

Case Study: University of Sydney (Sydney, New South Wales, Australia)

The University of Sydney is a research-intensive institution in Sydney, Australia. It was established in 1850, is the oldest University in Australia and is a member of the research-orientated Group of Eight. In 2009, the University enrolled approximately 48,000 students in both undergraduate and postgraduate programs.



Science at Sydney: The [Faculty of Science](#) administers the large, broad and flexible Bachelor of Science (BSc), which has an average annual intake of 2000 students. The BSc had an [entry cut-off of 84.50](#) in 2011 (out of a possible 100, with 100 being the highest ranking). The [Bachelor of Science](#) offers over 30 majors.

Mathematics requirements for entry into Science: There is no Mathematics requirement for entry into the BSc.

The University of Sydney case study focuses on majors in the Life Sciences and is framed around a model of educational change based on the work of [Michael Fullan](#).



Initiation of Change

"Who prompted need for QS in science and why?"

At the institutional level, an ongoing graduate attributes project, led by staff from the centralised [Institute for Teaching and Learning](#), has prompted policy change across the institution.

In the Faculty of Science, [external drivers](#) around [national policy in higher education](#) have prompted further activity towards changing curricular and assessment practices. The [Learning and Teaching Academic Standards](#) project and subsequent articulation of National [Science Threshold Learning Outcomes](#) has further prompted change to better articulate and document learning outcomes and standards at the University of Science.

QS are viewed as an inherent characteristic of a scientist, and the need to transition undergraduates into honours in science prompts QS activity in the Life Science majors in the BSc at the University of Sydney.

Vision for Change

"What do QS in Science look like?"

There are established university-wide graduate attributes which are framed around the "[Sydney Graduate](#)" with [five clusters](#) of more specific attributes.

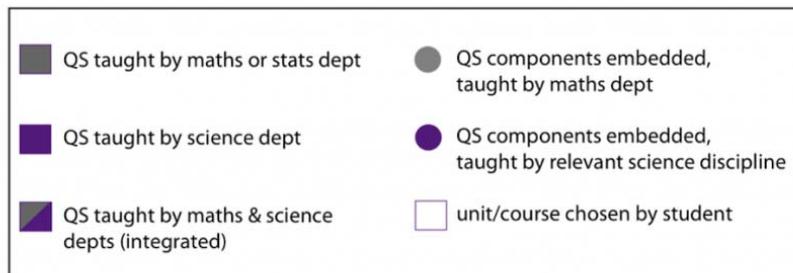
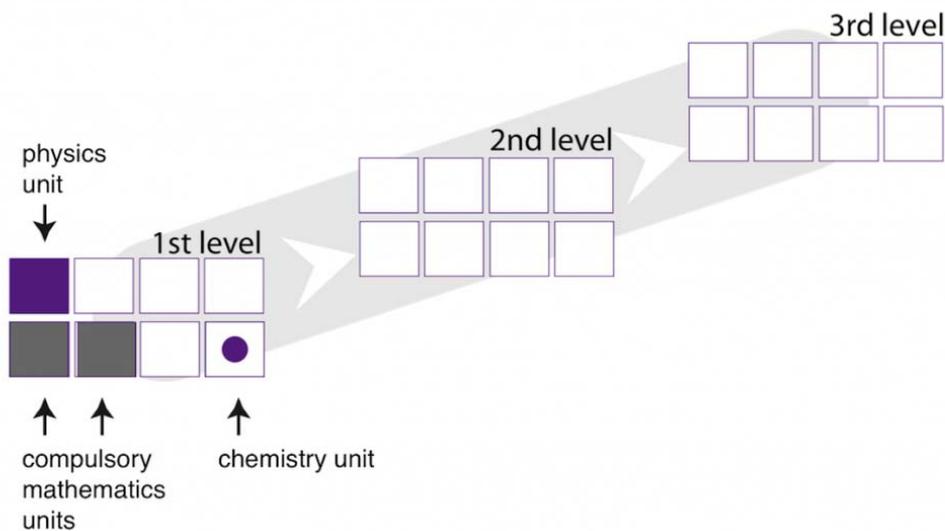
The University-wide attributes have been articulated into [Faculty of Science](#) statements of attributes around the five clusters. Although QS are not explicitly stated, the statements implicitly assume QS. These statements were ratified by the Faculty following [industry consultation](#). A [mapping exercise](#) within the Faculty of Science involved unit coordinators identifying which of the five cluster areas they teach in their unit, however this occurs at the generic level of the five cluster areas of attributes and is not science specific.

The Biology department utilises the Faculty of Science statements of attributes.

Implementing for Change

"How is need for QS in Science translated into practice?"

The Biological Sciences majors can build on the mathematical and statistical knowledge provided in the compulsory level one units. However, the flexible nature of the degree program, especially in the second and third years enables students to mix and match, making it difficult to identify the "critical QS pathway" within the majors.



Curriculum Structure for building QS: The above diagram shows the "critical QS pathway", highlighting the requisite units for the major. In the Biological Sciences majors the inclusion and development of QS occurs at the level of the individual major and varies considerably.

1st level features a philosophy of building foundation knowledge in the "enabling sciences", including physics, chemistry, mathematics and biology. The only compulsory unit is mathematics, where a selection of units is on offer to accommodate for the range of prior mathematics knowledge. [Mathematics for Life Sciences](#) is a unit tailored for BSc Life Sciences students, and is one of the options available.

2nd level features more specialised units where QS can be applied in context. [Plant PhysiCAL](#) was developed for plant biology specifically to build the QS of students. The interactive, online modules are offered as supplementary support for students, and are an example of context specific QS embedded in upper level Life Sciences units.

3rd level features more specialised units where QS can be applied in context.

Extra Curricular QS: There is a [Mathematics Learning Centre](#) to support the mathematics units, although it is limited to 'eligible students'.

Interdisciplinary QS: There is currently a project, the Sydney Scientists, which is bringing together teaching teams from the four first year units to discuss commonality across the units in terms of graduate attributes. However, the focus is on mapping writing and communication skills with QS to a lesser extent.

Evaluating the Change

"How effective has the change to build QS in Science been?"

Institutional standardised evaluation procedures are in place at the University of Sydney, including general unit surveys.

Evidence of QS learning outcomes: No science specific, program level evaluation procedures are in place at present, although conversations are beginning to explore standards based assessment around science graduate attributes.

Scholarship of Teaching and Learning activities at the University of Sydney have focused on numeracy in science, and the transfer of mathematical knowledge into a science context. A list of references is provided below.

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Thanks to the following people at the University of Sydney for collaborating with us to document this case study:

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If you have any questions, comments or thoughts on the University of Sydney case study, you are welcome to contact them directly.

This case study is up to date as of September 2011. The interviews to gather this data were conducted in May 2011 with further communications in August 2011.