master of Environmental	Implicit		✓✓		

	Science					
	Master of Environmental Studies	Implicit		✓✓		
	Master of International Environmental Law	Implicit		✓	✓✓	

### **Masters in Sustainable Development**

This program is aimed at attracting professionals working in the field of environment and development or sustainable development. The program addresses professional needs about how to interact with people and organised groups to bring about change. It is particularly relevant to those who are involved in planning, financing and evaluating initiatives in sustainable development. Through its international case study focus, the program addresses the needs of professionals working in aid agencies, non-government organisations, government agencies, corporations and international bodies concerned with sustainability issues.

#### **Master of Environmental Education**

This program explores the role and scope of education in attaining environmental and sustainable development goals. Students learn to identify principles of good practice in order to plan and evaluate programs in environmental education and education for sustainable development. Emphasis is also placed on the communication and interpretation process, and effective communication techniques at various local, national and international levels, within informal and non-formal education.

#### **Master of Environmental Law**

The Master of Environmental Law is available to both lawyers and non-lawyers and is designed to meet the needs of business persons, environmental consultants, workers in the resource sector and lawyers working in the environmental law and government law area, or those wishing to work in these areas

#### **Master of Environmental Management**

This is an interdisciplinary program aimed at skilling and training environmental professionals. Students will build skills in critical thinking, report writing and oral presentation. A wide variety of projects are tackled. The learning outcomes are focused on being able to cooperate within or manage a team of people working from different discipline perspectives and areas on finding solutions to environmental problems.

#### **Master of Environmental Planning**

The Master of Environmental Planning is a holistic, inter-disciplinary and flexible program. Compulsory units of study develop professional skills and knowledge in matters important to planning practice, while the program also allows students to pursue their special interests, such as environmental and resources management, sustainable development in urban and non-urban planning contexts, and planning for climate change adaptation

#### **Master of Environmental Science**

The Master of Environmental Science is offered in conjunction with all science departments at Macquarie University. Students are therefore, able to study in depth in the three discipline areas of ecology, geosciences and the physical sciences (chemistry and physics). In addition, specific units of applied interdisciplinary study, such as Science and Management of Degraded Environments, and Pollution Control and Waste Management, are a feature of the program.

### Master of Environmental Studies

This Masters program is the broadest and most flexible of those offered by the Graduate School of the Environment, in that only four units are prescribed. These units provide the inter-disciplinary base. Students can then choose electives from the very wide range on offer. The program is particularly appropriate for students coming from a background which is not closely related and who want to learn about diverse aspects of the environment.

### Master of International Environmental Law

Masters degrees within Macquarie Law School provide an interdisciplinary perspective on regulatory problems facing governments, business and communities in the areas of global and national governance, environmental stability and corporate social responsibility. This degree will be particularly useful in providing international and comparative studies across a wide range of environmental law.

## Monash University

From: <http://monash.edu/pubs/2012handbooks/aos/index-bytitle.html>

**Table 32**  
**Summary of Sustainability Programmes, Monash University**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Monash	Master of Sustainability (Environment and Sustainability)	Explicit		✓	✓✓	
	Master of Sustainability (Corporate and environmental sustainability management)	Explicit	✓✓	✓		
	Master of Sustainability (International development and environmental analysis)	Explicit		✓✓		
	Masters of Business (Sustainability)	Explicit	✓✓	✓	✓	
	Masters of Environmental Science	Explicit	✓	✓✓	✓	✓

### Master of Sustainability

The three streams of the Master of Sustainability are:

Environment and sustainability:

For students who wish to broaden and deepen their understanding and experience to enable societal and individual change and responsible action to support sustainability, and to enhance their qualifications for careers in environmental policy and analysis, planning, consulting, education, advocacy and management. Core units provide knowledge and skills to critically analyse problems of environment and sustainability and to propose realistic solutions in both personal and professional settings, while a wide range of electives cater for specialised needs and interests.

Corporate and environmental sustainability management:

Designed to meet the growing need for skilled professionals that have competencies in both business and environmental/sustainability management and who understand the nexus between the two. It is vocationally oriented and flexible, to accommodate students who have only business or environmental backgrounds, people with significant industry experience, and people wishing to move into the field.

International development and environmental analysis:

For students who wish to pursue careers or enhance their professional skills in the fields of international development and environmental sustainability. Core units introduce students to international and comparative perspectives and approaches to development and global sustainability, and encourage critical and comparative analysis of international development policies and practice, promoting active engagement in sustainable development in transnational and regional contexts.

### **Masters of Business (Sustainability)**

The sustainability discipline extends the corporate governance and social responsibility foundations of the program with six units dealing with specific areas of business sustainability and the increasing need for corporate managers to integrate social and environmental impacts into decision making processes, including relevant units from the Monash School of Geography and Environmental Science.

### **Masters of Environmental Science**

Geography and environmental science is concerned with understanding dimensions, complexities and relationships of the physical, human and environmental world. The school has an active research program that provides research training and the foundations for interactions across a range of government, non-government and industry sectors. There are a number of broad research strengths within the school including:

- urban and regional sustainability - associated with social, cultural, economic, environmental and political change across a range of scales (global to local); dealing with a range of activities (housing, economic development, resource management, sustainability) and contexts (Australia, Africa and Indo-Pacific Region)
- short and long-term changes in climate, vegetation and the physical and human landscape
- the socio-political structures shaping human interactions with the biosphere and the exploration of the community governance of environmental and ecological change at the local, national and international scale
- specialisation in the archaeology of Aboriginal Australia and the Torres Strait
- geographic information systems (GIS) and remote sensing, with strong emphasis on scientific applications to environmental and resource management, GIS for mapping and modelling in local government, transport and land use planning applications

## University of Adelaide

From: <http://www.adelaide.edu.au/degree-finder/>

**Table 33**  
**Summary of Sustainability Programmes, University of Adelaide**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Adelaide	Master of Sustainability	Explicit	✓✓	✓✓	✓✓	?
	Master of Environmental Policy and Management	Implicit	✓	✓✓	✓	
	Master of Environmental Monitoring Technologies	Implicit		✓✓		

### Master of Sustainability

This is a multidisciplinary program drawing together a wide range of courses in the area of sustainability. The programs address the complex challenges of the future such as sustainability, climate change and sustainable resource management. The programs draw on courses from all Faculties of the University spanning themes of governance, technology and innovation, social and corporate responsibility, science and the environment and economics.

It explores key issues for sustainable futures including climate change, low carbon technologies, integrating sustainability and community engagement.

Courses are grouped into five themes:

- Economics
- Governance
- Innovation and Technology
- Science and the Environment
- Social and Corporate Responsibility

Courses must be taken from several of these areas, with choices available within themes to provide flexibility for students and accommodate a range of interests, backgrounds and schedules. Courses are delivered via a wide range of modes. An overview/scoping course provides an introduction to sustainability concepts and applications and is undertaken by all students.

### Master of Environmental Policy and Management

#### Master of Environmental Policy and Management(Applied)

This program provides you with a thorough understanding of the principles and practice of environmental policy, planning and governance. In the third millennium, responding effectively to environmental problems involves far more than the application of scientific knowledge or the 'top-down' regulation of people and their environments. Responding to contemporary environmental problems in the complex, multi-jurisdictional domain of environmental management, government policies must be negotiated with and implemented through diverse private sector agents and a differentiated civil society. Managing environmental problems therefore entails a new set of approaches, including government, public-private partnerships, economic tools and incentives, democratic decentralisation and risk management.



The program addresses how the signature environmental issues of our time -global warming, water shortages, deforestation and the like – are to be managed – now and into the future.

### Master of Environmental Monitoring Technologies

Concern about climate change, loss of biodiversity and water shortages is leading to the rapid growth in markets for accurate, low cost environmental monitoring tools. Government agencies responsible for reporting on the performance of their environmental programs, or who need to monitor compliance with environmental regulations, require managers who understand the technical options that are available to them. Businesses need solutions to meet their legislative obligations and there is a ready and growing market for lower cost monitoring solutions that make use of the latest technological platforms. Engineering companies need technical professionals who can lead development programs in this area.

### University of Melbourne

From: [http://www.environment.unimelb.edu.au/futurestudents/specialist\\_paths\\_of\\_study](http://www.environment.unimelb.edu.au/futurestudents/specialist_paths_of_study)

**Table 34**  
**Summary of Sustainability Programmes, University of Melbourne**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Melbourne	Master of Environment (Integrated Water Catchment Management)	Implicit	✓	✓✓	✓	
	Master of Environment (Development)	Implicit		✓	✓	
	Master of Environment (Conservation, Restoration and Landscape Management)	Implicit		✓	?	
	Master of Environment (Energy Studies)	Implicit	?	✓✓	✓	
	Master of Environment (Waste Management)	Implicit		✓✓		
	Master of Environment (Governance, Policy and Communication)	Implicit			✓✓	
	Master of Environment (Sustainable Cities, Sustainable Regions)	Explicit		✓✓	✓✓	
	Master of Environment (Sustainable Forests)	Explicit	✓	✓✓	✓	
	Master of Environment (Environmental Science)	Implicit		✓✓		
	Master of Environment (Climate Change)	Implicit	✓	✓✓		
	Master of Environment (Energy Efficiency Modelling and Implementation)	Implicit		✓✓		

## Master of Environment

### Areas of Specialisation:

- Development
- Conservation, Restoration and Landscape Management
- Integrated Water Catchment Management: With global climate change and more extreme weather conditions, water catchments have never been under more pressure, and professionals with skills in their management are in high demand. Catchment management involves the integration of sound biophysical information with social and economic analysis. This is used to achieve the best outcomes for a catchment's natural resources and the people who live and work there.
- Energy Studies: The amount of energy we consume as a global society is immediately impacted by the technologies we use to consume that energy, and how that energy is produced. The Energy Studies major is concerned with the theoretical and practical needs of professionals working in energy use and planning. A range of technologies, both mainstream and non-conventional, can be used for energy supply. We study these technologies and how they can be applied in energy planning and energy end use. We also examine the social and political factors influencing the acceptance of energy technologies.
- Waste Management: Waste is more than just what people throw in the bin. There are air-borne emissions, liquid wastes that impact on water supplies as well as the complex waste streams produced by industry that can have toxic impacts on the environment. Waste Management is concerned with the management of various waste streams. We study waste avoidance and minimisation, best environmental practice and provide the tools for sound decision making at the design and implementation phases of waste management projects
- Governance, Policy and Communication: Who drives the laws that determine our environmental future? And how can positive change be effectively communicated, or policy influenced through regulation, better governance and the media? The development and marketing of environmental policy is vitally important in effecting changes in government, corporate bodies, and across the environmental sector. The Governance, Policy and Communication major looks at existing national and international legal and political frameworks relevant to the environment, enhances your skills in policy-making, business management and marketing, and gives you the tools to incorporate these skills and work systems in the workplace.
- Sustainable Cities, Sustainable Regions: Complex relationships exist between cities and the agricultural and natural environments on which they rely. The Sustainable Cities, Sustainable Regions major examines such relationships and how they impact on urban, suburban, rural and regional dwellers in the 21st century at different scales. This major applies sustainability concepts to human settlements and to natural resource management in other settings.
- Sustainable Forests: Study biological, economic, social and environmental factors that impact on forests; the development of forest and natural resource management enterprises both in Australia and internationally, and carbon sequestration and water resource management
- Environmental Science: Through the subjects offered in this major, you will be able to describe major current global environmental challenges facing scientists and policy-makers; discuss the relevance of a range of scientific disciplines to environmental management including meteorology, ecology, toxicology, hydrology, geology and epidemiology; analyse scientific evidence and arguments including empirical observation and analysis, modelling and use of expert opinion; and judging the merit of scientific arguments made in environmental policy documents.
- Climate Change: Climate change mitigation and adaptation are increasingly being integrated into business management, government policy and technology design. These require knowledge across a range of fields including international conventions, strategic government and business policy, climate science, energy technology, economic analysis and management.

Effective solutions necessitate a new generation of policymakers, managers and scientists equipped with a multi-disciplinary understanding of climate change issues. This major is designed for students seeking an interdisciplinary perspective on climate change, for work in policy-making or business advisory roles.

- Energy Efficiency Modelling and Implementation: Energy modelling and implementation for buildings is an important area in the light of growing concerns about climate change, energy security and the general need to adopt more sustainable practices. Despite the obvious need for people with such knowledge, there is a severe shortage of people that are trained in energy modelling who have the capacity to interpret the modelling results to effective practice. The realms of energy knowledge required include heating and cooling requirements, as well as use of day lighting and natural lighting. These skills are crucial to being able to reduce the risk in the integration of innovative sustainability initiatives, this risk reduction centres on assurances of performance and delivery of desired sustainability outcomes.

Compulsory Courses:

- MULT90005 Transdisciplinary Thinking and Learning. This course enhances multidisciplinary thinking skills and further develops this kind of critical thinking through readings, class discussions and collaborative assessment. The subject will also further develop analytical approaches to environmental issues of complexity and uncertainty.
- MULT90004 Sustainability, Policy and Management: This course provides a fundamental appreciation of the concepts of sustainability and the skills to recognise appropriate (or best) practice in implementing sustainability. The subject will also assist students in deciding which further subjects to take and which stream may be the most suitable.

## University of Newcastle

From: <http://www.newcastle.edu.au/what-can-i-study/postgraduate-programs/>

**Table 35**  
**Summary of Sustainability Programmes, University of Newcastle**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Newcastle	Master of Environmental Business Management	Explicit	✓✓	✓✓	?	
	Master of Environmental Management	Implicit	✓	✓✓	✓	

### Master of Environmental Business Management

In today's society, there is increasing pressure for businesses to reduce their environmental impact. Drastic environmental concerns such as climate change are driving the way we think and work. As the importance of responsible environmental management grows, more and more people will need to improve their 'green' credentials.

Our Master of Environmental and Business Management program has been developed in response to these concerns and combines business management courses with environmental topics. Our program focuses on:

- project management
- sustainability
- environmental planning and policy
- climate change

- environmental management
- human resources and financial management
- consumer decision making and behaviour.

### Master of Environmental Management

The Master of Environmental Management produces graduates who can constructively engage with complex environmental concerns that confront contemporary society. Combining theory with practice, this degree program gives you an excellent grounding in sustainability, environmental management, impact assessment and policy allowing you to participate in various environmental management projects and decision making processes. Regardless of your background – whether from environmental science, resource management, geography, social science or humanities – the understanding and insight gained from this degree will greatly benefit your career prospects. With better understanding of the environment and current political climate, you will become more engaged in the leading environmental and social issues affecting both the public and private business sectors.

### University of New South Wales

From:

<http://www.handbook.unsw.edu.au/vbook2012/brProgramsByAtoZ.jsp?StudyLevel=Postgraduate&descr=A>

**Table 36**  
**Summary of Sustainability Programmes, University of New South Wales**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
	Master in Environmental Management	Explicit	?	✓✓	?	
	Master of Built Environment (Sustainable Development)	Explicit	✓	✓✓	✓	

### Master in Environmental Management

The program offers students a solid grounding in the frameworks, tools and basic knowledge relevant to this field. The program particularly emphasizes sustainability in environmental management.

### Master of the Built Environment (Sustainable Development)

The built environment is the physical expression of economic and social development of society. Creating sustainable built environments that satisfy environmental, social and economic objectives are widely accepted in principle, and a degree of understanding about sustainability has developed in many countries. Yet achieving sustainability is a complex task and the challenge has moved from sustainability education i.e. the need to inform about the need, to education for sustainability i.e. how to implement sustainable development programs. There is a growing body of principles and techniques to do this in relation to the built environment, and still a lot to learn. Education for sustainability is about empowering professionals to take on the challenge, it is transformative rather than just transmissive, it is holistic and seeks critical thinking. The task begins with ways of thinking as well as considering the differing value systems and cultures that influence the ways communities shape their built environments.

## University of Queensland

From: <http://www.uq.edu.au/study/browse.html?level=pgpg>

**Table 37**  
**Summary of Sustainability Programmes, University of Queensland**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
	Master of Business (Sustainability)	Explicit	✓✓	✓		
	Master of Environmental Management (Natural Resource Management)	Implicit		✓✓		
	Master of Environmental Management (Sustainable Development)	Explicit	✓	✓✓	✓	

### Master of Business (Sustainability)

A field of study in Sustainability is concerned with climate change, carbon emissions trading, and the management of sustainability strategies. The UQ Business School' research in contemporary sustainability practice, as well as its widespread industry involvement, has influenced managers to develop leadership and goals for future sustainability practice. This outreach into industry provides the basis for courses in this plan offering the theory and practice of sustainability and the innovative strategies available to business through which managers can succeed in existing and untapped markets by generating entrepreneurial solutions when faced with sustainability issues.

Courses include:

- [ENVM7523](#) Systems Thinking for Sustainability
- [TIMS7317](#) Corporate Sustainability
- [TIMS7328](#) Strategies for Business Sustainability and Innovation

ENVM7523: This course introduces systems thinking as a tool & scientific methodology for sustainability. Sustainability involves multiple domains & divergent interests & perspectives including natural-environmental, social-political, business-economics, & policy-governance. Decision making & policy formulation in this setting is complex & embeds uncertainty & distant time horizons, often creating unintended consequences, trade-offs & compromises. The examples are evident: climate change, environment & energy. This course will help students develop a systems (holistic) view of sustainability as well as gaining new tools & skills for dealing with its multifarious elements.

### Master of Environmental Management (Natural Resource Management)

Natural Resource Management is a field of study addressing a world-wide demand for people with the understanding and skills to manage natural resources (land, water, forests, minerals, marine resources, biodiversity), often in conjunction with the use of land for production enterprises

### Master of Environmental Management (Sustainable Development)

This plan is designed for students who wish to solve environmental problems. It emphasizes the importance of a healthy environment as the basis of sustainable jobs and industries. Students gain the skills and knowledge to work towards sustainable development. Courses explore strategies ranging from cleaner production for individual industries, and better environment design, to regional

and national environmental policies and plans. Students acquire integrated knowledge across a broad spectrum of disciplines, including ecology, geography, economics, planning, law, environmental design and relevant social sciences. The final year focuses on environmental problem-solving and allows students to specialise in specific areas of sustainable environment management. Students also gain professional experience in applying social, economic, business and scientific principles to the management of natural, rural, and urban resources

## University of Sydney

From:

[http://sydney.edu.au/courses/courses/search?utf8=%E2%9C%93&query=sustainability&query\\_type=Program&commit=Search&course\\_level%5B%5D=pgc&available\\_to=domestic&location=&atar=&of\\_fshore=&faculty=&semester\\_commences=&course\\_level%5B%5D=&combined=](http://sydney.edu.au/courses/courses/search?utf8=%E2%9C%93&query=sustainability&query_type=Program&commit=Search&course_level%5B%5D=pgc&available_to=domestic&location=&atar=&of_fshore=&faculty=&semester_commences=&course_level%5B%5D=&combined=)

**Table 38**  
**Summary of Sustainability Programmes, University of Sydney**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
Sydney	Master of Science (Environmental Science)	Implicit		✓✓		
	Master of Environmental Science and Law	Implicit		✓	✓	
	Master of Marine Science and Management	Implicit		✓✓		
	Master of Agriculture (Sustainable Agriculture)	Explicit	✓	✓✓		
	Master of Engineering (Sustainable Processing)	Explicit	✓	✓✓	?	
	Master of Sustainability	Explicit	✓✓	✓✓	✓✓	?
	Master of Sustainable Design	Explicit		✓✓	✓	

### Master of Science (Environmental Science)

Environmental science is an applied science concerned with the environment around us, regardless of whether it is natural or human-made, and how we can utilise or manage it for our benefit. It draws on a wide range of science-based disciplines and applications, from ecology to solar power, analytical chemistry to geomorphology. Environmental science is also concerned with the social issues involved, including environmental law and policy, sustainability, resource economics, urban planning and environmental ethics.

### Master of Environmental Science & Law

The Master of Environmental Science and Law program allows you to undertake complementary units in the fields of environmental science and environmental law. It provides science graduates with the opportunity to extend your scientific knowledge into the area of the environment, as well as providing an introduction to the field of environmental law and policy. For law graduates, the opportunity is to extend your knowledge into environmental aspects of law, as well as to gain an understanding of some of the concepts underpinning environmental science. The program integrates disciplines which are normally considered separately and which are difficult to study concurrently outside of this program.

### **Master of Marine Science and Management**

The new postgraduate program of marine science and management offers a unique opportunity to gain in-depth knowledge in a multidisciplinary curriculum. This program has been developed in collaboration with the Sydney Institute of Marine Science and its partner universities. It has been designed to give you in-depth knowledge in a range of marine science and management disciplines including units in the science and management of coasts, marine ecology and conservation, coral reefs, climate change, oceanography (physical, geological and biological) and engineering (coastal and marine).

### **Master of Agriculture (Sustainable Agriculture)**

Specialising in Sustainable Agriculture you will develop knowledge and skills to apply agricultural practices and how they are integrated into the wider environmental systems. This may involve integrating understanding of plants in their environment with water and soil management and taking into account environmental economic considerations.

### **Master of Engineering (Sustainable Processing)**

A postgraduate specialisation in sustainable processing will be broadly concerned with sustainability, especially energy utilisation and protection of the environment and human amenity. You will learn about the development of sustainable products and processes that maximise resource and energy efficiency and minimise environmental impact. You may engage in areas of study including green engineering, wastewater engineering, and sustainable design engineering and management.

### **Master of Sustainability**

The Master of Sustainability is a truly multi- and cross-disciplinary qualification aimed at producing sustainability professionals able to combine their discipline-specific skills with an appreciation of the technological, commercial, legal, governmental and societal imperatives underpinning sustainability issues. The course has been developed collaboratively between the University's Institute of Sustainable Solutions and industry professionals from areas such as energy, finance, the media, planning, health, law, and government. Major themes addresses in this course include biodiversity, energy conservation, emission management, sustainable building design, urban planning, public health, economic development and environmental, national and international treaty law.

### **Master of Sustainable Design**

Sustainable design is concerned with both the process and outcomes of creating buildings to meet needs of a world that is growing increasingly conscious of the large impacts made by buildings on the worlds ecological systems and on human kind. As the world shifts to a more sustainable form of development in the coming millennium the task facing designers is uniquely challenging and different from previous eras. The program aims to assist design professionals and allied practitioners to recalibrate their knowledge and skills to meet this challenge through emphasizing some core aspects of sustainable design. The course is a journey from ethical concerns for the ecology of the planet and the effects of building on its makeup to the concerns for the internal environment and developing principles to help guide and nature practice.

## University of Tasmania

From:

[http://courses.utas.edu.au/portal/page?\\_pageid=53,33166&\\_dad=portal&\\_schema=PORTAL&P\\_KEY\\_WORD=sustainability%20master&P\\_CONTEXT=NEW](http://courses.utas.edu.au/portal/page?_pageid=53,33166&_dad=portal&_schema=PORTAL&P_KEY_WORD=sustainability%20master&P_CONTEXT=NEW)

**Table 39**  
**Summary of Sustainability Programmes, University of Tasmania**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
	Master of Applied Science (Geography & Environmental Studies)	Unknown				
	Master of Applied Science (Agricultural Science)	Unknown				
	Master of Environmental Planning	Implicit	✓	✓	✓	?
	Master of Environmental Management	Implicit		✓✓		

### Master of Applied Science (Geography & Environmental Studies)

The Geography specialisation covers the following areas:

- Geography
- Environmental Studies
- Remote Sensing and GIS

No further information available.

### Master of Applied Science (Agricultural Science)

The Agricultural Science specialisation covers the following areas:

- Agricultural Science
- Horticultural Science
- Microbiology
- Sustainable Resource Management

No further information available

### Master of Environmental Planning

The courses address the central role of environmental planning in achieving environmental, social and economic sustainability. Essential planning theory is integrated with understandings drawn from biophysical, social, cultural, legal and public policy disciplines. Urban, regional and natural environments are considered, and emphasis is given to planning across all land tenures at catchment and landscape scales

### Master of Environmental Management

The courses provide students with the capacity to work for the conservation and sustainable management of Australia's natural environments. The courses consider parks and protected areas, state forests and natural areas on private property. Extensive use of case studies provides students with practical examples of how to deal with the major issues facing natural environments



## University of Western Australia

From: <http://www.studyat.uwa.edu.au/courses/#Postgraduate-Mastersbycoursework>

**Table 40**  
**Summary of Sustainability Programmes, University of Western Australia**

University	Programme	Sustainability Implicit or Explicit	Aspect of Sustainability			
			Economic	Environ.	Social	Cultural
	Master of Environmental Science (Environmental Management)	Implicit		✓✓		
	Master of Environmental Science (Land and Water Management)			✓✓		
	Master of Environmental Science (Marine and Coastal Management)			✓✓		

### Master of Environmental Science

An interdisciplinary approach to problem solving is essential in this field, meaning that both the biological and earth sciences are encompassed within the course, as well as studies in environmental planning and management. The Master of Environmental Science will prepare you to deal with issues such as climate change, carbon trading, greenhouse gas emissions, water resource management, competition for land use, salinity, land degradation and rehabilitation, flora and fauna, habitat destruction, deforestation, energy and mineral depletion, air and water pollution, soil erosion, and groundwater contamination.

The following specialisations are available:

- Environmental Management
- Land and Water Management
- Marine and Coastal Management