

# Curriculum Development of Joint Degrees Courses with International Institutions

*Andy C. Tan*

Faculty of Built Environment and Engineering, Queensland University of Technology,  
George Street, Brisbane, Queensland 4001, Australia

*a.tan@qut.edu.au*

## Abstract

With globalisation and severe budget constraints in the education sector in Australia and around the world it has become necessary for higher education institutions to be more outward looking and seek funding from non traditional sources to supplement the financial shortfalls. One way to overcome this problem is to work cooperatively with other institutions to share facilities and courses, at the same time generating valuable income to maintain the operation of the university. This paper describes the development of joint curricula in built environment and engineering courses in QUT. It outlines the stages of development starting from seeking international partners, developing memorandum of understanding, making visit to partner institution to inspect the facilities, curriculum development to meet the academic requirements of the institutions and professional bodies and finally the implementation process.

## Introduction

Globalisation among the international community has resulted in mixed outcomes. Both developed and developing nations have gained from opening up their borders and resulted in flow of trade, technology, information and most significantly education. Education is the backbone of all nations which eventually results in knowledge and wealth generation to sustain our standard of living. In many countries, education budget has been the target when times are hard and has been moving in the direction of self-funding by those who can afford to acquire a tertiary education. This has forced many institutions of higher learning to seek funding from external sources and to cut cost in the delivery of education. One way to overcome this problem is to work cooperatively with other institutions to share facilities and courses, at the same time generating valuable income to maintain the operation of the university.

Internationalisation of QUT engineering courses started around early 1980s. Since then the number of international students coming to QUT has greatly increased. Around mid-1980 the three engineering schools started to provide advanced standing programs for engineering diplomats from the polytechnics in Singapore to articulate into our degree courses. The credit offered to those students was based on the grade point average (GPA) of the home institutions and varied from one to two years durations. To keep up with the competition from other institutions in attracting international students, the Faculty of BEE developed a number of strategies to internationalise its courses, namely, staff of the Faculty with experience in the local culture and education system were appointed to work on different countries in the region. Several links with Asian institutions were subsequently established.

In 1995 the first international joint orientation program between QUT and the University of Indonesia kicked off. Through this initial cooperation, the Faculty pioneered the very first dual/joint post-graduate courses, namely, Materials and Metallurgy, and Engineering Management. The former program was funded by the World Bank through BPPT (Agency for the Application of Science and Technology) and the latter program was funded by Pertamina (National Gas and Petroleum Corporation). Both programs required the students to spend the first year of the course at the UI and the final year at QUT. On completion of both parts of the course the students will be awarded postgraduate certificates from both institutions. The program was successfully delivered and was extended to several more batches and other academic programs.

In 1998, the innovative dual/joint degrees mode of delivery was extended to undergraduate engineering courses

between UI and QUT. The program was similar to the postgraduate programs which involved the students studying the first 2 years at UI and the final 2 years at QUT. Students enrolled in QUT had to meet the entry grade point score and the English language requirements. This mode of delivery is still in progress and is adopted throughout QUT with overseas institutions, and by institutions in Australia and around the world. This paper describes the development of joint curricula in built environment and engineering courses in QUT. In these programs, the course is shared between two institutions with approximately 50:50 ratio. On successful completion of both components of the course, the students will be awarded certificates by both institutions. For this mode to work, the course components of both institutions have to be compatible and meeting the required academic standards. It outlines the stages of development starting from seeking international partners, developing memorandum of understanding, making visit to partner institution to inspect the facilities, curriculum development to meet the course requirements and finally the implementation process. It will also describes some of the initially obstacles experienced during implementation and the successes of the on-going programs.

### Background

QUT's earlier international links were with institutions in Singapore and Malaysia. The program was to provide advanced standing for engineering diplomats from those polytechnics to articulate into our degree courses. The credits offered to those students were based on the GPA obtained at the home institutions and varied from one to two years durations. This program was subsequently introduced to institutions Hong Kong and around Asia. According to QUT statistics, the total international enrolment of fee paying overseas students from 1998 to 2008 grew from 2393 to 4531 [1]. This figure shows a tremendous increase in our overseas student enrolment and represents about 11% of the total student population in QUT. Recently, the bulk of the students came from China (an increase of 19.4%) and India (an increase of 15.9%). According to AEI's international student data for 2008 shows there were 543 898 enrolments by full-fee paying international students in Australia on a student visa. This represents an increase of 20.7 per cent on 2007 enrolments. In 2008 year-to-date enrolments exceeded half a million for the first time [2]. Table 1 shows the enrolments of the top 10 countries in Australia institutions. China has a largest student number and represents a total growth of 23.4%. Although the number from India is not as high as China, it has a tremendous of 54.2% from 2007.

According to AEI's report [2], of those students enrolled in Australian institutions, the Higher education ranked first by volume of enrolments (182,770) and third by volume of commencements and followed by vocational education and training (175,461). VET enrolments and commencements were the fastest growing of all sectors. Enrolments grew by 226.9 per cent between 2002 and 2008, and by 46.4 per cent between 2007 and 2008. China dominated the higher education market by volume of enrolments (28.2 per cent) and volume of commencements (29.1 per cent). India was the second largest market with 15.2 per cent and 15.7 per cent respectively. No other markets in this sector individually contributed more than 10.0 per cent [2]. According to AEI research report, international education activity contributes \$14.2 billion in export income to the Australian economy in 2007-08 and remains Australia's largest service export industry ahead of personal travel (tourism) services (\$12 billion) [6]. Table 2 shows the international student's enrolments and commencements by sector.

Table 1. International student enrolments by nationality in Australia (top 10 markets) in 2008 [2]

<i>Nationality</i>	<i>Enrolments</i>	<i>% of Total</i>	<i>Growth on 2007</i>
China	127,276	23.4%	19.7%
India	97,035	17.8%	54.2%
Republic of Korea	35,376	6.5%	3.2%
Thailand	22,278	4.1%	12.9%
Malaysia	21,134	3.9%	7.1%
Nepal	18,063	3.3%	99.0%
Hong Kong	18,012	3.3%	-5.6%
Indonesia	16,063	3.0%	8.5%

Brazil	16,028	2.9%	28.6%
Vietnam	15,931	2.9%	65.2%
Other Nationalities	156,702	28.8%	10.0%
<i>All Nationalities</i>	<i>543,898</i>	<i>100.0%</i>	<i>20.7%</i>

Table 2. International Student Enrolments and Commencements by Sector in Australia in 2008

Sector	Enrolments			Commencements		
	Number	% of Total	Growth on 2007	Number	% of Total	Growth on 2007
Higher Education	182,770	33.6%	4.7%	78,070	24.1%	11.8%
VET	175,461	32.3%	46.4%	106,180	32.7%	46.1%
ELICOS	125,727	23.1%	23.4%	99,312	30.6%	22.8%
Schools	28,798	5.3%	7.1%	14,537	4.5%	6.6%
Other	31,142	5.7%	13.6%	26,116	8.1%	14.3%
<b>Grand Total</b>	<b>543,898</b>	<b>100.0%</b>	<b>20.7%</b>	<b>324,215</b>	<b>100.0%</b>	<b>24.8%</b>

### **QUT Dual/Joint Degrees Programs**

The introduction of the dual/joint degrees program was in response to QUT's goal to internationalise its courses and to attract full fee paying students. With our partner, the University of Indonesia, we pioneered the very first dual/joint degrees program in postgraduate studies in 1996. The structure of the program consisted of two components of studies, namely, the first year (2 semesters) at UI and the final year (2 semesters) at QUT. UI offered the core units worth 20 credit hours, while QUT offered the specialist units which were worth 96 credit points. The certificate of Master of Technology from UI and Graduate Certificate from QUT were awarded to students for successful completion of both components of the course.

In response to the economic crisis in Asia and South East Asia, QUT in partnership with UI again pioneered the very first dual/joint undergraduate degrees program in 1998. The aim was to provide the local students with global education experience and understanding of different cultures to fulfill the responsibility of a global engineer. In order to reduce the financial burden of those developing countries, this initial program known as 'three years plus one year (3+1)' program was to enroll local students to study the first 3 years in UI and the final year at QUT. This program was subsequently changed to '2+2' due to logistic problems and also travel registrations for QUT staff to travel to Indonesia to teach some components of the course in the 3<sup>rd</sup> year. Since our introduction, the innovative undergraduate joint degrees mode of delivery has been adopted by QUT and other universities in Australia and around the world.

#### **i. QUT/UI Dual Degree Undergraduate Programs – in Mechanical, Electrical and Civil Engineering**

This international joint/dual degrees program involving two institutions, QUT and UI, was designed for local students to progress towards a global information society. This international program aims at providing local students with multi-culture experience, global education outcome and the opportunity to fulfil the capability as a global professional engineer. In this program, UI and QUT jointly prepared the curricula and syllabi in line with QUT and UI academic standards which include monitoring of teaching activities, assessments, laboratory and computing quality.

In this program UI is responsible for the basic sciences, mathematical and engineering units in the first two years and QUT is responsible for the applied mathematics, engineering and management units in the final two years. The curricula for the first two years covered about 50% of an undergraduate course in QUT. The basic structure of the pro-

gram is shown in Table 3. On successful completion of the program at UI the student will be eligible to continue his/her study at QUT on meeting the entry requirements. To be eligible for admission to QUT the students must obtain a minimum Grade Point Average (GPA) of 2.75 or above (on a four point scale) and a minimum English requirement of IELTS of 6.0 or a TOEFL score of 550. The program is on-going and has graduated over 120 students. In May 2008, UI and QUT celebrated the 10th anniversary of the undergraduate joint degrees program.

Table 3: Course Structure of a Joint Degrees Program between QUT and UI

<u>Year 1 – University of Indonesia</u> Basic mathematics, science and engineering; and discipline introductory units	<u>Year 3 – Queensland University of Technology</u> Applied mathematics, specific engineering and management units.
<u>Year 2 – University of Indonesia</u> Advanced mathematics, science and fundamental engineering units	<u>Year 4 – Queensland University of Technology</u> Application of engineering principles, professional studies and final project.

## ii. Program Development

Development of international joint degrees program is unique and numerous obstacles have to be tackled before a harmonious delivery of joint educational outcomes between two different nations and cultures can be achieved. The long term objectives for the participating institutions are, students and teacher mobility, complimentary delivery of educational outcomes, experiencing different educational systems and cultures and potential long term research collaborations. The steps adopted by Dolinina and Kuzmicheva [3] in their implementation of joint curricula in IT field are similar to our approach; essentially it involves the following stages: finding international partners, development and signing of memorandum of understanding (MOU), visit to partner institution, development of curriculum, publicity and implementation.

*a. Finding international partners* – this can be problematic and requires some sort of initial bonds or contacts. This normally involves senior staff of the institution that has the authority or delegation to formalize the program.

*b. Development of MOU* – this is essentially a formal agreement describing the aims and objectives between parties. It expresses the terms and conditions to be met by each party to promote the program. It can be a legally enforceable agreement.

*c. Visit to partner institutions* – this normally takes place after the MOU has been signed. The aims are to have first hand knowledge of the facility, assessing the course structures and other academic matters.

*d. Development of curriculum, publicity and implementation* – curriculum development is essential for the program to be recognized by the respective education authority and professional bodies. It has to provide adequate opportunities for personal and professional development and meeting a set of educational and professional outcomes. This will be followed by publicity and acceptance of the program by local industries. The final stage is the implementation, which requires human and physical resources.

## iii. Curriculum Development

The curriculum must be structured to include integrated set of tasks and learning experiences. It aims at achieving specific educational outcomes and meeting a set of generic attributes as prescribed by the profession and the university. Specifically, it needs to have in depth technical competence in the designated field of study and area of specialization. In accordance with the Accreditation Policy of Engineers Australia [4], a professional engineering program would be expected to include a set of elements with associated percentages of the total learning experience as indicated in Table 4. The proportions are not mutually exclusive, some may relate mainly to content, and others may relate more to learning processes.

Table 4: Expectation of a professional engineering program [4]

Program Element	Percentage
Mathematics, science, engineering principles, skills and tools appropriate to the discipline of study	not less than 40%
Engineering design and projects	approx 20%
An engineering discipline specialisation	approx 20%
Integrated exposure to professional engineering practice, including management and professional ethics	approx 10%
More of any of the above elements, or other elective studies	approx 10%

QUT's engineering programs received full accreditation by the Engineers Australia; hence its degrees meet Stage 1 Competency Standard for Professional Engineer. Accreditation is importance among the profession and the educators to bench its degrees with the international community and Australian's engineering degrees are internationally benchmarked through the Washington Accord [5]. The Accord recognises the substantial equivalency of accreditation systems of signatory organisations and the engineering education programs accredited by them, and establishes that graduates of programs accredited by the accreditation organisations of each member nation are prepared to practice engineering at the entry level.

The University Academic Board of QUT is responsible for all academic matters, ranging from course development, unit development to assessments. In the engineering programs, the generic capabilities required by the course are in line with Engineers Australia which stipulates:

- A: Knowledge and skills pertinent to a particular discipline or professional area
- B: Critical, creative and analytical thinking, and effective problem-solving
- C: Effective communication in a variety of contexts and modes
- D: The capacity for life-long learning
- E: The ability to work independently and collaboratively
- F: Social and ethical responsibility and an understanding of indigenous and international perspectives
- G: Characteristics of self-reliance and leadership

The Teaching and Learning Committee is responsible for the setting of assessment guidelines. The prime objective is to help students learn. It is also about staff and institution learning through the process of understanding from assessment whether the learning experiences that the students have had have been good and successful for their learning. With the establishment of the program, the next task is to focus on unit (subject) development. This requires a detailed description of the topics within a unit. It basically contains the following information:

- a. Why write a unit outline? – the primary aim of a unit outline is to provide students with information about the unit to inform their study as well as provide a brief official record of the units studied as part of their course.
- b. Unit coordinator/staff – to be used as a basis for determining human resources that might be needed, and to assist tutors in the unit to understand the relevance of their sections of the unit to the learning outcomes.
- c. Course coordinators - to ensure that the unit contributes to the overall learning outcomes of the course, and that graduate attributes are developed throughout the course.
- d. All staff – determines the support provided to the students and staff for teaching the unit, and uses the unit outlines to determine the type of support required (e.g. Library, IT resources, exams and assessments).
- e. External audiences: the unit outline may be used by other institutions to determine credit arrangements or professional accreditation, and can also be reviewed by external agencies for quality assurance.
- f. Items to be included in the unit outline –
  - i. Rational – the importance of the unit to the students and its contribution to the learning outcomes.
  - ii. Aim – a broad but concise description explaining what the unit is designed to achieve and may include links to the overall aim of the course.
  - iii. Learning outcomes – The outcomes provide the foundation of a unit outline and guide the design of assess-

ment criteria. It includes knowledge, values, skills, attitudes and competencies that students are expected through successful completion of the unit. The learning outcomes must be achievable, measurable and linked to criteria and performance evaluation.

- iv. Content – a brief and general statement of topics to be covered and the skills, and generic capabilities to be achieved.

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QUT has an established set of guidelines in assessment of units which is based on criterion-reference assessment. It consists of a number of elements and goals within the Teaching Capabilities Framework. The elements in each framework are: i) pedagogical/organisational knowledge, ii) discipline, iii) curriculum, iv) learners, v) environment and vi) scholarship. The TCF are listed as follow:

- a. Engaging learners – involves teachers adopting and fostering active, interactive and deep learning approaches so that learners can interact meaningfully with the concepts, materials, processes and people in a course.
- b. Designing for learning – requires planning and design of appropriate curriculum, activities, environments and assessment to support student learning and achieve planned student learning outcomes.
- c. Assessing for learning – informs what and how students learn. Setting appropriate and challenging standards, assessing the learner and their learning progress (through diagnostic, process, and outcome assessment in both a formative and summative manner) are integrated to the learning process.
- d. Managing for learning – this is enhanced by effective and consistent administration and organisation of time to plan and generate resources, organise and plan systems and people. It requires an engagement with the policies and organisational priorities that impact on teaching and learning.

#### **IV. Implementation**

This process requires the respective institution to appoint a program coordinator. The program coordinator's tasks are basically to ensure that the course is offered in accordance to the specified objectives, the delivery of the course by appropriate personnel, funds for laboratory and IT facilities are available and the progression of the students. As the course is to be delivered at two institutions, they need to have knowledge of the facilities and human resources of the partner's institution. They also need to be counselors to the students and monitor their progress in the course. To ensure the quality of the course is maintained, samples of course assignments and examination scripts will be assessed by the respective coordinator in consultation with the university course coordinator. An obstacle at the early stage of implementation was the assignment of teaching staff to go to the partner's institution to teach a certain component of the course. This was mainly due to the government's travel restrictions to Indonesia.

#### **Conclusion**

The severe budget constraints faced by many universities and globalisation have resulted in these institutions seeking cooperation to share the resources and at the same seeking external income to cover the financial shortfalls. In spite of economic downturn faced by many Asian countries, the student enrolment in higher education in Australian institutions is still relatively strong, with a total enrolment of over 182,770 in 2008. The total number of international students studied in Australia in 2008 is 543,898, an increase of 17.6% over 2007. The largest group of students was from China and they accounted for 22.2% of all international students. As of 2008, Australia's international student continues to provide substantial export income to the Australian economy, amounting to \$14.2 billion and is ahead of tourism industry.

To date the dual/joint undergraduate program has graduated over 120 students and is still going strong and has generated over A\$3 million to QUT. This not only generates substantial income to the university to cover the financial

shortfalls, but also lead to students having the opportunity to experience different culture and education systems to fulfil the responsibility of global engineers. This is attributed to the innovative dual mode of delivery of education between two institutions with totally different cultural background, education systems and economic background. The main challenge remains with curriculum development so that the course meets the requirements of the academic standards of the institutions and also the professional bodies. For continuing success, it is essential to keep in mind that financial rewards should not be the only objective; both institutions need to assist each other in promoting research cooperation, teaching quality and sharing of resources wherever possible.

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