

Working from the evidence of prior art and experience in curriculum database development

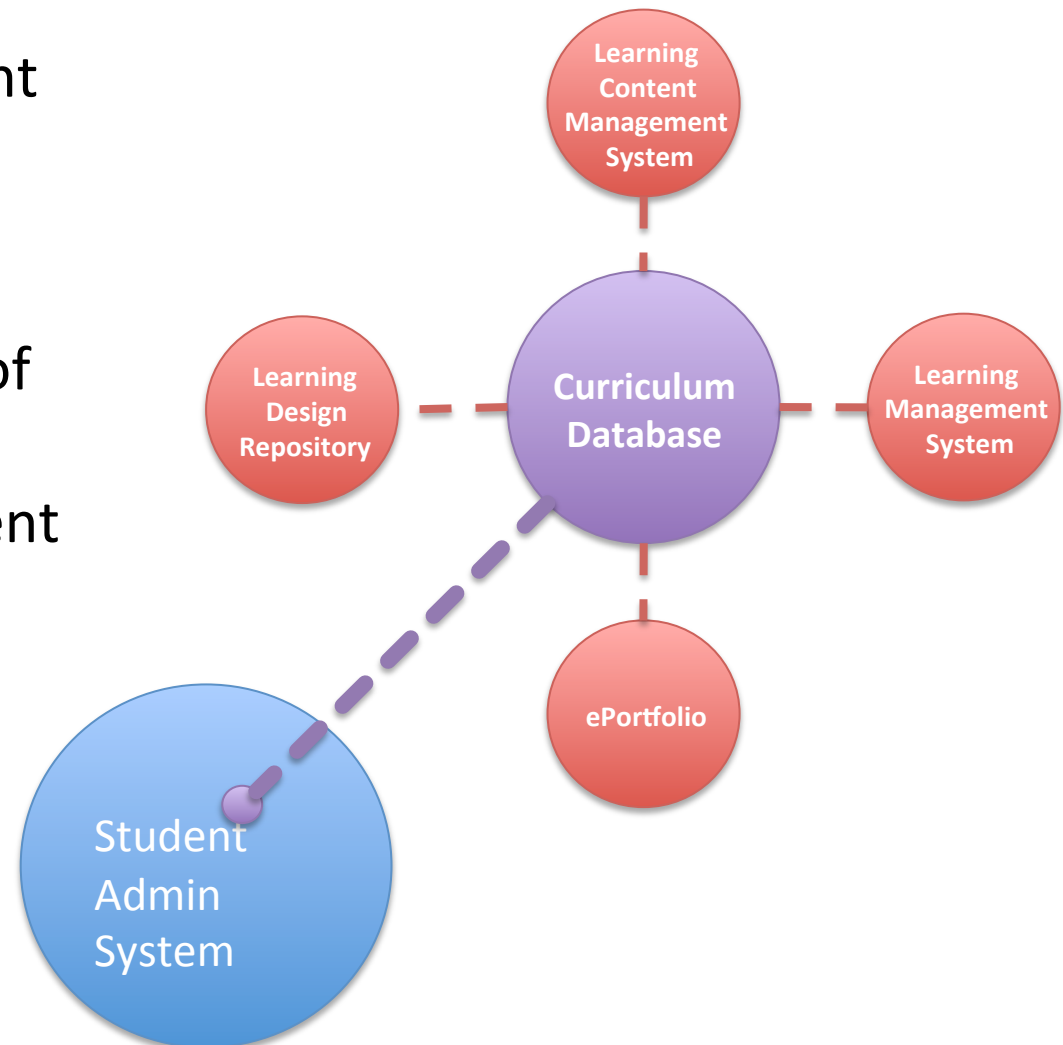
Tim Lever, Richard Gluga & Judy Kay

Faculty of Engineering & IT

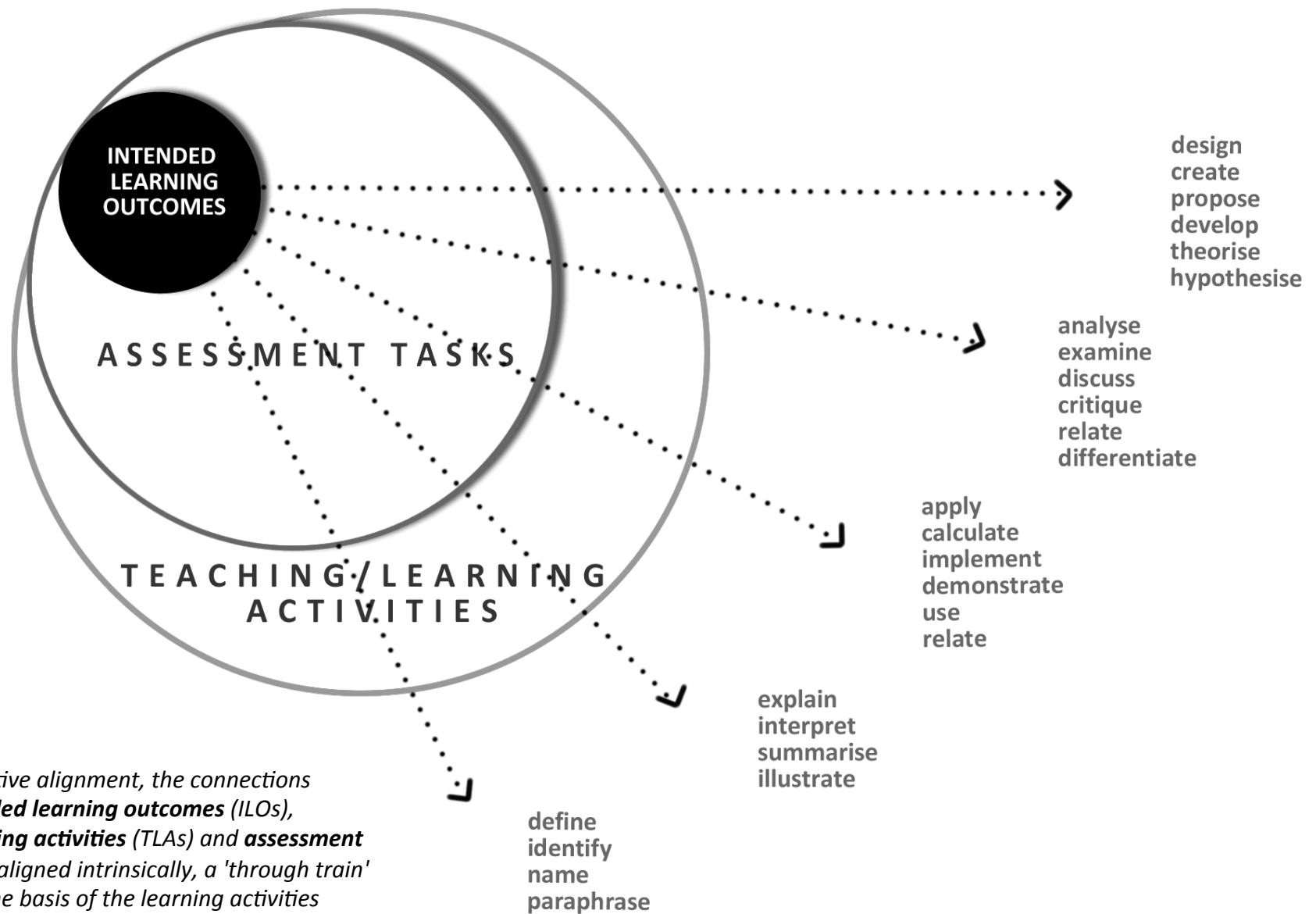
The University of Sydney

What are curriculum databases?

- A. Curriculum management *tool*: reporting on curriculum design
- B. Emerging core system of university curriculum information management



Curriculum model: top-down, outcomes based



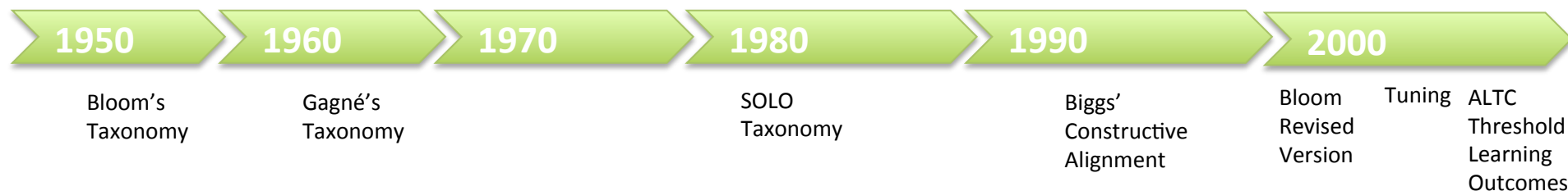
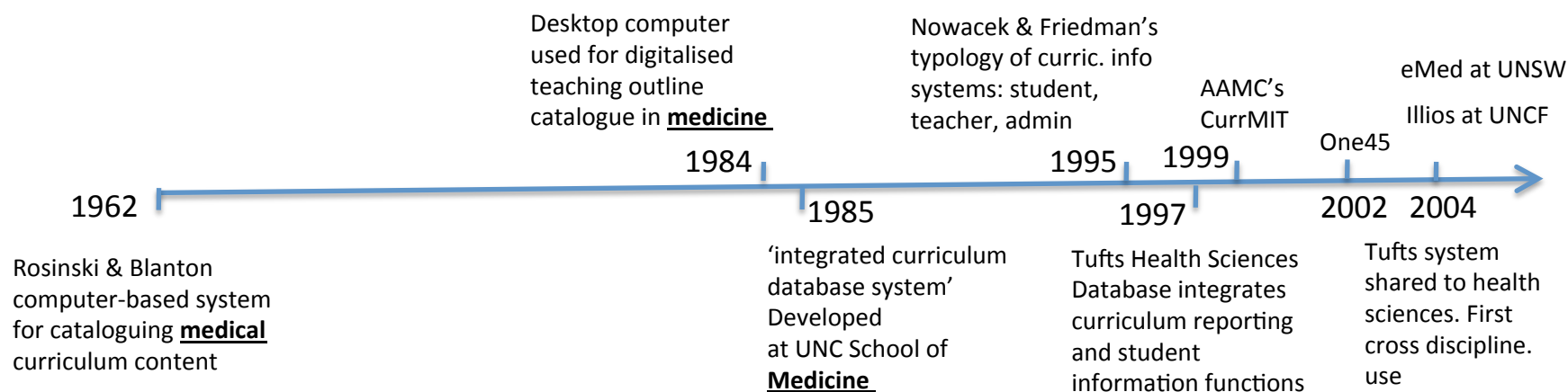
*'... In constructive alignment, the connections between **intended learning outcomes** (ILOs), **teaching/learning activities** (TLAs) and **assessment tasks** (ATs) are aligned intrinsically, a 'through train' if you like, on the basis of the learning activities expressed in the outcomes statements.' (Biggs & Tang, 2007, p.53)*

Development challenge: non-aligned curriculum environment

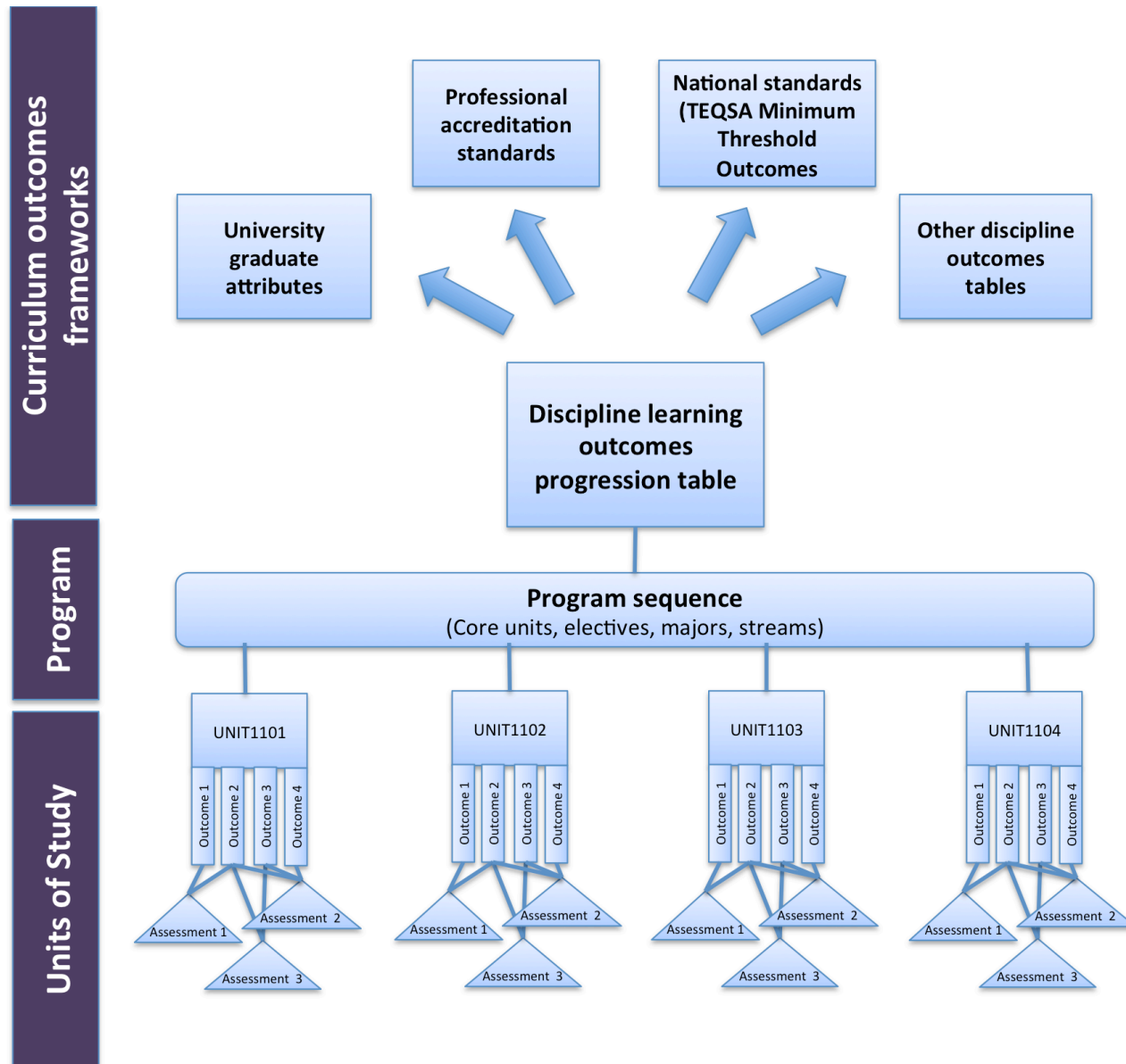
“It is so obvious. Yet most university teaching is not aligned.” (Biggs & Tang, 2007: 61)

“University courses are often not developed as a coherent whole but as a pastiche of individual units” (Toohey, 1999: 49)

Curriculum databases: a brief (medical) history



U. of Sydney curriculum database (CUSP)



- Starting in 2003 as a single discipline, engineering-based unit of study database.
- Since 2010, a multi-faculty, multi-discipline curriculum information management system
- Connects three critical layers of curriculum information: unit of study design, program design, curriculum outcome framework.





































Basic content layer: subject/unit of study outlines

Units > CIVL2410 > Soil Mechanics - 2012 Semester 2 (Open)   

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Handbook	Requirements	Teaching	Attributes	Outcomes	Assessments	Resources	Schedule	Course Map	Reports
<p>Learning outcomes are the key abilities and knowledge that will be assessed in this unit. They are listed according to the course goal supported by each. See Assessment Tab for details how each outcome is assessed.</p> <p>Design and Problem Solving Skills (Level 1)</p> <ol style="list-style-type: none"> 1. Use a spreadsheet to analyse a geotechnical design problem     <p>Discipline Specific Expertise (Level 2)</p> <ol style="list-style-type: none"> 2. Give an engineering classification of any piece of soil, and on this basis predict how it will perform as an engineering material     3. Calculate the settlements, and rates of settlement, under structures of various shapes and sizes     4. Explain the advantages and limitations of the different methods of settlement calculation     5. Determine the strength parameters appropriate to a range of stability problems, and understand the difference between total and effective stress approaches     <p>Fundamentals of Science and Engineering (Level 2)</p> <ol style="list-style-type: none"> 6. Understand the principle of effective stress, and be able to apply this to calculate the stresses causing soil deformation     7. Calculate quantities of water flowing through the ground, and understand the effects that water flow has on the soil     <p>Information Skills (Level 2)</p> <ol style="list-style-type: none"> 8. Proficiency in handling experimental data, including strength parameters.     <p>Professional Communication (Level 2)</p> <ol style="list-style-type: none"> 9. To report the results of a laboratory experiment at a professional standard     <p>Add Outcome</p>									

Unit learning outcomes address *selected* discipline outcomes

Units > CIVL2410 > Soil Mechanics - 2012 Semester 2 (Open)   

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Handbook	Requirements	Teaching	Attributes	Outcomes	Assessments	Reports	3	problem Calculate the settlements, and rates of settlement, under structures of various shapes and sizes	50.00%
Assessment Methods:									
							Close		

Assessment Learning Outcomes		
#	Outcome Description	Weight
1	Use a spreadsheet to analyse a geotechnical design problem	50.00%
3	Calculate the settlements, and rates of settlement, under structures of various shapes and sizes	50.00%
Close		

Unit assessment tasks address unit learning outcomes at specific values

Middle curriculum layer: program structure

Programs > Eng > BE > Software (2011)

Show information for 2011 commencing students. 

[Print View](#)

Semesters	Streams/Majors	Unit Blocks	Requirements	Reports
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Year 1 - Semester 1

Type	CP	CP From
Core	6	ENGG1805: Professional Engineering and IT
Core	6	INFO1103: Introduction to Programming
Core	3	MATH1001: Differential Calculus
Core	3	MATH1002: Linear Algebra
		Select from ACCT1003: Financial Accounting Concepts
Yr1 Recommended	6	

Year 1 - Semester 2

Type	CP	CP From
Core	6	
Core	6	
Core	3	
Core	3	
Yr1 Recommended	6	

Year 2 - Semester 1

Type	CP	CP From
Core	6	COMP2129: Operating Systems and Machine Principles
Core	6	INFO2120: Database Systems 1
Core	6	MATH2069: Discrete Mathematics and Graph Theory
Yr2 Recommended	6	Select from ELEC2602: Digital Logic MATH2061: Linear Mathematics and Vector Calculus

Unit Block Details

Block 1 - Yr1 Recommended (Min CP: 12,Max CP: 12)

Note: Units shaded gray (if any) are not available in the selected semester/stream.

Unit Code	Unit Name	CP	Sessions Offered
ACCT1003	Financial Accounting Concepts	6	Semester 1 Semester 2
ACCT1004	Management Accounting Concepts	6	Semester 2
ELEC1103	Fundamentals of Electrical and Electronic Engineering	6	Semester 1
INFO1003	Foundations of Information Technology	6	Semester 1 Semester 2
MKTG1001	Marketing Principles	6	Semester 1 Semester 2
PHYS1001	Physics 1 (Regular)	6	Semester 1
PHYS1003	Physics 1 (Technological)	6	Semester 2

Close

Top curriculum layer: discipline outcomes tables

- [Engineering-IT Graduate Outcomes Table](#)

- Architecture, Design and Planning Faculty
Contextualised Generic Attributes

- Planning Generic Graduate Attributes

- Commerce Program-Level Learning Goals

Matrix of Engineering/IT Learning Domains & Levels

Faculty of Engineering and Information Technologies					
	Level 1	Level 2	Level 3	Level 4	Level 5
1 Design process skills Students are able to apply design process skills to design a product or system, including the selection of materials, components, and manufacturing processes. (Engg, Year 1, Sem 1, Unit 1, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 1.18, 1.19, 1.20, 1.21, 1.22, 1.23, 1.24, 1.25, 1.26, 1.27, 1.28, 1.29, 1.30, 1.31, 1.32, 1.33, 1.34, 1.35, 1.36, 1.37, 1.38, 1.39, 1.40, 1.41, 1.42, 1.43, 1.44, 1.45, 1.46, 1.47, 1.48, 1.49, 1.50, 1.51, 1.52, 1.53, 1.54, 1.55, 1.56, 1.57, 1.58, 1.59, 1.60, 1.61, 1.62, 1.63, 1.64, 1.65, 1.66, 1.67, 1.68, 1.69, 1.70, 1.71, 1.72, 1.73, 1.74, 1.75, 1.76, 1.77, 1.78, 1.79, 1.80, 1.81, 1.82, 1.83, 1.84, 1.85, 1.86, 1.87, 1.88, 1.89, 1.90, 1.91, 1.92, 1.93, 1.94, 1.95, 1.96, 1.97, 1.98, 1.99, 2.00, 2.01, 2.02, 2.03, 2.04, 2.05, 2.06, 2.07, 2.08, 2.09, 2.10, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 2.17, 2.18, 2.19, 2.20, 2.21, 2.22, 2.23, 2.24, 2.25, 2.26, 2.27, 2.28, 2.29, 2.30, 2.31, 2.32, 2.33, 2.34, 2.35, 2.36, 2.37, 2.38, 2.39, 2.40, 2.41, 2.42, 2.43, 2.44, 2.45, 2.46, 2.47, 2.48, 2.49, 2.50, 2.51, 2.52, 2.53, 2.54, 2.55, 2.56, 2.57, 2.58, 2.59, 2.60, 2.61, 2.62, 2.63, 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Planning Generic Graduate Attributes

[illegible]

Architecture, Design and Planning Faculty Contextualised Generic Attributes

[illegible]

Program Goal Matrix for Commerce & Business Teaching Programs

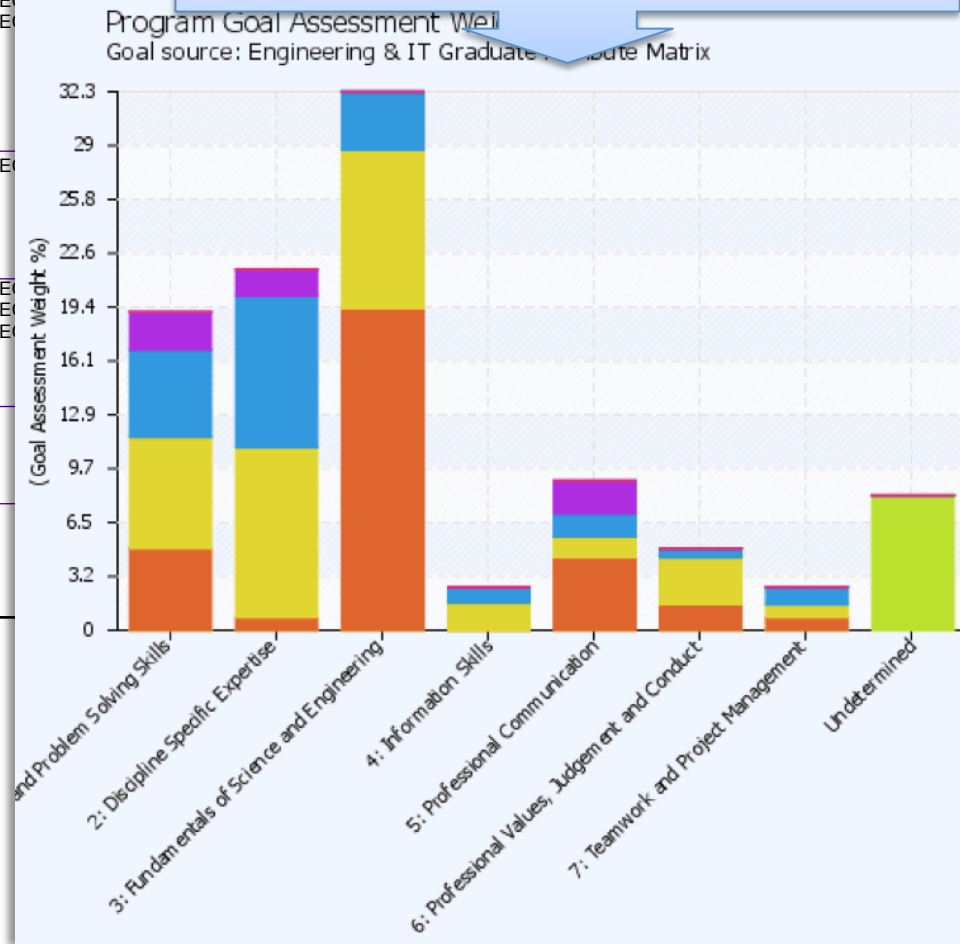
	Level 1 - Orientation level	Level 2 - Discovery level	Level 3 - Decision-making level	Level 4 - Strategy level	Level 5 - Leadership level
2.1 Business context	<ul style="list-style-type: none"> Understand contextual business and economic concepts. 	<ul style="list-style-type: none"> Standard applications of common concepts. 	<ul style="list-style-type: none"> Making sound business judgements. 	<ul style="list-style-type: none"> Making sound business plans. 	<ul style="list-style-type: none"> Providing sustained business vision.
2.2 Business research and analysis	<ul style="list-style-type: none"> Critically analyse and interpret commercial, economic and business information to develop solutions and responses to business problems and challenges. 	<ul style="list-style-type: none"> Basic information search and analysis. 	<ul style="list-style-type: none"> Broad information search and analysis. 	<ul style="list-style-type: none"> Investigation of complex and challenging business situations. 	<ul style="list-style-type: none"> Major business research/development project.
3.1 Business communication	<ul style="list-style-type: none"> Communicate effectively, both orally and in writing, including the ability to negotiate and persuade in business context. 	<ul style="list-style-type: none"> Basic reporting. 	<ul style="list-style-type: none"> Fluent reporting. 	<ul style="list-style-type: none"> Business debate. 	<ul style="list-style-type: none"> Business negotiation.
4.1 Teamwork	<ul style="list-style-type: none"> Work effectively in organisation with diverse colleagues, in teams, and with clients, stakeholders and other stakeholders. 	<ul style="list-style-type: none"> Basic team awareness. 	<ul style="list-style-type: none"> Basic team practice. 	<ul style="list-style-type: none"> Advanced team practice. 	<ul style="list-style-type: none"> Sustained leadership practice.
5.1 Business innovation	<ul style="list-style-type: none"> Learn and creatively apply new business, economic and business knowledge. 	<ul style="list-style-type: none"> Basic concept generation. 	<ul style="list-style-type: none"> Theoretical grounding of business change and innovation 	<ul style="list-style-type: none"> Practical optimisation of new business ideas. 	<ul style="list-style-type: none"> Creatively addressing complex business challenges.
6.1 Business specialisation	<ul style="list-style-type: none"> Develop discipline-specific expertise that is a major or majors and be able to apply that expertise in a broad 	<ul style="list-style-type: none"> Basic discipline / specialisation applications. 	<ul style="list-style-type: none"> Standard discipline / specialisation applications. 	<ul style="list-style-type: none"> Fluent and flexible use of standard applications. 	<ul style="list-style-type: none"> Dealing with challenges at both conceptual and technical levels.
					<ul style="list-style-type: none"> Extending knowledge boundaries.

Curriculum reporting & analysis level

	Level 1	Level 2	Level 3	Level 4	Level 5
1. Design & Problem Solving	ELEC1103, ELEC1601, ENGG1805	ELEC2103, ELEC2104, ELEC2302, INFO1105	ELEC2602, ELEC3305, ELEC3505, ELEC4702	ELEC3405, ELEC3506, ELEC4505, ELEC4710, ELEC4711	
2. Discipline Specific Expertise	ENGG1805, INFO1103	COMP2129, ELEC1103, INFO1105	ELEC2103, ELEC2104, ELEC2302, ELEC2602, ELEC3305, ELEC3505	ELEC4702, ELEC4710, ELEC4711	ELEC3405, ELEC3506, ELEC4505
3. Fundamentals of Science & Engineering	ENGG1805, MATH1001, MATH1002, MATH1003, MATH1005, PHYS1001, PHYS1003, PHYS2213	COMP2129, ELEC1103, ELEC1601, ELEC2103, ELEC2104, MATH2061	ELEC2302, ELEC2602, ELEC3305, ELEC3405, ELEC3506, ELEC4505, ELEC4702, ELEC4710, ELEC4711	ELEC4702, ELEC4710, ELEC4711	
4. Information Skills		ELEC1103, ELEC2103, ELEC2104, ELEC2302, ELEC2602, ELEC3305, ELEC3405, ELEC4505, ENGG1805		ELEC4702, ELEC4710, ELEC4711	
5. Professional Communication	ELEC1103	ELEC1601, ELEC2103, ELEC2104, ELEC2302, ELEC2602, ELEC3405, ELEC3506, ELEC4505, ENGG1805	ELEC3305	ELEC4702, ELEC4710, ELEC4711	
6. Professional Values, Judgment & Conduct	COMP2129, ELEC1103, ELEC1601, ELEC2103	ELEC3505, ENGG1805	ELEC4702		
7. Teamwork & Project Management	ELEC1103, ELEC2103, ELEC2302, ELEC2602	ELEC1601, ELEC2104, ELEC3305, ELEC3405, ELEC3505, ELEC3506, ELEC4702, ENGG1805			

Unit of study progression
matched to discipline
learning progression

Relative weight of outcome domains and levels as
proportion of assessment across program as a whole



Lesson No.1: Limits of top-down, outcomes-based curriculum management in university context

- Misdirected focus on unit-level teaching delivery
- Insufficient to macro-level program coherence
- Superficial approach to program outcome formulation, fails to address complexities of broad-scale curriculum design

Lesson No.2: Program outcome frameworks have some minimum requirements

STRUCTURE

1. Program minimum goals defined within separate framework of discipline learning progression?
2. Domains and levels clearly & logically differentiated among themselves?
3. Clear, logical differentiation relative to other disciplines?

PROCESS

4. Iterative refinement in context of disciplinary and cross-disciplinary practice

ENVIRONMENT

5. Information system support for rapid, iterative prototyping & refining

	Level 1 Business principles	Level 2 Business operations	Level 3 Business specialisation	Level 4 Business innovation	Level 5 Business leadership
1. Business fundamentals	Basic concepts, principles and issues of commercial practice.	General applications of commercial concepts and principles in real-life business situations	Specialised applications of commercial concepts and principles in real-life business situations	Innovative applications of commercial concepts and principles in real-life business situations.	Applications of commercial concepts and principles in real-life business leadership..
2. Business context	Basic concepts, principles and issues including legal, political, environmental and ethical aspects.	General applications of concepts and principles regarding the broad business context in real-life business situations.	Specialised applications of concepts and principles regarding the broad business context in real-life business situations.	Innovative applications of concepts and principles regarding the broad business contexts in real-life business situations.	Applications of concepts and principles regarding the broad business context in real-life business leadership.
3. Business research & analysis	Basic information search and analysis. Ability to undertake a targeted business information search across a limited range of information sources.	Broad information search and analysis. Ability to undertake a broad business information search across an open-ended range of sources; extract and synthesise relevant details.	Investigation of complex and challenging business data. Ability to identify gaps, irregularities, uncertainties in reports and data sets of varying quality.	Investigation of complex, challenging business situations. Forming independent views through searching review of evidence, identifying the real questions to be asked and how they may be best answered.	Major business research/development project. Ability to undertake an in-depth business research project addressing a significant business challenge, requiring extensive first hand evidence and original analysis.
4. Business communication	Ability to communicate basic business concepts & issues in written and spoken form.	General fluency in business communication across a variety of formats and media.	Specialist fluency .Ability to successfully debate contested business ideas and issues at length in written and spoken form.	Strategic fluency in business communication. Ability to shape and drive team discussions and perceptions.	Strategic fluency at leadership level. Ability to shape and drive broad organisational discussion and perceptions.
5. Business organisation	Basic principles and techniques: team planning and decision-making, knowledge sharing, mutual support and negotiating differences.	General applications of organisation techniques and principles in real-life situations requiring general negotiation of roles and responsibilities	Specialised applications of organisation techniques and principles in real-life business situations. requiring specialised roles and capabilities.	Innovative applications of organisation techniques and principles in challenging business situations,. requiring team flexibility..	Applications of organisation techniques and principles in real-life business leadership.

Commerce Program Goals (Draft proposal). The University of Sydney Business School)

http://cusp.sydney.edu.au/attributes/view-attribute-set-pdf/competency_set_id/63/extended/0

Curriculum standards development, Australia, 2012

3.2 Threshold Learning Outcomes for Accounting

Column1	Bachelor graduates in Accounting will be able to:	Master
Judgement	Exercise judgement under supervision to solve routine accounting problems in straightforward contexts using social, ethical, economic, regulatory and global perspectives	Exerci proble and gl
Knowledge	Integrate theoretical and technical accounting knowledge which includes a selection of auditing and assurance, finance, economics, quantitative methods, information systems, commercial law, corporation law and taxation law	Integra a sele metho taxatic
Application Skills	Critically apply theoretical and technical accounting knowledge and skills to solve routine accounting problems	Critica to solv
Communication and Teamwork	Justify and communicate accounting advice and ideas in straightforward collaborative contexts involving both accountants and non-accountants	Justify collabo
Self-Management	Reflect on performance feedback to identify and action learning opportunities and self-improvements	Seek a opport

Australian Learning and Teaching Council (2010). Learning and Teaching Academic Standards Project, Business, Management and Economics: Learning and Teaching Academic Standards Statement for ACCOUNTING December 2010. Sydney: Australian Learning and Teaching Council



Program minimum goals defined within separate framework of discipline learning progression?



Domains and levels clearly & logically differentiated among themselves?



Clear, logical differentiation relative to other disciplines?



Iterative refinement in context of disciplinary *and* cross-disciplinary practice



Information system support for rapid, iterative prototyping & refining

Acknowledgements and contact

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- Available to other institutions free of charge under University Licence
- Contact: Tim Lever, tim.lever@sydney.edu.au