

ONWARD and UPWARD A Review of the Bachelor of Information Technology at CIT

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ABSTRACT

The first group of graduates from the Bachelor of Information Technology emerged from Central Institute of Technology at the end of 1998. It was then time to reflect on what we taught to the students and when we taught it. A review was carried out in 1999. In this paper some reflections are shared on the first three years together with student feedback. There is a brief examination of what other institutes are doing and general learning outcomes from the ACM Model Curriculum. Changes were then made to our degree. The change from competency based to norm references assessment generated a lot of debate. Other changes included a major rework to the Analyst major, changes in subject content at different levels and room for further expansion into other majors that presently are not included, and the conversion programme from other computer courses.



1. INTRODUCTION

In this paper the results of the review of the Bachelor of Information Technology at the Central Institute of technology are discussed. Firstly some background is provided concerning the degree and then the changes are outlined

1.1 Background to the CIT Degree

CIT purchased the BIT from The Waikato Polytechnic in 1995. The degree was divided into modules and each module into 3 units with each unit carrying a credit value of 1. To complete the degree, 54 credits were needed (18 credits each year). Changes were then made by CIT to adapt the degree to our local situation. The schedule of modules is in appendix A.

The first class of students began the degree in 1996. They graduated as the class of 98. By the end of that year we had good feedback on the degree from students, lecturers and employers. In 1999 we reviewed the degree and made significant changes to it for implementation in the year 2000.

During 1999, a series of meetings were held with staff and students and the following changes were examined. The Programme Advisory Committee approval was sought for suggested changes.

2. CIT POLICY

In order to meet the requirements of the CIT Academic Board certain changes were made. The addition of the level number to each module identification code and the alteration of the credit value of each module from 3 credits to 20 credits brought the degree in line with the

NZQA standard. This gives the student 120 credits for a year's study at approximately 1 credit for 10 student learning hours. The degree requires 360 credits for completion. The module format was changed to give aims, learning outcomes and content rather than purpose, elements and performance criteria of the old degree.

3. UNITS

Units were abolished. Rationale: These caused confusion among the students. Students would receive internal marks for each unit but only the modules were recognised by registry. A student who passed two units in one module in one year and only failed one unit, would be required to re-enrol in the whole module the next year. From the lecturers' point of view the units were very much like NACCQ (National Advisory Committee On Computing Qualifications) modules and led to a fragmentary course of study. Lecturers who had a unit to teach often spent too much time in assessment and did not integrate well with the other parts of the module.

4. AWARDING THE DEGREE

In the old documentation this was a little unclear. There was a list of compulsory modules (six at stage one, six at stage two and the double module of the project). We offered the student options at stage three but the student usually chose to do four stage three modules. Although this is what we still offer, the wording now requires the student to complete a minimum of six stage one modules, a minimum of six stage two modules and a minimum of four stage three modules which include the double module of the project. This allows the other two modules to be taken from an additional stage two module or to choose a module from other degrees such as Business or Electronics.

5. GRADING SYSTEM

This discussion caused the most debate. The degree had followed the mastery assessment method of the National Diploma in Business Computing handbook. This is a system that is familiar to the lecturers. If a module had three assessments then a student is expected to pass each assessment (8.4, 8.6). A pass is considered to be 80% and it is required that 60%-80% of the content is assessed (8.9). If the student did not show mastery on their first attempt a second assessment was given (8.11.1) under certain conditions.

Other methods were examined. The one that held favour was the adoption of the institute's generic grading. This gives an A, B or C as a passing grade and a D or E as a failing grade. Assessments are divided into two - coursework done during the module and an examination done at the end of the module. Generally 60% of the marks are awarded for the coursework and the rest for the examination. A student needs to pass with 50%.

5.1 Reasons for Change

There were several reasons that helped make this change. A comment from several of the students who completed the degree was the value of it. A student who obtained merits was acknowledged. But the student who almost obtained a merit received nothing different than the student who had to resit many of the assessments. This middle group of students felt the grading system disadvantaged them. Much of the lecturers' energy seemed to go into the students who have to do resits and some students were using the first attempt as practice so they could do well at the resit.

Employers' or agencies' concern was how to compare a student from Victoria University or other tertiary institutes who had A, B, and Cs with one from CIT with Ps and Ms when looking at candidates for a job. Several employers had already discarded non-degree students.

Since CIT still offers the Diploma in Business Computing many students opt to study the Certificate in Business Computing, the Diploma, a Conversion programme and then the third year of the degree. By changing the assessment method the student now has a choice between a diploma that offers the mastery method and the degree that offers the normative method.

This change also brought us in line with other degrees. Several students on other programmes would have liked to do a computer module although then had difficulty with an 80% pass to be achieved and not receiving a proper grade.

From the lecturers point of view there is now the effort of rewriting assessments and marking schedules. However the resit option has been removed but there is still the opportunity for special examinations.

6. CURRICULUM CHANGES

In 1998 the first group of students finished their third year of the Bachelor of Information Technology degree (BIT) at the Central Institute of Technology (CIT).

In the review of the programme, it was identified that the Systems Analysis and Design modules did not flow well together and that there was need to make changes.

6.1 Background

The module IT103 Fundamentals of Software Development and Design was taught in the first year. In this module the students were introduced to Systems Theory, the System development lifecycle, elements of good design and an introduction to programming using Visual Basic. This module is the prerequisite for the programming stream and for the Information Systems stream and for the Database stream.

In the second year of the Information Systems stream there was one module IT205 Systems Implementation and Control in which the students gained an appreciation of project management, systems control and systems implementation planning. This module was clearly similar to the NACCQ modules PM200 Project Management, SC200 Systems Control and SI200 Systems Implementation which are taught to the Diploma of Business Computing students.

In the third year there are two modules in the Information Systems stream. These are IT303 Systems Analysis, Design and Control and IT313 Systems Delivery. Also all the students are required to complete in the second semester of the third year the double module IT301 Project for which many students opted for the development and implementation of a system. The IT303 module included an understanding of the investigation phase, the needs for standards and documentation, application of tools commonly used, preparation and presentation of a requirements definition and design documents. Also the students were to examine different methodologies and justify their selection.

In the Rationale for the Programme Structure it is stated that a stage two module allows the student to apply the theory to given controlled examples and provide plenty of practice. Students should demonstrate an understanding of a body of knowledge along with the ability to apply the underlying principles and concepts to a given set of facts.

Stage three modules allow the student to apply the theory in depth with larger case studies which are industry related. Students should demonstrate an understanding of a body of knowledge along with the ability to apply the underlying principles and concepts to the identification and solution of unstructured problems in unfamiliar settings.

Another concern was with the integration of the Diploma in Business Computing students who had done a conversion programme and been admitted to the third year of the degree. Feedback from the degree students indicated they felt at a disadvantage when doing IT303 since the Diploma students had already completed SD200 and SA200 before entering the third year of the degree.

6.2 Statement of the Problem

Students and staff were reasonably happy with the introductory module IT103 and with IT205 and IT313. However the application of analysis and design tools easily fitted into the stage two rationale while the examination of different methodologies and the implementation of one using a case study fitted into stage three rationale. It was therefore decided to divide IT303 into two modules.

6.3 Examination of Model Curricula

The IS'97 Models Curriculum provides 10 prescriptions with a total of 139 learning units. For each unit there is a unit goal, unit objectives and competency level and a body of knowledge elements listed.

The prescription for Analysis and Logical Design (IS97.7) has 14 learning units with a total of 70 context elements at level 2 or 3. Level 2 is recognition of knowledge in its context and level 3 - usage and comprehension - requires considerable practice and repetition. The fourth level application requires unsupervised practice.

6.4 Examination of Other Degrees

An examination was then carried out to investigate how systems analysis and design was implemented in other degree programmes. Several degrees from polytechnics and universities were investigated. Some provided an introduction in the first stage, others did not. All had a full second stage module and a third year stage.

6.5 Changes Made

With these in mind a new module was added at stage two called Systems Analysis and design. This module concentrates on the traditional tools and techniques used by the analyst. This gives the student the opportunity to practice the tools or technique and use a CASE tool to develop their work. The third year module familiarises

the student with different methodologies, some object oriented tools, and investigates the appropriateness of the methodology to a given situation. There is also a major assignment where the student has to produce a requirements definition, a design and a working prototype of their system or the equivalent in their chosen methodology.

Various other changes were made to names of modules such as changing IT205 from Systems Implementation and Control to Project Management or Human Machine Interaction to Human Computer Interaction.

Two new first year modules were introduced. The unit on operating systems was removed from IT102 and the module IT106 The Information Technology Environment was removed from the course. Certain parts of IT106 were incorporated into IT5107 with the rest of IT102 giving a new module with the title Fundamentals of Information Technology. This module should also appeal to students from other degree programmes who wish to do some computing.

IT6204 Computer Technology and Operating Systems was removed from the modules being taught. A new first year module IT5108 Computer Systems Architecture is included and includes operating systems and other elements of hardware.

This leaves CIT with a strong degree in programming and information systems. The module IT306 Information Systems in Management was moved to the Information Systems thread. It is hoped that the other threads can be developed later. This will include the development of Information Technology thread and a Software Engineering thread (in conjunction with the Software Engineering Department). Another module will be added in Web Commerce in conjunction with the Business Department. Students from the BIT programme will also now be able to include modules in Marketing, Accounting, Business Law, and Electronics in their degree.

7. CONVERSION PROGRAMME

At CIT we gave the opportunity for students with a DipBC to enter with advance standing the third stage of the degree. Usually the student had to complete seven units that were offered in a summer programme. These were CI102, CS106, ST105, DM105 (2 credits), IP205 (2 credits).

One question that was raised concerned the aim of the conversion programme. Was it to prepare the student for the degree or provide the student with more knowledge? It should be noted that five of the credits are

at stage one. So here are diploma students who should be making a transition between stage two and three doing a lot of stage one subjects and then finding the third stage quite difficult.

After much discussion it was decided to offer a conversion programme to CBC students and that this was the more appropriate path into the degree for those who did not have the initial entry qualifications. In order to gain entry into stage two, students with a CBC are required to complete IT5105 Mathematics for Information Technology and IT5106 The Information Technology Environment which includes the ethics and computers in society which were not covered in our CBC. The other path will remain so that in order to gain entry into stage three, students with a DipBC are required to complete IT5105 Mathematics for Information Technology and IT6201 Communication Studies.

8. EXIT QUALIFICATIONS

Consideration was given to the addition of exit qualifications at the end of each year or at the end of the first year so that students can try the degree out. We thought that this may make the degree more attractive to students who were unsure whether they could commit themselves to a three year course of study. This was rejected in the end since the CBC, DipBC and the Conversion Programme existed and students can choose that course of study.

9. CONCLUSION

The CIT's Bachelor of Information Technology has evolved from the changes enforced by the initial accreditation through advice from the Programme Advisory Committee and feedback from the students and staff. This has provided us with a more robust degree and one that meets the needs of industry and provides employment for the students. There is room for future expansion of the degree with a good foundation and in depth alternatives in the third year.

10. REFERENCES

- CIT 1995 Bachelor of Information Technology Degree Handbook.
- The Waikato Polytechnic 1995 Bachelor of Information Technology Student Handbook.
- NACCQ 1998 National Diploma in Business Computing Handbook.
- CIT 1999 CIT Bachelory of Information Technology Curriculum Document.
- Davis, Gordon B et al 1997 IS'97 Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems.

APPENDIX A LIST OF MODULES AND UNITS IN 1995

Thread	Modules
<p>Communication Studies</p>	<p>IT101 Communication Studies BC101 Written and Oral Communication CI101 Cultural Identity IP101 Introduction to Interpersonal Communication IT201 Communication Studies IP201 Interpersonal Communication (2) PW201 Professional Writing IT207 Topics in Communication Studies* OC207 Oral Communication TR207 Training IT304 Personnel Management Issues* IP304 Interpersonal Communication (2) TR304 Training</p>
<p>Information Technology</p>	<p>IT102 Fundamentals of Information Technology FI102 Fundamentals of Information Technology (2) OS102 Operating Systems IT105 Mathematics for Information Technology DM105 Mathematics for Information Technology (2) ST105 Probability and Statistics IT106 The Information Technology Environment BA106 Introduction to Business ET106 Ethics and Professionalism CS106 Computers and Society IT202 Data Communications and Networks DC202 Data Communications & Networks (2) IN202 Internet Management IT204 Computer Technology and Operating Systems CT204 Computer Technology (2) PR204 Programming Operating Systems IT306 Information Systems in Management IS306 Information Systems Management DS306 Decision Support Systems (2) IT311 Developing Models, Specifications and Languages* FS311 Formal Specification in Software Development PT311 Implementing Programming Languages (2) IT312 Systems Programming* PR312 Programming with Unix (2) OS312 Operating System Maintenance</p>
<p>Software Development</p>	<p>IT104 Programming PR104 Applications Programming (2) QA104 Software Quality Assurance IT203 Software Development Methods SD203 Software Development (2)</p>

PY203 Prototyping

Thread	Modules
	<p>IT302 Software Development SD302 Software Development (3) IT305 Knowledge-Based Systems* KB305 Knowledge- Based Systems (3) IT308 Human-Machine Interaction HM308 Human Machine Interaction PJ308 Research Project in HMI PR308 Programming with graphical user Interface</p>
<p>Information Systems</p>	<p>IT103 Fundamentals of Software Development and Design PD103 Program Development SD103 Systems Design IS103 Introduction to Systems Development and Analysis IT205 Systems Implementation and Control PM205 Project Management SC205 System Controls and Security SI205 Systems Implementation IT206 Data Models and Databases DB206 Database Management Systems DM206 Data Modelling FG206 Fourth Generation Languages IT208 Evaluation and Procurement* EP208 Evaluation and Procurement (2) IG208 Information Gathering IT303 Systems Analysis and Design SS303 Systems Development Tools and Methods SA303 Systems Analysis SD303 Systems Design IT309 Data Models and Databases DM309 Database Management Systems DM309 Data Modelling FG309 Fourth Generation Languages IT313 Packaged Systems Implementation SI313 Software Systems Testing SP313 Package Configuration</p>
	<p>SR313 Systems Review and Maintenance IT301 Project PI301 Project (6)</p>

*not offered at CIT in 1995 onwards

The number in brackets indicate the credit value of a unit that is worth more than one credit.

APPENDIX B OLD MODULE TITLES AND NEW MODULES TITLES

Old Module Titles	New Module Titles
T101 Communication Studies T102 Fundamentals of Information Technology T103 Fundamentals of Software Development & Design T104 Programming T105 Mathematics for Information Technology T106 The Information Technology Environment	IT5101 Communication Studies IT5102 Fundamentals of Information Technology (offered till 1999) IT5103 Fundamentals of Software Development and Design IT5104 Programming IT5105 Mathematics for Information Technology IT5106 The Information Technology Environment (offered till 1999) IT5107 Fundamentals of Information Technology (offered 2000-) IT5108 <i>Computer Systems Architecture</i> (offered 2000-)
T201 Communication Studies T202 Data Communications and Networks T203 Software Development Methods T204 Computer Technology and Operating Systems T205 Systems Implementation and Control T206 Data Models and Databases T207 Topics in Communication Studies* T208 Evaluation and Procure*	IT6201 Communication Studies IT6202 Data Communications and Networks IT6203 Software Development Methods IT6204 Computer Technology and Operating Systems (offered till 2000) IT6205 <i>Project Management</i> IT6206 Data Models and Databases IT6207 Topics in Communication Studies* IT6208 Evaluation and Procurement* IT6209 Systems Analysis and Design (offered in 2001-)
T302 Software Development T303 Systems Analysis and Design T304 Personnel Management Issues* T305 Knowledge-Based Systems* IT306 Information Systems in Management T308 Human-Machine Interaction T309 Data Models and Databases T311 Developing Models, Specifications and Languages* * IT312 Systems Programming*	IT7302 Software Development IT7303 Systems Analysis and Design (offered till 2001) IT7304 Personnel Management Issues* IT7306 Information Systems in Management IT7308 <i>Human Computer Interaction</i> IT7309 <i>Database Design and Implementation</i> IT7312 Systems Programming*

