

New Undergraduate Model for broadly based Spatial Science Curriculum at Queensland University of Technology: Diversity in Surveying Curriculum

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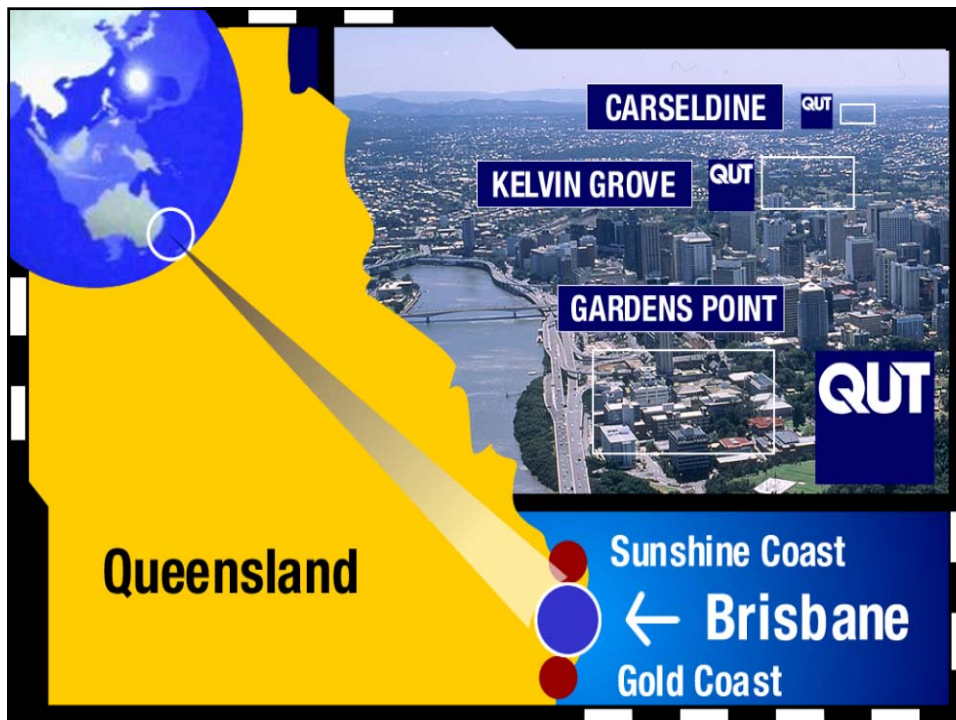
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Presented by Robert Webb
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Introduction

New Undergraduate Model for broadly based Spatial Science Curriculum at Queensland University of Technology: Diversity in Surveying Curriculum

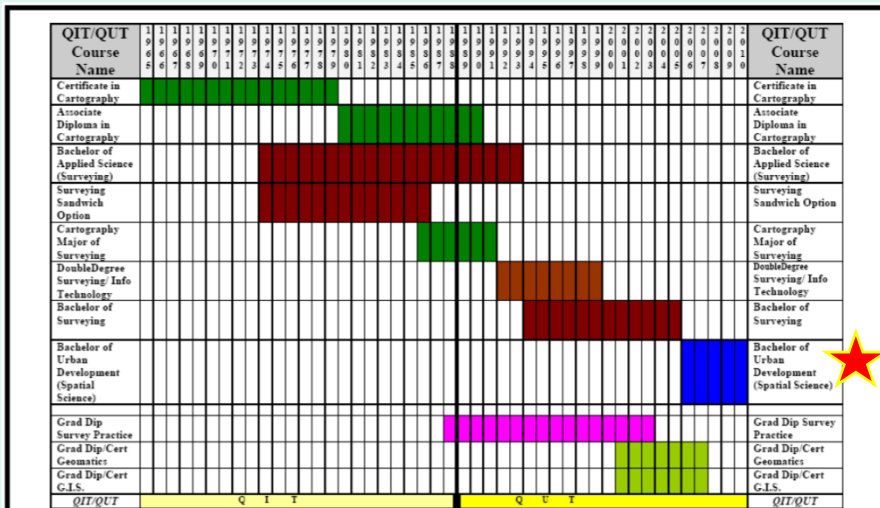
- Brief history survey & mapping courses @ QIT/QUT
- Major Faculty/Courses Re-structure in 2006
- Broad-based Undergraduate model applied
- Curriculum Mapping approach adopted & applied to the Spatial Science program at QUT.
- What does the current course look like now?
- Exploring Course Quality
- WIL- improving “graduate employability”
- Higher Education Reform in AU(snapshot)
- Conclusions



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Some History of Survey & Mapping Programs

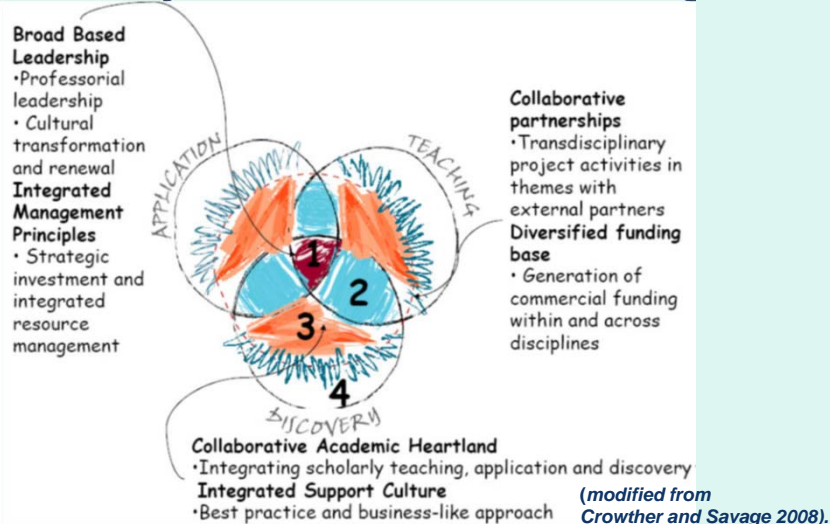


Timeline of Surveying and Mapping Courses at Q.I.T./Q.U.T.

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Major Faculty/Courses Re-structure in 2006 Faculty of BEE Model of Working



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Some overarching principles of the Desired BEE Undergraduate Model

- Crother and Savage (2008) describe this coming together of these Faculty goals, and ideas of transformative learning. *More info in the paper 4161*
- These new courses would provide **the student** with opportunities:
 - for self construction and divergence
 - for integrated trans-disciplinary study
 - to learning through and in practice (workplace learning)
 - Opportunities to engage in discovery (research) and application (external and community service) activities through a thematic approach to faculty activities. (Crother and Savage 2008)

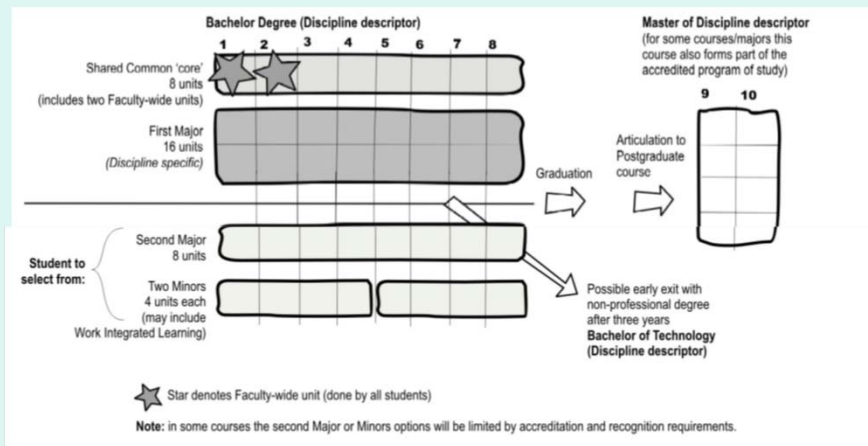


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Desired Model of the Shared Course Structure BEE



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Where does Surveying/ Spatial Science fit within BEE?

- *Bachelor of Design* with majors in: Architecture, Industrial Design, Interior Design, and Landscape Architecture.
- *Bachelor of Engineering* with majors in: Aerospace Avionic, Civil, Civil and Environmental, Civil and Construction, Computer Systems, Electrical, Infomechatronics, Mechanical, Medical, and Telecommunication, with scope in the future for Chemical Engineering, Process Engineering, Building Services Engineering
- *Bachelor of Urban Development* with majors in: Construction Management, Property Economics, Quantity Surveying, **Spatial Science**, and Urban & Regional Planning.



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What is Curriculum Mapping?

- Central element of curriculum mapping is an exercise involving staff review of
 - learning outcomes, content, learning activities, and assessment of a given course
 - identify **where and how** graduate attributes are taught, practised, and assessed within the whole course.
- This exercise shows that many graduate attributes are already being developed but not in an explicit way.
- The Curriculum Mapping process can reveal opportunities for new or improved alignment between aspects of course design.



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What is Curriculum Mapping?



- most common approaches to developing graduate attributes in Australia and internationally is
- **curriculum integration or embedding.**
- Involves facilitating students' development of graduate capabilities within disciplinary contexts of the courses they undertake as part of their undergraduate university programs.

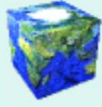
- Informed by framework to guide and steer the effective development of practice and scholarship surrounding teaching and learning at QUT.



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QUT Teaching Capabilities Framework

- Four dimensions to this framework
1. Engaging Learners
 2. Designing for Learning
 3. Assessing for Learning
 4. Managing for Learning

Graduate attributes inform the wider community about the **qualities**, **skills**, **knowledge** and **abilities** developed by the University's graduates.



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The Curriculum Mapping Process adopted for Review of Spatial Science @ QUT

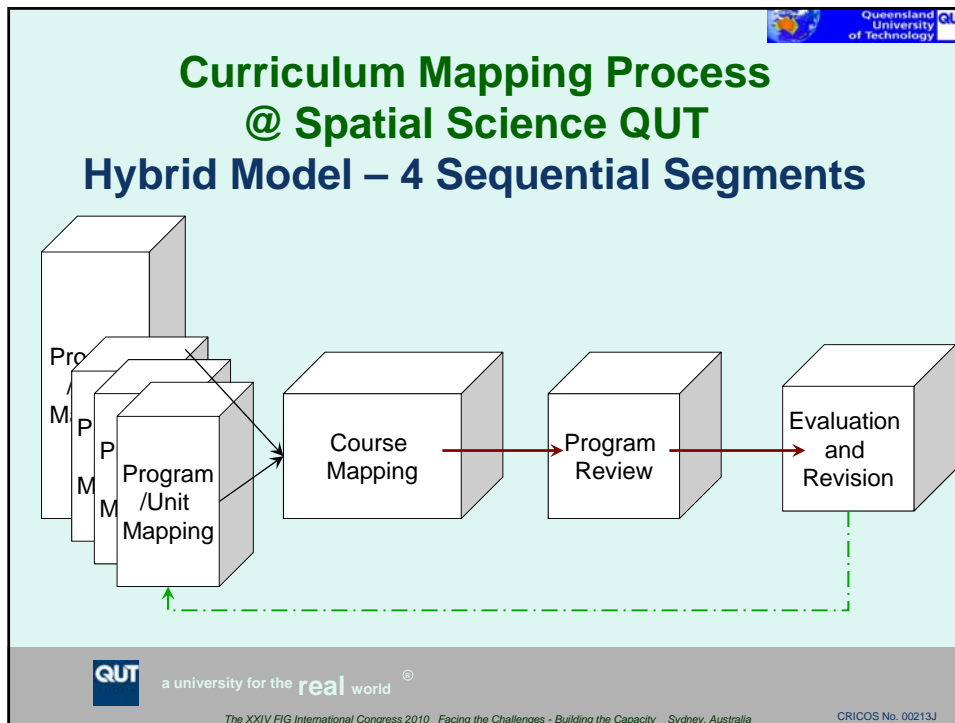
- Influenced / informed by following:
1. University of Qld – Teaching & Learning Support
 - mapping and embedding graduate attributes approach
 2. University of NSW- Learning and Teaching
 - curriculum mapping approach
 3. Consideration of own QUT teaching and learning frameworks with supportive graduate capabilities resources.



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- Queensland University of Technology **QUT**
- ### C.M. Process @ Spatial Science QUT
- #### Hybrid Model – 4 Sequential Segments
- **1: Program mapping** - What do the learning outcomes and graduate capabilities mean when applied to graduates of the Spatial Science unit/program?
 - **2 Course mapping** - How does each of the units within a program support the development of discipline specific graduate attributes? Several **thematic layers** applied to fundamental course map matrix to determine strengths/weakness.
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C.M. Process @ Spatial Science QUT Hybrid Model – 4 Sequential Segments

- **3: Program review** - How does the whole program contribute towards the expected graduate capabilities? *Faculty/ University level.*
- **4: Evaluation and revision** - How can discipline themes and individual learning units be refined to ensure developmental and sequential support for students to develop program graduate attributes? *5-7 year cycle*
- *MORE DETAILS IN THE PAPER*

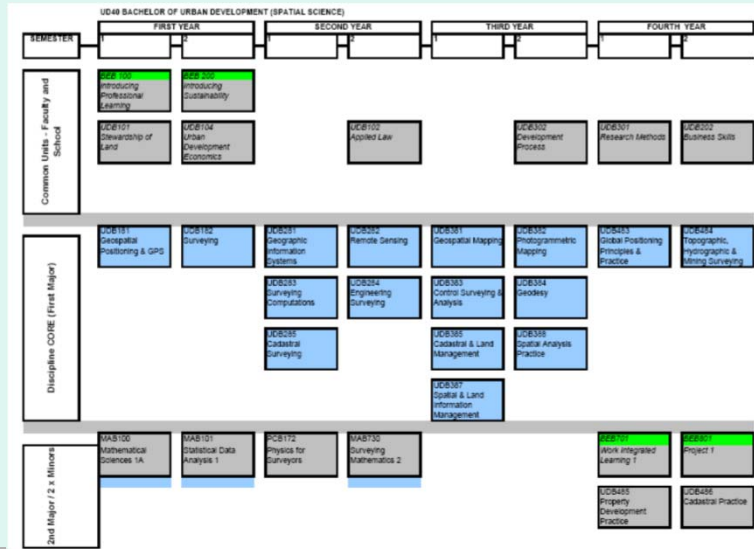
Photogrammetric Mapping: Strength over time?



- However, a continuing strength between these two surveying and mapping courses (**comparing 2005 with 2008**) has been the teaching alignment of photogrammetric mapping principles, practice and applications.
- The preliminary **curriculum mapping process** has shown a consistency in delivery and outcomes through this photogrammetric unit.



S.A.M.S. Basic Course Map



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An Enhanced Thematic Representation

2008 Course Matrix: UD40 Bachelor of Urban Development (Spatial Science)


	Year 1		Year 2		Year 3		Year 4	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
FACULTY WIDE UNITS	BEB100 Introducing Professional Learning ¹	BEB200 Introducing Sustainability ¹					BEB701 Work Integrated Learning ^{1,4}	BEB801 Project ^{1,4}
SCIENCE THEME (minor)	MAB100 Mathematical Sciences 1A ²	MAB101 Statistical Data Analysis ²	PCB172 Physics for Surveyors ²	MAB730 Surveying Mathematics ³			UBB301 Research Methods ²	UBB202 Business Skills ²
LAND DEVELOPMENT/ CADASTRAL THEME	UBB101 Stewardship of Land ²	UBB104 Urban Development Economics ²	UBB285 Cadastral Surveying ²	UBB102 Applied Law ²	UBB385 Cadastral & Land Management ²	UBB302 Development Process ²	UBB485 Property Development Practice ²	UBB486 Cadastral Practice ²
MEASUREMENT SCIENCE SURVEYING THEME		UBB182 Surveying ⁵	UBB283 Surveying Computations ⁵	UBB284 Engineering Surveying ⁵	UBB363 Control Surveying & Analysis ⁵	UBB384 Geodesy ⁵	UBB483 Global Positioning Principles and Practice ⁵	UBB484 Topographic, Hydrographic & Mining Surveying ⁵
MAPPING SCIENCE THEME	UBB181 Geospatial Positioning and GPS ⁵			UBB282 Remote Sensing ⁵	UBB381 Geospatial Mapping ⁵	UBB382 Photogrammetric Mapping ⁵		
GIS THEME			UBB281 Geographic Information Systems ⁵		UBB387 Spatial & Land Information Management ⁵	UBB388 Spatial Analysis Practice ⁵		

1 = Faculty-Wide unit; 2 = School based common unit; 3 = Science Minor unit; 4 = Applications Minor unit; 5 = Spatial Science Core unit

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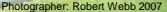
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Themes of **Spatial Science @ QUT** include

- 1. Measurement Science/ Surveying Centric Theme**
sequential learning units with rigid pre-requisites – supported by science minor
- 2. Land Development Theme** with strong cadastral surveying “flavor”. Recognition received from Surveyors Board of Qld when mapped against the Qld Surveyors Board Competency Frameworks (2007)
- 3. Mapping Science/ GIS Centric Theme** has contracted to an identified six units (20%). However, this theme has seen student growth from outside disciplines.



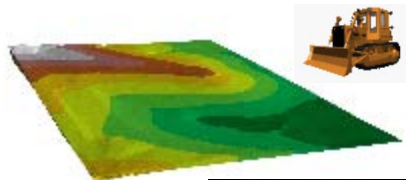


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Spatial Science Minor

offered to other programs
Student choice of 4 units

- **Geospatial Positioning and GPS**
- **Geographic Information Systems**
- **Remote Sensing**
- **Geospatial Mapping**
- **Spatial and Land Information Management**
- **Spatial Analysis Practice**

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Bachelor of Urban Development (Spatial Science) Exploring Course Quality

How do the students rate the learning experience?

Learning Experience Questionnaire -every subject, every semester

- ✓ 5 questions on teaching
- ✓ 5 questions on unit
- ✓ Open questions/comments

University Management have started to use results as performance measures.



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Course Map Matrix – Spatial Science

COURSE MAP 2009: UD40 Bachelor of Urban Development (Spatial Science)

SPATIAL SCIENCE UD40SS	Year 1		Year 2		Year 3		Year 4	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
Spatial CORE UNITS (18 units)	UDB181 Geospatial Positioning and GPS ¹	UDB182 Surveying ¹	UDB283 Surveying Computations ⁴	UDB284 Engineering Surveying ¹	UDB383 Control Surveying & Analysis ¹	UDB384 Geodesy ²	UDB483 Global Positioning Principles and Practice ³	UDB484 Topographic, Hydrographic & Mining Surveying ¹
SCIENCE Minor (4 units)	MAB100 Mathematical Sciences 1A ¹	MAB101 Statistical Data Analysis ¹	PCB172 Physics for Surveyors ³	MAB730 Surveying Mathematics ¹	UDB387 Spatial & Land Information Management ⁴	UDB388 Spatial Analysis Practice ⁴	UDB485 Property Development Practice ⁴	UDB486 Cadastral Practice ⁴
School Focused Units (6 units)	UDB101 Stewardship of Land ²	UDB104 Urban Development Economics ²	UDB285 Cadastral Surveying ³	UDB102 Applied Law ²	UDB385 Cadastral & Land Management ⁴	UDB382 Development Process ²	UDB301 Research Methods ²	UDB202 Business Skills ²
Integrated Transdisciplinary Units (4 units)	BEB100 Introducing Professional Learning ¹	BEB200 Introducing Sustainability ¹	UDB281 Geographic Information Systems ⁴	UDB282 Remote Sensing ⁴	UDB381 Geospatial Mapping ⁴	UDB382 Photogram- metric Mapping ⁴	BEB701 Work Integrated Learning ¹	BEB801 Project ^{1,4}

1 = Faculty-Wide unit; 2 = School based common unit; 3 = Science Minor unit; 4 = Applications Minor unit; 5 = Spatial Science Core unit

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2009: LEX Unit05 Question

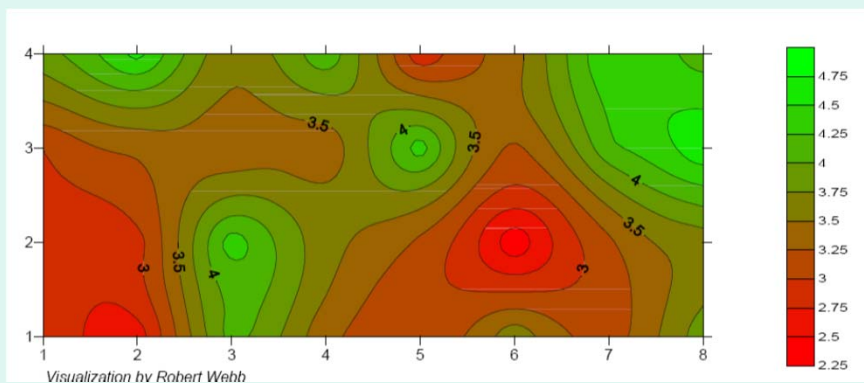
> I have been satisfied with the overall quality of this unit.

Scale 0.0 to 5.0

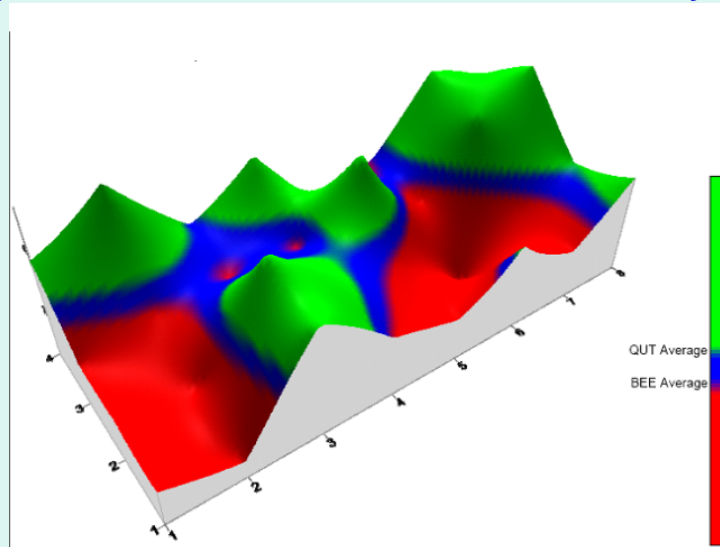
SPATIAL SCIENCE UD4955	Year 1		Year 2		Year 3		Year 4	
	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2	Semester 1	Semester 2
Spatial CORE UNITS (18 units)	UD0101 Geospatial Positioning and GPS ¹ 3.9	UD0102 Surveying ² 4.6	UD0203 Surveying Computations ² 3.5	UD0204 Engineering Surveying ² 4.2	UD0303 Control Surveying & Analysis ³ 2.8	UD0304 Geodesy ³ 3.4	UD0403 Global Positioning Principles and Practice ⁴ 4.5	UD0404 Topographic, Hydrographic & Marine Surveying ⁴ 4.1
SCIENCE Minor (4 units)	MAD008 Multivariate Statistics IA ¹ 3.3?	MAD011 Statistical Data Analysis ¹ 3.3?	FCB012 Physics for Surveyors ² 3.3?	MAD204 Surveying Mathematics ² 3.3?	UD0307 Spatial & Land Information Management ³ 4.1	UD0306 Spatial Analysis Practice ³ 3.2	UD0405 Property Development Practice ⁴ 4.2	UD0408 Cadastral Practice ⁴ 4.7
School Focused Units (6 units)	UD0101 Surveying of Land ¹ 3.0	UD0102 Urban Development Economics ¹ 2.9	UD0205 Cadastral Surveying ² 4.4	UD0206 Applied Law ² 3.6	UD0305 Cadastral & Land Management ³ 3.2	UD0302 Development Practice ³ 2.3	UD0401 Research Methods ⁴ 3.2	UD0402 Business Skills ⁴ 3.6
Integrated Transdisciplinary Units (4 units)	MAD002 Introducing Professional Learning ¹ 2.9	MAD003 Introducing Professional Learning ¹ 2.6	UD0201 Geographic Information Systems ² 4.1	UD0202 Remote Sensing ² 3.3	UD0301 Geospatial Mapping ³ 3.0	UD0302 Photogrammetry and Mapping ³ 3.7	MAD001 Work Integrated Learning ⁴ 3.1	MAD001 Project ⁴ 3.9

1 = Faculty-Wide unit; 2 = School based common unit; 3 = Science Minor unit; 4 = Applications Minor unit; 5 = Spatial Science Core unit

2009 Contours of LEXU05 Quality Question over Course Matrix



Spatial Science at QUT – LEXu05 Terrain Quality 2009

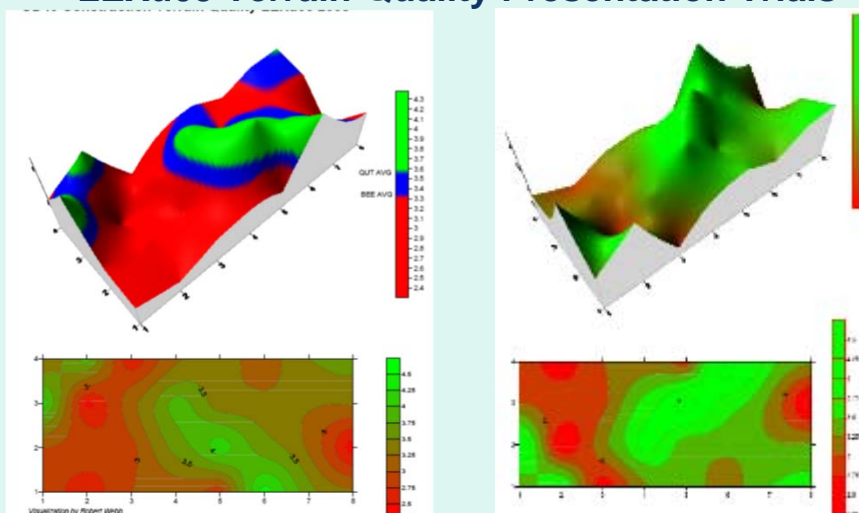


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Other Urban Development Disciplines LEXu05 Terrain-Quality Presentation Trials



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Work Integrated Learning (WIL) Environments



Work Integrated Learning (WIL)

- WIL described as a form of practical education that integrates periods of academic study with periods of work experience in jobs related to the students study area.
- Increasing pressure on Australian Universities to give greater emphasis and accept more responsibility for “**graduate employability**”.
- Two instruments used nationally measure and report graduates success in gaining employment.
 - Graduate Destination Survey (GDS)
 - Course Experience Questionnaire (CEQ)



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Partnerships:

- Distinctive feature of effective work-placement programmes (such as occurs in nursing programs) is that they involve **partnerships** among diverse groups:--
- Employers
- Students
- Academic teachers
- Higher education managers
- And professional bodies



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Summary of W.I.L. Teaching

- The teaching and learning content in WIL unit(s) predominantly will be delivered in the workplace, under the supervision of practicing professional.
- Duration of the WIL directed employment will vary as required by the specified Course/Major(study area).
 - For Spatial Science, this is a minimum of 14 days over a 15 week period.
 - These WIL days ALSO contribute towards the 90 days industrial experience requirement.

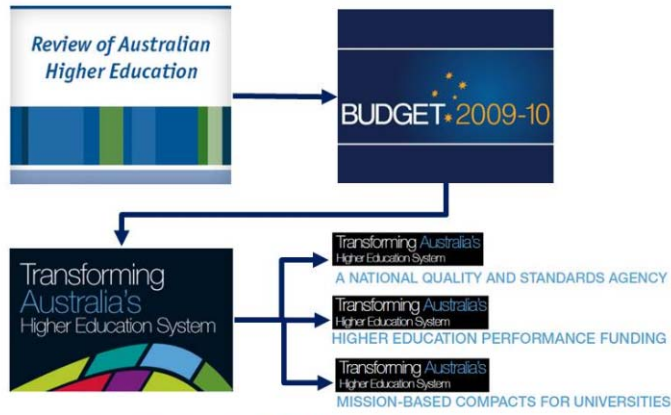


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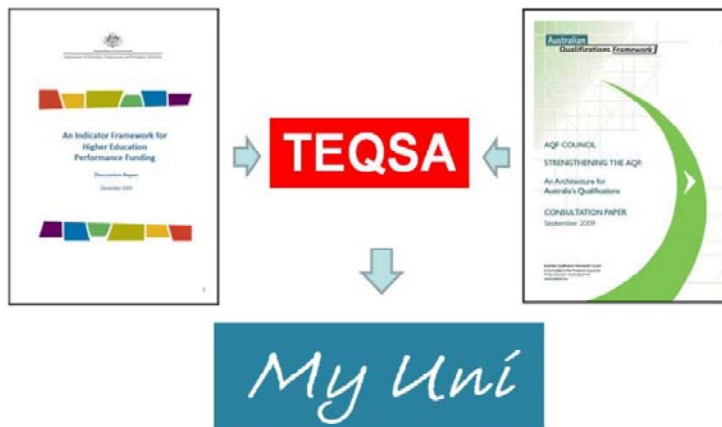
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A very dynamic context



Standards & public accountability



Higher Education Reform in AU (A Snapshot)

- Centrepiece of the new system –
- **student demand-driven model**, in 2012.
- New funding mechanisms for **Research**
 - Sustainable Research Excellence (SRE)
- Intention of AU government to expand educational opportunities
 - Target of increasing the number of 25-34 year olds holding a bachelor level qualification to **40 percent by 2025**.
 - Increasing targets in low **Socio-Economic Students**



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Conclusions

New Undergraduate Model for broadly based Spatial Science Curriculum at Queensland University of Technology: **Diversity in Surveying Curriculum Paper 4161**

- ✓ The role of **curriculum mapping** in whole-of-course design has been shown to be a useful process to academic and unit content advisors.
- ✓ Restructure of the Spatial Science program generally aligns to the university corporate-orientated business models to focus on **high volume, low overhead** programs and provide **for future capacity**.



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Conclusions

New Undergraduate Model for broadly based Spatial Science Curriculum at Queensland University of Technology: **Diversity in Surveying Curriculum Paper 4161**

- ✓ **Work Integrated Learning** is viewed as contributing industry relevance and depth to a students learning experience.
- ✓ New undergraduate model applied to courses will ensure graduates of the Faculty of Built Environment and Engineering leave QUT with:
 - **a broader understanding of professions,**
 - **broader understanding of disciplines and workplaces,**
 - **combined with recognisable professional competence.**



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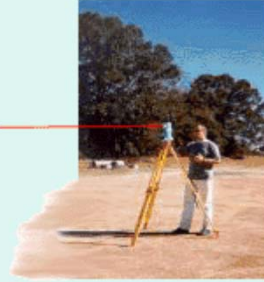
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Robert Webb
Faculty of Architecture, Design & Planning
 Queensland University of Technology




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Questions?




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Where have we been located at Gardens Point?




School of Surveying
1976-1987

School of Planning, Landscape Architecture and Surveying (PLAS)
1988-1999

School of PLAS/DBE
1999-2005

School of Urban Development
2006-2009

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