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| Appendix 1 | | |
| *Threshold Concepts in Undergraduate Subjects* | | |
| Subject | Threshold Concepts | Researchers |
| Accountancy | cash, depreciation, profit, reconciliation | Lucas & Mladenovic, 2006  Weil & McGuigan, 2010, 2013 |
| Art therapy | professional identity, reflexivity, taboo | Sibbett & Thompson 2008 |
| Biology | complexity, conceptual change, dynamics, energy, equilibrium, evolution, homeostasis, hypothesis creation, osmosis, process and abstraction, probability, proportional reasoning, randomness and scales, variation | Ross et al., 2010  Taylor 2006, 2008  Taylor & Meyer, 2010 |
| Business and commerce | politics as power | Williams, 2014 |
| Climate change | uncertainty | Hall, 2014 |
| Computing | code reuse, complexity, data abstraction, design patterns memory/pointers, modularity, object-oriented programming, state, recursion | Flanagan & Smith, 2008  Rountree & Rountree, 2008  Shinners-Kennedy, 2008  Sorva, 2010  Thomas et al., 2010  Zander et al., 2008 |
| Economics | discretionary fiscal policy, economic modelling, efficiency, elasticity, equilibrium, incentives, interaction between markets, margin, opportunity cost, welfare | Davies, 2006  Davies & Mangan, 2008, 2010  Meyer & Land, 2003, 2005  Pang & Meyer, 2010  Reimann & Jackson, 2006  Shanahan, Foster & Meyer, 2008, 2010  Shanahan & Meyer, 2006 |
| Electrical engineering | dynamic resistance, feedback, holistic current flow, Thévenin’s theorem | Harlow & Peter, 2014  Harlow, Peter, Scott, & Cowie, 2014  Peter et al., 2014  Scott, Harlow, Peter, & Cowie, 2010 |
| Engineering | Bode plots, logical thinking, map sense, professionalism, response, social justice, transient critical flow, transmission lines | Baillie & Johnson 2008  Cartensen & Bernhard 2008  Flanagan, Taylor, & Meyer, 2010  Kabo & Baillie, 2010  Knight, Callaghan, Baldock, & Meyer, 2013  Scott, 2013a |
| Geography and geoscience | data modelling, geologic/deep time, interoperability, map scale | Cheek, 2010  Srivastava, 2013 |
| Humanities | subjective interpretation | Moffatt, 2013  Moffat & McKim, 2014 |
| Information literacy | authority, commodification of information, disciplinarily, format as process, metadata | Hofer, Townsend, & Brunetti, 2012  Townsend, Brunetti, & Hoffer, 2011 |
| Leadership | moral courage, risk, service, shared leadership, structural leadership, ‘the job of leaders is to create leaders’ | McKie, 2013a, 2013b  Peter et al., 2014 |
| Linguistics | rank scale | Orsini-Jones, 2008, 2010 |
| Philosophy | personhood, representation | Booth, 2006  Cowart, 2010 |
| Physics | entropy, experimentation, ‘physics is conceptual’, ‘physics is a science’ | Scott, 2013b  Wilson, 2013, 2014 |

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| Appendix 2 | | | | | | | | | | | | |
| *Attributes of Graduateness in Bachelor Degree Programmes at New Zealand Universities* | | | | | | | | | | | | |
| University | Programme | 1. specialist knowledge, scholarship and research | 1. local, national and global context | 1. information/digital literacy | 1. communication | 1. critical and analytical; thinking, problem solving and use of argument | 1. initiative, autonomy, independence, self-motivation and self-direction | 1. co-operation, collaboration and team work | 1. life-long learning | 1. ethical understanding | 1. cultural, social and civic awareness, engagement and responsibility | Other attributes |
| Institution Level |  |  |  |  |  |  |  |  |  |  |  |  |
| University of Auckland (2003) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | * creativity |
| University of Canterbury (2013) |  | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | * innovation and entrepreneurship * employability |
| Lincoln University (2012c) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ |  |
| University of Otago (2003) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | * employability |
| Victoria University of Wellington (n.d.) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | * goal setting |

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| Programme Level |  |  |  |  |  |  |  |  |  |  |  |  |
| Victoria University of Wellington  (School of Engineering and Computer Science, n.d.) | Bachelor of Engineering | ✓ |  |  | ✓ | ✓ |  | ✓ |  | ✓ | ✓ | * environmental awareness * risk management |
| Victoria University of Wellington (2010) | Bachelor of Laws | ✓ | ✓ |  | ✓ | ✓ |  | ✓ |  | ✓ |  | * legal awareness |
| Auckland University of Technology (2014) | Bachelor of Laws | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |  | * professional responsibility * legal awareness |
| Massey University (2009) | Mathematic Majors | ✓ |  | ✓ | ✓ | ✓ |  |  |  |  |  |  |
| University of Waikato (2013, 2014) | Bachelor of Teaching | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | * awareness of constraints * employability |
| University of Waikato (Waikato Management School, 2002, 2013f, 2014) | Bachelor of Electronic Commerce | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | * political awareness * tolerance * educational transformation * professional engagement * leadership |
| *Note:* Reference to the Treaty of Waitangi was considered to indicate an awareness of national context. | | | | | | | | | | | | |

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| Appendix 3 | | | | | | | | | | | | | |
| *Attributes of Graduateness in Bachelor Degree Programmes at Lincoln University* | | | | | | | | | | | | | |
| Programme |  | 1. specialist knowledge, scholarship and research | 1. local, national and global context | 1. information/digital literacy | 1. communication | 1. critical and analytical; thinking, problem solving and use of argument | 1. initiative, autonomy, independence, self-motivation and self-direction | 1. co-operation, collaboration and team work | 1. life-long learning | 1. ethical understanding | 1. cultural, social and civic awareness, engagement and responsibility | 1. creativity, originality, innovation and entrepreneurialism | 1. employability and professionalism |
| Bachelor of Agribusines and Food Marketing  (Lincoln University, n.d.a) |  | ✓ | ✓ |  | ✓ | ✓ |  |  |  | ✓ | ✓ |  | ✓ |
| Bachelors of Agriculture, Agricultural Science, and Agricultural Science with Honours  (Lincoln University, n.d.o) |  | ✓ | ✓ | ✓ |  | ✓ |  |  |  | ✓ | ✓ |  | ✓ |
| Bachelor of Commerce  (Lincoln University, n.d.b,c,d,e,f,g, 2013b) |  | ✓ | ✓ | ✓ | ✓\* | ✓ | ✓ |  | ✓ | ✓ | ✓ |  | ✓ |
| Bachelor of Environment and Society  (Lincoln University, n.d.h,i,j, 2012a,b) |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓\* |  | ✓ | ✓ |  | ✓ |
| Bachelor of Environmental Management and Planning  (Lincoln University, 2008) |  | ✓ | ✓ | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ |  | ✓ |
| Bachelor of Land and Property Management  (Lincoln University, n.d.k) |  | ✓ |  | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ |  | ✓ |
| Bachelor of Landscape Architecture  (Lincoln University, n.d.l) |  | ✓ |  | ✓ | ✓ | ✓ |  | ✓ |  | ✓ | ✓ | ✓ | ✓ |
| Bachelor of Science – Food Science Major  (Lincoln University, n.d.m) |  | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ |  |  |
| Bachelor of Sport and Recreation Management  (Lincoln University, 2013a) |  | ✓ |  |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ |
| Bachelor of Tourism Management  (Lincoln University, 2014) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |
| Bachelor of Viticulture and Oenology  (Lincoln University, n.d.n) |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ |  | ✓ |
| \* Present in most, but not all, majors in the degree. | | | | | | | | | | | | | |

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| Appendix 4 | | | | | | | | | | | | | |
| *Attributes of Graduateness in Bachelor Degree Programmes at the University of Waikato* | | | | | | | | | | | | | |
| Programme |  | 1. specialist knowledge, scholarship and research | 1. local, national and global context | 1. information/digital literacy | 1. communication | 1. critical and analytical; thinking, problem solving and use of argument | 1. initiative, autonomy, independence, self-motivation and self-direction | 1. co-operation, collaboration and team work | 1. life-long learning | 1. ethical understanding | 1. cultural, social and civic awareness, engagement and responsibility | 1. creativity, originality, innovation and entrepreneurialism | 1. employability and professionalism |
| Bachelor of Arts (BA)  (Faculty of Arts and Social Sciences, 2013a) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |
| Bachelor of Business Analysis – Financial (BBA(FIN))  (Waikato Management School, 2013a) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ |  | ✓ |
| Bachelor of Communication Studies (BCS)  (Waikato Management School, 2013b) |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |  | ✓ | ✓ | ✓ | ✓ |
| Bachelor of Computer Graphic Design (BCGD)  (Faculty of Computing and Mathematical Sciences, 2013a) |  | ✓ |  | ✓ | ✓ | ✓ |  |  |  | ✓ | ✓ | ✓ | ✓ |
| Bachelor of Computing and Mathematical Sciences (BCMS)  (Faculty of Computing and Mathematical Sciences, 2013b) |  | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |  |  | ✓ |
| Bachelor of Electronic Commerce (BECom)  (Waikato Management School, 2013c) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ |  | ✓ |
| Bachelor of Engineering (BE) – Software Engineering Major  (Faculty of Computing and Mathematical Sciences, 2013c) |  | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |
| Bachelor of Engineering with Honours (BE(Hons))  (Faculty of Science and Engineering, 2012a) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Bachelor of Environmental Planning (BEP)  (Faculty of Arts and Social Sciences, 2013b) |  | ✓ | ✓ |  |  | ✓ |  |  | ✓ | ✓ | ✓ |  | ✓ |
| Bachelor of Laws (LLB)  (Te Piringa – Faculty of Law, 2013) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Bachelor of Management (BMS)  (Waikato Management School, 2013d) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ |  | ✓ |
| Bachelor of Māori and Pacific Development (BMPD)  (School of Maori and Pacific Development, 2011). |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |
| Bachelor of Media and Creative Technologies (BMCT)  (Faculty of Arts and Social Sciences, 2013c) |  | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ |
| Bachelor of Music (BMus)  (Faculty of Arts and Social Sciences, 2013d) |  | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ |
| Bachelor of Science (BSc)  (Faculty of Science and Engineering, 2012b) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  |  | ✓ |
| Bachelor of Science (BSc) – Computer Science, Mathematics and Statistics majors  (Faculty of Computing and Mathematical Sciences, 2013d) |  | ✓ |  | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ |  |  | ✓ |
| Bachelor of Science Technology (BSc(Tech))  (Faculty of Science and Engineering, 2012c) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  |  | ✓ |
| Bachelor of Social Sciences (BSocSc)  (Faculty of Arts and Social Sciences, 2013e) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ |  | ✓ |
| Bachelor of Sport and Leisure Studies (BSpLS)  (Faculty of Education, 2003) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ | ✓ | ✓ |
| Bachelor of Teaching (BTchg)  (Faculty of Education, 2008) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Bachelor of Tourism – Tourism & Hospitality Management (BTour(THMgt))  (Waikato Management School, 2013e) |  | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |  | ✓ | ✓ |  | ✓ |

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| Appendix 5 | |
| *Graduate Profiles from which Initial Attributes of Graduateness were Derived* | |
| University | Programme |
| Institution Level |  |
| University of Auckland (2003) |  |
| University of Canterbury (2013) |  |
| Lincoln University (2012c) |  |
| University of Otago (2003) |  |
| Victoria University of Wellington (n.d.) |  |
| Programme Level |  |
| Victoria University of Wellington  (School of Engineering and Computer Science, n.d.) | Bachelor of Engineering |
| Victoria University of Wellington (2010) | Bachelor of Laws |
| Auckland University of Technology (2014) | Bachelor of Laws |
| Massey University (2009) | Mathematic Majors |
| University of Waikato (2013, 2014) | Bachelor of Teaching |
| University of Waikato (Waikato Management School, 2002, 2013f, 2014) | Bachelor of Electronic Commerce |

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| Table 2 |
| *Graduate Profiles Obtained From Lincoln University* |
| Bachelor of Agribusines and Food Marketing (Lincoln University, n.d.a) |
| Bachelors of Agriculture, Agricultural Science, and Agricultural Science with Honours  (Lincoln University, n.d.o) |
| Bachelor of Commerce (Lincoln University, n.d.b,c,d,e,f,g, 2013b) |
| Bachelor of Environment and Society (Lincoln University, n.d.h,i,j, 2012a,b) |
| Bachelor of Environmental Management and Planning (Lincoln University, 2008) |
| Bachelor of Land and Property Management (Lincoln University, n.d.k) |
| Bachelor of Landscape Architecture (Lincoln University, n.d.l) |
| Bachelor of Science – Food Science Major (Lincoln University, n.d.m) |
| Bachelor of Sport and Recreation Management (Lincoln University, 2013a) |
| Bachelor of Tourism Management (Lincoln University, 2014) |
| Bachelor of Viticulture and Oenology (Lincoln University, n.d.n) |

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| Table 3 |
| *Graduate Profiles Obtained From The University of Waikato* |
| Bachelor of Arts (Faculty of Arts and Social Sciences, 2013a) |
| Bachelor of Business Analysis – Financial (Waikato Management School, 2013a) |
| Bachelor of Communication Studies (Waikato Management School, 2013b) |
| Bachelor of Computer Graphic Design (Faculty of Computing and Mathematical Sciences, 2013a) |
| Bachelor of Computing and Mathematical Sciences (Faculty of Computing and Mathematical Sciences, 2013b) |
| Bachelor of Electronic Commerce (Waikato Management School, 2013c) |
| Bachelor of Engineering– Software Engineering Major (Faculty of Computing and Mathematical Sciences, 2013c) |
| Bachelor of Engineering with Honours (Faculty of Science and Engineering, 2012a) |
| Bachelor of Environmental Planning (Faculty of Arts and Social Sciences, 2013b) |
| Bachelor of Laws (Te Piringa – Faculty of Law, 2013) |
| Bachelor of Management (Waikato Management School, 2013d) |
| Bachelor of Māori and Pacific Development (School of Maori and Pacific Development, 2011). |
| Bachelor of Media and Creative Technologies (Faculty of Arts and Social Sciences, 2013c) |
| Bachelor of Music (Faculty of Arts and Social Sciences, 2013d) |
| Bachelor of Science (Faculty of Science and Engineering, 2012b) |
| Bachelor of Science– Computer Science, Mathematics and Statistics majors (Faculty of Computing and Mathematical Sciences, 2013d) |
| Bachelor of Science Technology (Faculty of Science and Engineering, 2012c) |
| Bachelor of Social Sciences (Faculty of Arts and Social Sciences, 2013e) |
| Bachelor of Sport and Leisure Studies (Faculty of Education, 2003) |
| Bachelor of Teaching (Faculty of Education, 2008) |
| Bachelor of Tourism – Tourism & Hospitality Management (Waikato Management School, 2013e) |