Submission to House of Representatives Standing Committee on Education and Vocational Training *Inquiry into Teacher Education*

The Australian Mathematical Sciences Institute (AMSI) welcomes the opportunity to respond to this important inquiry.

AMSI was established in November 2002 with funding from the Victorian Government's Science, Technology and Innovation Infrastructure grants program and matching funds from a member consortium of Australian universities and other mathematical organisations.

The aims of AMSI are to:

- Establish national industry-linked research activity in areas as security, bioinformatics, optimisation and financial mathematics.
- Develop research programs that both build upon existing research strengths of Australian mathematicians, and develop expertise in strategic new and emerging areas.
- Expand the scope and delivery of post-graduate short courses to meet the needs of post-graduate students, academic staff and industry.
- ***Improve the teaching of mathematics at primary and secondary level by joining with mathematics teacher associations and government agencies to develop a strategy to address issues such as teacher shortfalls and under-qualified teachers.***
- Provide leverage to pursue further Federal, State and Industry funding to extend its activities.

In 2004 AMSI was awarded the International Centre of Excellence for Education in Mathematics (ICE-EM) which is funded by an Australian Government Grant over four years. ICE-EM is managed by the AMSI Board, and the Board is supported by its Education Advisory Committee. The activities of ICE-EM to date include:

- Writing of textbooks and associated materials for Years 5 to 10 that develop mathematical ideas sequentially across the levels.
- Investigation of the mathematical content knowledge needed by teachers of mathematics at all levels of the school through a series of workshops attended by mathematicians, mathematics educators and teachers of mathematics. This project is adapting a significant body of work from the USA to Australian needs.
- Initial trials of a professional development program that targets specific areas of need in the school curriculum.
- Development of careers awareness materials highlighting the importance of mathematics to many career opportunities.

AMSI and ICE-EM are well placed to make recommendations to this inquiry. A staff of respected mathematicians, mathematics educators and teachers of mathematics are employed by AMSI and ICE-EM. While key staff members are located at the AMSI offices at The University of Melbourne at 111 Barry Street, the activities of AMSI/ICE-EM are devolved.

Through the AMSI membership and these devolved activities, it is possible to take a national view of the mathematical sciences including the preparation of teachers of mathematics.[1]

In Australia there are several pathways to becoming a teacher of mathematics. By completing:

- A four year Bachelor of Education (BEd) which is the normal route for the preparation of teachers for primary schools but can lead to a P-12, P-10 or secondary qualification.
- A double degree eg BSc/BEd.
- An undergraduate or higher degree, followed by a Diploma of Education (DipEd). (Usually secondary although some primary DipEd courses are available)

Education authorities and schools generally expect that:

- all primary teachers will be teachers of mathematics. The majority will undertake a BEd program.
- secondary teachers of mathematics will have two years (minimum) study in mathematics or statistics at the tertiary level. The majority will complete their teaching qualification via the degree/DipEd pathway.

From the perspective of teacher education for prospective teachers of mathematics it is therefore essential that BEd courses for primary teachers, and DipEd courses for secondary teachers, prepare these teachers well as ***teachers of mathematics***.

In this submission a number of serious concerns are documented concerning BEd courses. Improvements are also necessary in DipEd provision but, in general, AMSI/ICE-EM find graduate teacher education programs far less problematic.

The submission deals separately with BEd and DipEd courses. The issues identified, and the recommendations relating to these courses, are applicable to other courses that prepare teachers of mathematics. For example, combined degrees leading to a qualification to teach mathematics in a secondary school should require that the education degree include the important features of a DipEd documented here. However, the submission does not deal specifically with courses other than the BEd and DipEd.

BACHELOR OF EDUCATION (PRIMARY)

In support of this submission, websites of faculties of education in Australia that have Bachelor of Education programs in Early Childhood Education, Primary Education or Middle Years of Schooling Education were surveyed. The information is 'as publicly advertised' by the universities. The subjects in their degree programs that were examined dealt with ' mathematics' or 'mathematics education' in order to ascertain the type of preparation that their pre-service teachers receive to teach mathematics. The mathematical pre-requisites (if any) required to enter the B. Ed. Program were also recorded (Attachment 1).

The term 'mathematics education', in ordinary English usage, is synonymous with 'teaching of mathematics' or 'education in mathematics'. It is absolutely essential that the inquiry team should be aware that within Faculties of Education it frequently has quite different meanings. This is best explained by quoting from subject descriptions (Attachment 2) of Faculty of Education web pages:

- "…modern theory of how children learn mathematics…"
- "…constructivist and representational theories…"
- "…principles of relational understanding…"

[1] For further details of AMSI see www.amsi.org.au and for ICE-EM, www.ice-em.org.au

- "…the social, cultural and political contexts within which the teaching of mathematics occurs…"
- "…children's construction of mathematical understanding and their interaction with physical materials in a social context…"
- "…thinking and working mathematically, scientifically and environmentally from socially inclusive and critical perspectives…"

AMSI/ICE-EM consider that teacher education courses should be concerned with mathematical content knowledge appropriate to the level at which teachers are going to teach and separate courses about the pedagogical skills related to that knowledge. Course descriptions should reflect this and be written in clear and unambiguous language.

In the following pages, the terms of reference are addressed.

1. Examine and assess the criteria for selecting students for teacher training courses.

The NTER score for entry into BEd courses is low in many cases. In 2004 the NTER was in the 70s for many universities, some were in the 80s. In 2005 this situation seems to have changed and some students began teacher training courses this year with a reported NTER in the 50s. This is far too low.

Our data shows that only 4 of 31 universities state that they require Year 12 mathematics of any type. Another 8 indicate that they require Year 11 mathematics. The remaining 19 do not have any mathematics as an entry requirement or have not made it specific on their course information websites.

Recommendations: A comprehensive study of the existing requirements for entry into teacher training courses be completed. Primary school teachers should be expected to have demonstrated a sound understanding of core mathematics before entering the course. A minimum NTER, or its equivalence, should be set in the range 70-75. These requirements should apply across all institutions.

2.Examine the extent to which teacher training courses can attract high quality students, including students from diverse backgrounds and experiences.

The starting salaries of beginning teachers compare well with other professions but a plateau is reached when teachers have a number of years of experience; remuneration appears not to increase with experience or acquisition of further discipline expertise after a certain point.

The low NTER is a "put-off" for able students. It is well known that parents, and the community generally, discourage students with high NTERs from a perceived waste of the effort in obtaining a good score by entering a course requiring a much lower one.

The Smith Report (2004)[2] describes the incentives that prospective secondary mathematics teachers in the United Kingdom are given to become teachers. Up to £10,000 is awarded to potential teachers who are to become qualified to teach in 'shortage subjects'. This type of incentive could be used to attract mathematically well-qualified students to BEd courses.

[2] ***Smith, A., (2004) Making Mathematics Count***, the Report of Professor Adrian Smith's Inquiry into Post-14 Mathematics Education [Available: http://www.mathsinquiry.org.uk/index.html]

Recommendation: Positive steps should be taken to improve career paths for highly skilled primary teachers. Salary structures for people with strong mathematics backgrounds should reflect market forces as such people are in demand. Experienced teachers of mathematics, especially those who have successfully completed accredited professional development, should be rewarded and remunerated.

3.Examine attrition rates from teaching courses and reasons for that attrition.

Selection methods for teachers are largely based on NTER scores. This takes no account of unrealistic views of some students of the reality of the classroom. For the more academic students, BEd courses are often boring. For the less well-prepared, serious gaps in mathematics content knowledge are not addressed.

Recommendation: Selection of candidates for teaching courses be based on NTER supplemented by other selection procedures including interviews.

4.Examine and assess the criteria for selecting and rewarding education faculty members.

Universities generally place the highest value in promotion on producing research papers. The value of many of the research papers in education is questionable.[3] The primary purpose of Education faculties should be the training of pre-service teachers and the provision of professional development for teachers. Doing this well should be rewarded.

Many Education faculty have had little recent classroom experience

Recommendation: Staff who prepared teachers to teach mathematics should be rewarded for teaching, maintaining contact with the discipline of mathematics, their contribution to the professional development of teachers and to scholarship rather than to educational research publications. A record of excellence in classroom teaching of mathematics should be a prerequisite for selection of such faculty members.

5.Examine the educational philosophy underpinning the teacher training courses (including the teaching methods used, course structure and materials, and methods for assessment and evaluation) and assess the extent to which it is informed by research.

In the universities surveyed, many of the subjects nominally concerning mathematics are not dealing with mathematics but with issues such as theories of learning, child development, constructivism, sociocognitive approaches to learning, curriculum planning and gender. For example:

Griffith University - 3022 EPS Mathematics education 2- course description:
"This course is the second of two mathematics education subjects. In this subject the emphasis is on the social, cultural and political contexts within which the teaching of mathematics occurs in contemporary Queensland and Australian society."

[3] This is not restricted to research in education

University of South Australia - Studies in Science, Mathematics and Society and Environment Education 3 course description:
"Classroom structures and practices that support constructivist and interactive approaches to teaching; classroom practices that encourage students to pose questions and think and work mathematically scientifically and environmentally; planning, teaching and evaluating integrated units of work; key concepts embedded in pattern and spatial sense and geometric reasoning, rational number, soils and rocks, energy and student centred inquiry, governance (political, social and economic systems); aspects of Years 3 – 9 curriculum; analysis of curriculum policies and frameworks."

The data collected clearly shows that many BEd students are not being adequately prepared for the teaching of mathematics. Further, it is possible for a student to complete a Bachelor of Early Childhood Education, undertaking less than their BEd primary counterparts in mathematics education subjects. These students qualify as teachers of children between the ages 0 and 8 but can obtain a position teaching outside of that range in a primary school, even upper primary. This is particularly alarming.

Few courses require pre-service teachers to demonstrate understanding in the discipline of mathematics. Only The Melbourne University BEd (primary and early childhood) web information indicates a requirement for pre-service teachers to pass a basic test of mathematical competency as a hurdle task in order to complete the course.

By the end of their course intending teachers should achieve a deeper and more complete understanding of, and the ability to do, mathematics. This does not mean taking courses in advanced mathematics. Primary teachers need in-depth knowledge of areas such as elementary arithmetic, mensuration and geometry, and comprehensive knowledge of the application of these to every day life.[4]

Recommendations: During their course pre-service teachers' understanding of mathematics should be strengthened through subjects concerned with the mathematics discipline content that is appropriate to primary teachers.
As a minimum there should be two semester-long subjects in mathematics content in addition to any pedagogical studies.
A national exit test should be set that requires students to demonstrate competency in the core areas of mathematics appropriate to the teaching of mathematics in primary schools. This test should be independently set by mathematicians and experienced teachers.

6.Examine the interaction and relationships between teacher training courses and other university faculty disciplines.

There is generally insufficient involvement in the Education faculties by staff from other disciplines.

Intending primary teachers are not receiving the types of courses concerned with mathematics as a discipline appropriate to primary teaching. This could be remedied by more collaboration between Education and Mathematics departments.

[4] For an example of such a course see Parker, H. and Baldridge, S. (2004). *Elementary mathematics for teachers*. Michigan: Sefton-Ash Publishing.

Recommendation: Mathematics departments and Education faculties should be held jointly accountable for the quality and appropriateness of the mathematical content of courses. The courses need to be genuinely appropriate for pre-service teachers.

7.Examine the preparation of primary and secondary teaching graduates to:

(i) teach literacy and numeracy;

The teaching of English and mathematics should be central to the preparation of all primary teachers. This can only be achieved by devoting considerably more time to these fundamental subjects than is currently the case in many BEd courses.

The current fashion of treating 'numeracy' as if it were distinct from mathematics and its everyday applications is misguided. Primary teachers who have taken the kind of mathematics courses we propose would be well prepared in the applications of elementary mathematics in everyday life. They should be able to use this knowledge appropriately throughout their teaching, including in other discipline areas.

(ii) teach vocational education courses;

Primary trained teachers involved in teaching mathematics in the VET/TAFE/Adult Basic Education sector require appropriate background in the discipline of mathematics and an understanding of adult learners. A BEd in primary teaching is not sufficient in itself.

(iii) effectively manage classrooms;

No comment—assumed this will be part of a BEd.

v) successfully use information technology;

No comment—assumed this will be part of a BEd.

(v) deal with bullying and disruptive students and dysfunctional families;

No comment—assumed this will be part of a BEd and induction and mentoring for new teachers.

(vi) deal with children with special needs and/or disabilities;

Children who perform successfully in mathematics are considered to be good at mathematics. Many children with difficulties at the very low end of the scale participate in programs that target their learning needs. Of concern is the group of children who pass tests sometimes, who may fall in the lower middle band and are simply told that they are not good at mathematics. These children go on to make subject and career choices with little mathematics and limit their options as a result.

Children with special needs in mathematics have different needs to children with special needs in other subject areas. Potential primary teachers need to be able to diagnose and target misconceptions rather than label students as being incapable of achieving higher levels.

Teachers of mathematics at all levels need to be aware that data such as TIMSS show that many Australian students could achieve at higher levels and that few should be in the lowest band. It appears that low expectations for some groups and individuals—a belief that some

children cannot do mathematics that is often associated with teachers who found mathematics difficult themselves—is often stopping children from higher achievement.

Recommendations: Strategies for investigation of children's specific difficulties in mathematics should be part of pre-service training for primary teachers.
Selection processes should be strengthened to exclude candidates who have negative attitudes to mathematics learning.

(vii) achieve accreditation; and

Teachers should be accredited and this should be linked to on-going professional development. Teacher accreditation should be linked to appropriate courses as described above and include satisfactory completion of an exit test in mathematics.

It should be possible to obtain accreditation as a of specialist teacher of mathematics (primary). Primary teachers who have additional qualifications in mathematics over and above a standard BEd, and have a record of successful classroom teaching and leadership in mathematics, should be recognised.

The Standards that have been developed by the Australian Association of Mathematics Teachers (AAMT)[5] should not be used for accreditation in their current form as they do not require explicit, clearly defined subject content mastery.

(see also section 7 in regard to secondary teachers)

(viii) deal with senior staff, fellow teachers, school boards, education authorities, parents, community groups and other related government departments.

These are complex issues that should be part of induction and mentoring in schools.

8. Examine the role and input of schools and their staff to the preparation of trainee teachers.

There is generally little effort made to place student teachers with practising teachers who have been identified as good models for the sound teaching of mathematics. Those who offer to be involved in the supervision and preparation of pre-service teachers are not always the best examples of teachers.

Recommendation: Incentives should be offered to experienced teachers who are able to offer placements. If there were enough teachers with accreditation in the category of specialist teacher of mathematics (primary), this would greatly assist in identifying appropriate staff to supervise trainee teachers.

[5] See www.aamt.edu.au

9. Investigate the appropriateness of the current split between primary and secondary education training.

In general the preparation of primary teachers is inadequate for the demands of teaching mathematics to secondary students.

The mathematics content and philosophy of some emerging courses for 'middle years' should be viewed with considerable caution. For example, Ballarat University conducts a BEd (P-10 mathematics and IT) that includes mathematics and mathematics education subjects for those wishing to specialise. However the course only requires Year 11 mathematics as an entrance requirement.

Some materials being produced for 'middle years' mathematics are of an abysmally low standard and in the hands of less than well qualified teachers could be extremely damaging. For example, see Attachment 3 where a complex mathematical concept is trivialised in a childish way and the writer clearly does not understand the mathematics.

10. Examine the construction, delivery and resourcing of ongoing professional learning for teachers already in the workforce.

It is generally difficult for teachers to be allowed the time and money to participate in professional development. Professional development is too general, insufficient to meet the needs of teachers and not content specific.

There is not a well-structured professional development program available.

There are too few opportunities for professional development in mathematics content.

Recommendations: Schools be rewarded for high levels of teacher participation in accredited professional development for their teachers.
That there be national co-ordination, and extra funding for, teacher professional development in mathematics.

11. Examine the adequacy of the funding of teacher training courses by university administrations.

A central issue that bedevils any discussion about improving teacher education is the fact that university faculties and departments are primarily funded according to number of students that they take in and retain. This results in undesirable practices:

- Accepting students who NTER is too low.
- Setting little or no mathematics as a course pre-requisite.
- Not including 'hard' subjects such as those dealing with mathematics per se.
- Passing students whose performance is inadequate.

Such practices are clearly not in the national interest if quality schooling is a priority.

Recommendation: The Australian government and the universities work together to break the nexus between funding and the number of students enrolled, irrespective of national need.

THE EDUCATION OF MATHEMATICS TEACHERS FOR SECONDARY SCHOOLS

AMSI/ICE-EM considers that the Degree/DipEd is the preferred route for secondary mathematics teachers and that this is the pathway that should be supported. As this route has proven to be the major source of well-qualified secondary mathematics teachers, this section specifically addresses DipEd course provision.

1. Examine and assess the criteria for selecting students for teacher training courses.

Normal practice at present is to select on Grade Point Average (GPA) and two years of mathematics in the undergraduate degree. This is problematic for the following reasons:

- Teachers of the more advanced senior courses and leadership positions need a major in mathematics.
- GPA is not necessarily a good indicator of ability to teach or enthusiasm and knowledge of specific subjects.
- Students with very poor language skills are often admitted to DipEd courses.

A further difficulty arises when the different universities compete against one another for students. When they fail to attract enough students in particular discipline areas, in order to maintain funding and staff positions, teaching methods are made generic or made less discipline specific. In other cases students have been enrolled in a method being offered by another university via distance mode.

Recommendations: Supplementary selection procedures be used for the DipEd to assess—in particular—enthusiasm for mathematics and English competence.
The universities in each State and Territory be required to co-operate in student selection so that students are offered the methods they wish to study and so that national needs in particular subjects are addressed.

2.Examine the extent to which teacher training courses can attract high quality students, including students from diverse backgrounds and experiences.

Mathematics graduates are in demand. Substantial financial incentives similar to those in the UK should be implemented for discipline areas that are in demand. (see footnote 1, p. 3)

A significant number of people with substantial mathematics in their degrees decide to become teachers. There is inadequate provision for these people.

There are many people teaching mathematics in secondary schools who are not qualified in the subject. This gives the impression that there is not a shortage of mathematics teachers.

Recommendations: Substantive financial incentives be given to well-qualified graduates and career change professionals in high demand discipline areas.
Barriers to the employment of newly graduated, well-qualified teachers of mathematics due to on-going positions being held by teachers teaching out of field should be removed.

3.Examine attrition rates from teaching courses and reasons for that attrition.

Graduates have usually made mature decisions about becoming teachers. While there is insufficient formal evidence for attrition, there is considerable anecdotal data. One factor is

financial stress and another is an unsupportive environment during the first school placement. The latter can be exacerbated by students having insufficient preparation via discipline specific methods classes. Lack of flexibility in courses for students with family responsibilities can be another cause of attrition eg many late afternoon classes.

4.Examine and assess the criteria for selecting and rewarding education faculty members.

Education faculty with responsibility for mathematics education should have a strong background in the discipline of mathematics and a record of successful teaching of mathematics in schools. Many Education faculty with a strong discipline background in mathematics are reaching retirement age. When they are replaced, it is seldom by people with the same depth of discipline knowledge. It is therefore essential that staff who prepared teachers to teach mathematics are rewarded for maintaining links with the discipline of mathematics or these links will be further eroded.

It may be more appropriate to second excellent teachers to teach methods courses. Flexible arrangements, including appropriate financial incentives, would be needed.

Recommendation: Staff who prepared teachers to teach mathematics should be rewarded for teaching, maintaining contact with the discipline of mathematics, their contribution to the professional development of teachers and to scholarship rather than to educational research publications.
Excellent classroom teachers should be seconded to teach methods courses.

5.Examine the educational philosophy underpinning the teacher training courses (including the teaching methods used, course structure and materials, and methods for assessment and evaluation) and assess the extent to which it is informed by research.

Currently prospective secondary mathematics teachers in some institutions can have no lecturer with a recent background in the teaching of mathematics at a school or connections with the discipline of mathematics.

Graduates need a course that assumes that they know how to learn, and therefore primarily addresses what it is they need to know to be successful teachers. There are four elements that should be a part of a DipEd course:

- Core knowledge that all teachers need eg classroom management strategies, an understanding of special needs such as the effect of Ramadan on Islamic students, ways of working with teaching aides for students with disabilities, mandatory reporting etc
- Teaching methods specific to the areas they will be teaching
- A review of the content knowledge in their areas of specialisation, especially as it relates to school curricula
- School experience

The teaching methods, linked to the content knowledge review, and school experience should be central to the course. For prospective teachers of mathematics all should clearly relate to the discipline of mathematics. For some DipEd courses this is no longer the case with ‘integrated’ courses and generic methods.

Further, it is nearly impossible for DipEd students to complete a double mathematics method, as few universities now offer it. In other words, they are not encouraged to become experts in

the teaching of mathematics but compelled in many faculties to take another method that may not interest them.

Recommendations: DipEd courses for prospective teachers of mathematics should have a clear focus on the teaching of mathematics.
At least one major Education faculty in each State should offer a double mathematics method to allow for specialisation and interest.

6.Examine the interaction and relationships between teacher training courses and other university faculty disciplines.

This is very variable but in the past 20 years the gulf between mathematics educators in Education faculties and mathematicians has widened considerably. AMSI/ICE-EM are attempting to redress this. To date, teachers of mathematics have been more receptive to connecting with the discipline than staff of Education faculties. Thus Education faculty appear to be out of step with the teachers in this regard.

There is an additional barrier to interaction in that many education places (primary and secondary) are in universities that have few, if any, strengths in mathematics. Similar comments apply to other discipline areas such as physics.

Recommendation: The preparation of mathematics teachers (primary and secondary) should be concentrated in universities where there is a strong mathematical sciences department.

7.Examine the preparation of primary and secondary teaching graduates to:

(i) teach literacy and numeracy;

Few DipEd courses provide mathematics teachers with the skills need for teaching literacy as it applies in a mathematical context. This literacy component should be included in courses specific to teaching mathematics.

The current fashion of treating ‘numeracy’ as if it were distinct from mathematics and its everyday applications is misguided. Mathematically well-qualified teachers will recognise these everyday applications and use them appropriately throughout their teaching. When it is appropriate they will assist their colleagues from other discipline areas reinforce these everyday applications.

(ii) teach vocational education courses;

A DipEd is recognised in the TAFE sector and school experience for those students who are interested in this area should be an option.

(iii) effectively manage classrooms;

Noted above as core element of all DipEd courses.
In addition to core strategies, teachers of mathematics need to be able to recognise and manage students’ difficulties with the subject matter. Diagnostic strategies for mathematical understanding should be part of all methods courses. It should also be recognised that this is a very difficult area and expectations of what can be done in pre-service courses should not be too ambitious.

(iv) successfully use information technology;

Tends to be over-emphasised as a panacea in current education courses and is not an issue. The current intake of pre-service teachers of mathematics tend to know more than their lecturers about IT.

(v) deal with bullying and disruptive students and dysfunctional families;

Should not be a core part of initial teacher training but should be a core part of a first-year mentoring program. These skills cannot be taught in the abstract.

(vi) deal with children with special needs and/or disabilities;

Children with special needs in mathematics have different needs to children with special needs in other subject areas. See previous comments on primary courses.

(vii) achieve accreditation; and

There should be appropriate accreditation of teachers of mathematics that specifies what year levels they are qualified to teach. It should have clearly defined content knowledge standards, differentiate between teaching at junior and senior secondary levels, and be linked to a specific method in mathematics teaching.

Senior and junior mathematics methods courses need to be developed as the depth and kind of mathematical knowledge needed to teach in the first two years of secondary school is different to that required for senior years.

The Standards that have been developed by the Australian Association of Mathematics Teachers (AAMT)[6] should not be used for accreditation in their current form as they do not require explicit, clearly defined subject content mastery.

Until there is an appropriate national, discipline specific accreditation implemented, there can be no accurate work force planning in the secondary sector.

Although bodies such as the Victorian Institute of Teachers have articulated what appear to be appropriate standards, subject specific accreditation remains problematic. Concern is expressed that there can also be accreditation by stealth, with principals or others deciding whether teachers can be accredited based on perceived skills. This undermines the process and does not progress the status of teaching. All accreditation must be by a properly constituted body that can independently assess discipline specific qualifications and skills.

> **Recommendation:** That there be national accreditation of teachers of mathematics with criteria that are subject specific.

[6] See www.aamt.edu.au

(viii) deal with senior staff, fellow teachers, school boards, education authorities, parents, community groups and other related government departments.

The core courses in a DipED should deal with these topics but they should be largely left to mentoring and induction after graduation.

8. Examine the role and input of schools and their staff to the preparation of trainee teachers.

There is increasing difficulty finding suitable placements for beginning teachers of mathematics. If there were enough teachers with accreditation in the category of teacher of mathematics (junior or senior secondary), this would greatly assist in identifying appropriate staff to supervise trainee teachers.

Rewarding schools with good programs by making them 'centres' for school experience, and for the on-going professional development of teachers from the region (eg the professional development schools in the USA), should be investigated. This would require the appointment of additional staff to these schools.

Recommendation: That the concept of 'professional development schools' be tried in at least one state.

9. Investigate the appropriateness of the current split between primary and secondary education training.

The middle years cover crucial areas in the mathematical development of young people eg in algebra. Any qualification for teaching in the first two years of secondary must have a rigorous mathematics content component that could be different to that required for later years. However this approach should only be considered with a great deal of care and clear accreditation requirements. Post the first two years of secondary, teachers of mathematics need to understand the Year 11 and 12 courses and should be qualified to teach at these levels.

10. Examine the construction, delivery and resourcing of ongoing professional learning for teachers already in the workforce.

As identified on p. 8, the inadequate provision of professional learning for mathematics teachers, especially in content knowledge, is a serious problem.

11. Examine the adequacy of the funding of teacher training courses by university administrations.

The issues identified for primary are compounded for the DipEd. A well-managed DipEd is an expensive course, and will run for more weeks than undergraduate courses. In order to cut costs and maintain income flow, a four year BEd has unfortunately come to be considered preferable to a one-year graduate DipEd.

It should also be noted that there is unmet demand for one-year primary DipEd courses and that degree/DipEd primary graduates are highly regarded by employers.

Recommendation: That there be incentives for administrators to maintain and expand graduate teacher education programs.

University			
Course	**Mathematics pre-requisites**	**Qualifies to teach age range**	**Course Content**
Australian Catholic University (ACT, NSW, QLD & VIC)			
Bachelor Of Education (Primary)	Year 11	5-12	Mathematics content and mathematics education content
Charles Sturt University			
Bachelor of Education (Early Childhood)	Not specified	0-8	No information found
Charles Sturt University			
Bachelor of Education (Primary)	Not specified	5-12	Mathematics education content only
Curtin University			
Bachelor of Education (Early Childhood Education)	Not specified	5-12	Mathematics education content only
Curtin University			
Bachelor of Education (Primary Education)	None	5-12	Mathematics education content only
Deakin University			
Bachelor of Education Primary	None	5-12	Mathematics content and mathematics education content
Edith Cowan University			
Bachelor of Education (Early Childhood Studies)	Not specified	0-8	Not specified
Edith Cowan University			
Bachelor of Education (Kindergarten through Primary)	Not specified	4-12	No information found
Edith Cowan University			
Bachelor of Education (Primary)	Not specified	5-12	No information found
Griffith University			
Bachelor of Education - Primary	Not specified	5-12	Mathematics education content only
La Trobe University			
Bachelor of Education (RBED)	Not specified	5-12	Mathematics content and mathematics education content
Macquarie University			
Bachelor of Education Primary (graduate)	None	5-12	Mathematics education content only
Monash University			
Bachelor of Early Childhood Education	Year 11	0-12	Mathematics education content only
Monash University			
Bachelor of Primary Education	Year 11	5-12	Mathematics content and mathematics education content
Murdoch University			
Bachelor of Education Primary	None	5-12	Mathematics content and mathematics education content

Queensland University of Technology			
Bachelor Of Education (Primary)	Not specified	5-12	Mathematics education content only
RMIT University			
Bachelor of Education (Primary Education)	None	5-12	Mathematics education content only
University of Ballarat			
Bachelor of Education (p-6 science, p-6 literature)	Year 11	5-16	Mathematics content and mathematics education content
University of Ballarat			
Bachelor of Education (p-10 literature & SOSE, p-10 health & science p-10 maths & IT)	Year 11	5-16	Mathematics content and mathematics education content
University of Canberra			
Bachelor of Education in Early Childhood Teaching Bachelor of Education in Primary Teaching	Year 12	0-8 5-12	Mathematics content and mathematics education content
University of Melbourne			
Bachelor of Early Childhood Education	Year 11	0-8	Mathematics content and mathematics education content
University of Melbourne			
Bachelor of Education (Primary) BEd (Primary)	Year 11	5-12	Mathematics content and mathematics education content
University of Newcastle			
Bachelor Of Education (Early childhood)	Year 11	0-12	Mathematics content and mathematics education content
University of New England			
Bachelor of Education (Primary) (BEd)	Year 12	5-12	Mathematics content and mathematics education content
University of South Australia			
Bachelor of Early Childhood Education	None	0-8	Mathematics education content only
University of South Australia			
Bachelor of Education (Junior Primary and Primary)	None	5-12	Mathematics content and mathematics education content
University of South Australia			
Bachelor of Education (Primary and Middle)	None	5-14	Mathematics education content only
University of Sydney			
Bachelor of Education (Primary Education)	Year 12	5-12	Mathematics education content only
University of Tasmania			
Bachelor of Education (E3A)	Year 12	4-12	Mathematics content and mathematics education content

University of Wollongong			
Bachelor of Education Primary	None	5-12	Mathematics education content only
Victoria University of Technology			
Bachelor of Education in Four Year Pre-Service (P-12)	Not specified	5-12	Mathematics content and mathematics education content

Mathematics pre-requisite for course entry	**Number of courses**
None	9
None specified	10
Year 11	8
Year 12	4
Total	31

Mathematics content	**Number of courses**
Mathematics content and mathematics education content	15
Mathematics education content only	12
No information found	4
Total	31

University **Australian Catholic University (ACT)**

Course Bachelor of Education (Primary)

Qualifies to teach chn aged 5-12

Entry requirement Units 1 and 2–mathematics (any). Units 3 and 4–a study score of at least 25 in English (any)

Subjects	Subject Description	Credit Points
First Year		
FOUNDATION STUDIES EDMA 100 Exploring Mathematics	This unit is a combination of experiences in mathematical processes and content. It develops relevant mathematics skills in estimation and computation, problem solving, investigations and mathematical modelling and the application of technology to mathematics. It also develops concepts in pre-algebra and space and measurement, chance and data. The students will also study how mathematics can be applied to their lives. Demonstration of an acceptable level of mathematics knowledge and skills by the student is required.	10
EDMA 101 Mathematics Education 1	This unit is designed to provide students with an introduction to primary mathematics education by discussing and investigating current directions in mathematics education. The unit will focus on theories of learning mathematics, the structure and content of the mathematics curriculum, and effective teaching and assessment approaches. A child-centred approach to learning and teaching mathematics will be emphasised with students considering the role of assessment in assisting teachers to understand children's current mathematical thinking and to plan effective learning experiences. The students will examine the role of manipulatives, technology, and language development in supporting children's construction of mathematical concepts and processes	10
Second Year		
EDMA 200 Mathematics Education 2	This unit is designed to provide students with opportunities to consider issues and strategies in planning, implementing and monitoring children's learning experiences. Students will further explore the structure and content of the mathematics curriculum with reference to national and state documents. Opportunities will be provided for students to critically examine learning activities such as problem solving and investigations, teaching approaches such as cooperative learning, a range of assessment strategies, and issues such as gender, culture, context and language. Underpinning students' explorations in the unit will be theories of children's mathematical learning such as constructivism, and sociocognitive approaches to learning.	10
Third year		
EDMA 300 Mathematics Curriculum and Teaching 1	This unit is designed to provide participants with strategies for planning, implementing and monitoring learning experiences for students studying mathematics in secondary schools. The unit will build on both national and state documents relating to mathematical curricula. The focus is junior secondary. Special attention will be given to understanding in mathematics, lesson planning, the use of concrete materials (for example, in algebra), problem solving, technology and strategies for fostering mathematical thinking in students	10
Fourth Year		
	Extra subjects in mathematics are offered as electives	
	Total	40
	Percentage of credit points dedicated to mathematics education	11.11%

University **Australian Catholic University (NSW)**

Course Bachelor of Education (Primary)

Qualifies to teach chn aged 5-12 **Entry requirement** Units 1 and 2–mathematics (any). Units 3 and 4–a study score of at least 25 in English (any)

Subjects	Subject Description	Credit Points
First Year		
FOUNDATION STUDIES EDMA 100 Exploring Mathematics	This unit is a combination of experiences in mathematical processes and content. It develops relevant mathematics skills in estimation and computation, problem solving, investigations and mathematical modelling and the application of technology to mathematics. It also develops concepts in pre-algebra and space and measurement, chance and data. The students will also study how mathematics can be applied to their lives. Demonstration of an acceptable level of mathematics knowledge and skills by the student is required.	10
EDMA 101 Mathematics Education 1	This unit is designed to provide students with an introduction to primary mathematics education by discussing and investigating current directions in mathematics education. The unit will focus on theories of learning mathematics, the structure and content of the mathematics curriculum, and effective teaching and assessment approaches. A child-centred approach to learning and teaching mathematics will be emphasised with students considering the role of assessment in assisting teachers to understand children's current mathematical thinking and to plan effective learning experiences. The students will examine the role of manipulatives, technology, and language development in supporting children's construction of mathematical concepts and processes	10
Second Year		
EDMA 200 Mathematics Education 2	This unit is designed to provide students with opportunities to consider issues and strategies in planning, implementing and monitoring children's learning experiences. Students will further explore the structure and content of the mathematics curriculum with reference to national and state documents. Opportunities will be provided for students to critically examine learning activities such as problem solving and investigations, teaching approaches such as cooperative learning, a range of assessment strategies, and issues such as gender, culture, context and language. Underpinning students' explorations in the unit will be theories of children's mathematical learning such as constructivism, and sociocognitive approaches to learning.	10
Third year		
EDMA 307 Mathematics Education 3	This unit is designed to focus in further detail on contemporary curriculum issues that relate to the learning of mathematics. The students will investigate current research into mathematics education and discuss its implications for the classroom. The students will examine state, national and international curriculum publications, curriculum programs, research journals and internet websites. There will be a particular emphasis on understanding how children construct mathematical knowledge and skills and develop mathematical understandings. Inquiry-based teaching strategies that promote numeracy through mathematical thinking will be modelled. Demonstration of an acceptable level of mathematics knowledge and skills by the student is required	10
Fourth Year		
	Extra subjects in mathematics are offered as electives	
	Total	40
	Percentage of credit points dedicated to mathematics education	11.11%

University **Australian Catholic University (QLD & VIC)**

Course Bachelor of Education (Primary)

Qualifies to teach chn aged 5-12

Entry requirement Units 1 and 2–mathematics (any). Units 3 and 4–a study score of at least 25 in English (any)

Subjects	Subject Description	Credit Points
First Year		
FOUNDATION STUDIES EDMA 100 Exploring Mathematics	This unit is a combination of experiences in mathematical processes and content. It develops relevant mathematics skills in estimation and computation, problem solving, investigations and mathematical modelling and the application of technology to mathematics. It also develops concepts in pre-algebra and space and measurement, chance and data. The students will also study how mathematics can be applied to their lives. Demonstration of an acceptable level of mathematics knowledge and skills by the student is required.	10
EDMA 101 Mathematics Education 1	This unit is designed to provide students with an introduction to primary mathematics education by discussing and investigating current directions in mathematics education. The unit will focus on theories of learning mathematics, the structure and content of the mathematics curriculum, and effective teaching and assessment approaches. A child-centred approach to learning and teaching mathematics will be emphasised with students considering the role of assessment in assisting teachers to understand children's current mathematical thinking and to plan effective learning experiences. The students will examine the role of manipulatives, technology, and language development in supporting children's construction of mathematical concepts and processes	10
Second Year		
EDMA 200 Mathematics Education 2	This unit is designed to provide students with opportunities to consider issues and strategies in planning, implementing and monitoring children's learning experiences. Students will further explore the structure and content of the mathematics curriculum with reference to national and state documents. Opportunities will be provided for students to critically examine learning activities such as problem solving and investigations, teaching approaches such as cooperative learning, a range of assessment strategies, and issues such as gender, culture, context and language. Underpinning students' explorations in the unit will be theories of children's mathematical learning such as constructivism, and sociocognitive approaches to learning.	10
Third year		
Fourth Year		
	Extra subjects in mathematics are offered as electives	
	Total	30
	Percentage of credit points dedicated to mathematics education	8.33%

University **Charles Sturt University**
Course Bachelor of Education (Early Childhood)

Qualifies to teach chn aged 0-8 **Entry requirement**

Subjects	Subject Description	Credit Points
First Year		
Second Year		
Third year		
EMS205 Early Childhood Science & Mathematics	None available	Not specified
EMS206 Mathematics in the Early Years of School	None available	Not specified
Fourth Year		
	Total	
Percentage of credit points dedicated to mathematics education		%

University **Charles Sturt University**
Course Bachelor of Education (Primary)
Qualifies to teach chn aged 5-12 **Entry requirement** Not specified

Subjects	Subject Description	Credit Points
First Year		
Second Year		
EMM206 Mathematics in the Primary School	EMM206 Mathematics in the Primary School – this subject focuses on the specific teaching and learning strategies appropriate for the early learning of mathematics and the use of curriculum documents and other resources to plan programs and assess student understanding. Credit for this subject is 8 points.	8
Third year		
ESS303 Advanced Studies in Literacy and Numeracy	ESS303 Advanced Studies in Literacy and Numeracy – This subject focuses upon catering to the specific needs of individuals in literacy and numeracy development in school contexts. The subject will allow students to develop a range of specific skills and strategies appropriate to individual needs instruction in literacy and numeracy. Students will undertake practical skill development exercises in workshops and complete assessment tasks in schools applying their knowledge of programming, planning, teaching and assessment specific to literacy and numeracy with identified individual children. Credit for this subject is 8 points.	8
Fourth Year		
ESS 418 Advanced Studies in Literacy and Numeracy 2	ESS 418 Advanced Studies in Literacy and Numeracy 2 - This subject focuses upon the specific needs of students in upper primary and the first years of high school in literacy and numeracy. The subject will allow students to develop a range of specific pedagogical skills and strategies appropriate to literacy and numeracy, particularly in relation to assessing and catering for individual needs. Students will undertake practical skill development exercises in workshops and complete assessment tasks in schools applying their knowledge of programming, planning, teaching, assessment and reporting specific to literacy and numeracy for young adolescents Students will develop expertise in using Victorian and New South Wales English and Mathematics curriculum documents. Credit for this subject is 8 points.	8
	Total	24
	Percentage of credit points dedicated to mathematics education	Less than 9.38 %

University **Curtin University**
Course Bachelor of Education (Early Childhood Education)

Qualifies to teach chn aged **Entry requirement**

Subjects	Subject Description	Credit Points
First Year		
Ed 136 - Introduction to the English and Mathematics Learning Areas	A general introduction to the English and mathematics curriculum, including definitions, current practices, outcomes-based approaches and the use of related resources. Development of a clear relationship between theories of learning and teaching practices in English and mathematics, along with related content knowledge.	25
Second Year		
Ed 239 - Mathematics Education 1	Beliefs and principles that underpin the mathematics learning area. Children's construction of mathematics and developmental approaches teaching and learning mathematics. Teaching and learning in number, measurement, and working mathematically, along with using technology in mathematics teaching.	25
Third year		
Fourth Year		
	Total	50
Percentage of credit points dedicated to mathematics education		6.25%

University **Curtin University**
Course Bachelor of Education (Primary Education)

Qualifies to teach chn aged **Entry requirement** One TEE Mathematics.

Subjects	Subject Description	Credit Points
First Year		
Ed 136 - Introduction to the English and Mathematics Learning Areas	A general introduction to the english and mathematics curriculum, including definitions, current practices, outcomes-based approaches and the use of related resources. Development of a clear relationship between theories of learning and teaching practices in english and mathematics, along with related content knowledge.	25
Second Year		
Ed 239 - Mathematics Education 1	Beliefs and principles that underpin the mathematics learning area. Children's construction of mathematics and developmental approaches teaching and learning mathematics. Teaching and learning in number, measurement, and working mathematically, along with using technology in mathematics teaching.	25
Third year		
Fourth Year		
	Extra subjects in mathematics are offered as electives	
	Total	50
Percentage of credit points dedicated to mathematics education		6.25%

Course Bachelor of Education Primary **Entry** Year 12

Qualifies to teach chn aged 5-12 **requirement**

Subjects	Subject Description	Credit Points
First Year		
SIT197 Number and Chance (B, G, W) Unit chair: M Cyganowski	Contact hours: 1 one-hour lecture, 1 two-hour tutorial and 1 one-hour practical per week Note: This unit cannot be used as part of a major or sub-major in Mathematics. **Content** The unit will cover the natural numbers, divisibility, factorisation and primes; rational and irrational numbers. Applications of elementary number theory to cryptography and bar codes will be studied. The nature of chance and expectation, random events, 'fair' and 'unfair' games, and the connection between probability and statistics (e.g. insurance) will be explored. The concepts of independent and dependent events will be illustrated by means of experiments. The nature of a statistical investigation: posing the question, collecting the data, summarising, analysing and presenting the data; interpreting the results, will be studied by means of group projects. **Assessment** Examination 50%, grp project 20%, two assignments (15% each) 30%.	1
Second Year		
ESM210 Children and Mathematics: Developing Numeracy Concepts (B, G, W) Unit chair: S Groves (B), G Herbert (G), H Mays (W)	Contact hours: 3 to 4 hours of contact per week Content This unit is the first of three compulsory units in primary mathematics education. The unit aims to promote students' understanding of how children's mathematical concepts develop in two of the key components of numeracy - number and measurement. Students' interaction with and analysis of children's responses to mathematical tasks will be used as a stimulus for them to examine their own understandings of some of the key mathematical concepts, terminology, operations and procedures related to our number systems and measurement. Building on these experiences, students will explore the development of learning activities to support children's further construction of these mathematical concepts. Students will be introduced to a range of teaching aids and effective ways of incorporating the use of a range of learning technologies. National and state trends in the development of numeracy standards will be examined. Current state curriculum documents will be referred to and used. intensively. **Assessment** Group report based on an analysis of children's responses to an interview (30%). Individual written assignment developing teaching tasks based on understandings of children's development from first assignment (30%). One written examination (40%). Prescribed texts Bobis, J., Mulligan, J., & Lowrie, T. (2004) (2nd edn) 'Mathematics for Children'. Frenchs Forest, NSW. Pearson Education Australia	1
SIT198 Patterns in Space (B, G, W) Standard semester rate Semester 1, 1 credit point Unit chair: M Cyganowski	Contact hours: 1 one-hour lecture, 1 two-hour tutorial and 1 one-hour practical per week Note: This unit cannot be used as part of a major or sub-major in Mathematics. **Content** The unit will examine regular polygons, regular and homogeneous tessellations, symmetries and transformations in the plane; reflections, rotations, translations and glide reflections and their combinations; creating and identifying finite and infinite patterns in the plane. The work of MC Escher will be examined with a view to creating Escher-type tessellations in the plane. The Platonic solids and their duals and examples of these occurring in art and nature will be studied, as well as the construction of solids from nets. Finally, linear, quadratic, exponential and logarithmic functions will be introduced in an applications context, as well as discrete techniques such as graphs, directed graphs, spanning trees and networks. **Assessment** Examination 50%, grp project 20%, two ass of equal weight 30%.	1
Third year		
ESM310 Teachers and Mathematics: Creating An Inquiry-based Classroom (B, G, W) Unit chair: B Doig (B), G Herbert (G), H Mays (W)	Contact hours: 3 to 4 hours per week **Content** This unit is the second of three compulsory units in primary mathematics education. Students in this unit will explore the connection between children as learners who construct their own understanding of mathematics and an inquiry-based model for classroom practice. They will develop strategies to provide challenging, coherent and inclusive mathematical learning experiences for children. Other topics include planning, implementing and evaluating collaborative learning in mathematics; problem-solving and mathematical investigations; developing spatial thinking and techniques for teaching geometry; teaching chance and data through an investigational approach; the development of informal and formal concepts for the measurement of time, temperature, money and angle; designing effective activities for mathematics learning; and the use of appropriate learning technologies to enhance mathematics learning and teaching **Assessment** Written and/or oral report of a research or practice based development of an outline of a unit of work in mathematics (30%), one written examination (40%), report of activities comprising individual and/or group responses to set tasks within selected topic (30%). Assessment will total the equivalent of 4000 words. Prescribed texts Bobis, J., Mulligan, J., & Lowrie, T. (2004) (2nd edn) 'Mathematics for Children'. Frenchs Forest, NSW. Pearson Education Australia	1

University **Edith Cowan University**
Course Bachelor of Education (Early Childhood Studies)

Qualifies to teach chn aged 0-8 **Entry requirement**

Subjects	Subject Description	Credit Points
First Year		
Second Year		
Mathematics Education for Young Children		12
Third year		
Fourth Year		
	Total	
Percentage of credit points dedicated to mathematics education		2.5%

University **Edith Cowan University**
Course Bachelor of Education (Kindergarten through Primary)

Qualifies to teach chn aged 4-12 **Entry requirement**

Subjects	Subject Description	Credit Points
First Year		
Mathematics education one	None available	
Second Year		
Mathematics education one	None available	
Third year		
Fourth Year		
	Total	
Percentage of credit points dedicated to mathematics education		Not possible to tell%

University **Edith Cowan University**
Course Bachelor of Education (Primary)

Qualifies to teach chn aged 5-12 **Entry requirement**

Subjects	Subject Description	Credit Points
First Year		
Mathematics and Numeracy 1	None available	15
Second Year		
Mathematics and Numeracy 2	None available	15
Third year		
Focus on language and mathematics		12 Not counted in total
Fourth Year		
	Total	30
	Percentage of credit points dedicated to mathematics education	6.26%

University **Griffith University**
Course Bachelor of Education - Primary

Qualifies to teach chn aged 5-12 **Entry requirement** Not specified

Subjects	Subject Description	Credit Points
First Year		
		10
Second Year		
2011EPS mathematics 1	**The course code *"2011eps"* does not exist in the database.**	10
Third year		
3022 EPS mathematics education 2	This course is the second of two mathematics education subjects. In this subject the emphasis is on the social, cultural and political contexts within which the teaching of mathematics occurs in contemporary Queensland and Australian society.	
Fourth Year		
	Extra subjects in mathematics are offered as electives	
	Total	20
	Percentage of credit points dedicated to mathematics education	6.25%

University **La Trobe University**
Course Bachelor of Education (RBED)

Qualifies to teach chn aged 5-14 **Entry requirement** ENGLISH ONLY including a study score of at least 20 in Units 3 and 4 of English

Subjects	Subject Description	Credit Points
First Year		
EDU11MT THE TEACHING OF NUMBER, CHANCE AND DATA, AND ALGEBRA	Using concepts drawn from the topics of number, chance & data, and algebra, the structure of mathematics, the goals of mathematics teaching, the nature of the mathematics curriculum, and ways of engaging pupils in mathematics learning are explored. Students will be given the opportunity to broaden their personal understandings of, and attitudes to, these key mathematical concepts using problem solving and investigative approaches. The students will examine how understanding of these key mathematical concepts contributes to the development of numerate citizens, and how such approaches contribute to their own learning, and the implications for their mathematics teaching. It is a hurdle requirement that all students demonstrate appropriate understanding of relevant mathematical content for primary teaching.	15
Second Year		
EDU32ML APPROACHES TO LEARNING OF MEASUREMENT AND SPACE	Using concepts drawn from the topics of measurement (including: length, perimeter, area, volume, capacity, mass & weight, and time) and space (including: 2 and 3 dimension shape, symmetry, position, angles, nets, angles and polygons), students explore the structure of mathematics, the goals of mathematics teaching, the nature of the mathematics curriculum, and ways of engaging pupils in mathematics learning. Students will be given the opportunity to broaden their personal understandings of, and attitudes to, key mathematical concepts using problem solving and investigative approaches. The students will examine how such approaches contribute to their own learning, and the implications for the learning of students in schools. In particular learning strategies such as grouping, collaboration, and technology- supported learning will be emphasised.	15
Third year		
EDU42NFA INCLUSIVE APPROACHES TO NUMERACY TEACHING	The emphasis in this unit is on research based approaches to numeracy teaching, with emphasis on flexibility in task and pedagogy to address the specific needs of all students. In particular the issues associated with data informed teaching, understanding the structured curriculum, matching experiences to students needs, utilising technology effectively, activity and game based learning, using open-ended tasks in teaching and assessment, assessment of student learning generally, as well as affective issues including engagement and self efficacy will be explored. The emphasis will be on linking theory and practice through classroom based research projects.	15
Fourth Year		
	Total	45
	Percentage of credit points dedicated to mathematics education	9.38%

University **Macquarie University**
Course Bachelor of Education Primary(graduate)

Qualifies to teach chn aged 5-12 **Entry requirement** Approved Bachelor degree

Subjects	Subject Description	Credit Points
First Year		
Second Year		
EDUC258: Mathematics in Schools Dr Michael Cavenagh	This unit focuses on the factors affecting school students' learning of mathematics. Three major themes are addressed: the role of mathematics in human experience; the meaning of selected basic concepts, and the pathways by which students learn these concepts; and how teaching influences students' learning of, and beliefs about, mathematics. A K-12 perspective is taken in the lectures and tutorials, but students choose practicals with either a primary or a secondary emphasis. The external offering is only available to intending primary teachers.	3 ELECTIVE
Third year		
Fourth Year		
	Total	3
	Percentage of credit points dedicated to mathematics education	0 to 4.41%

University **Monash University**

Course Bachelor of Early Childhood Education

Qualifies to teach chn aged 0-12 **Entry requirement** Units 1 and 2 - two units of mathematics (any).

Subjects	Subject Description	Credit Points
First Year		
EDF 1204 Curriculum Studies: Primary Maths 1WT Seah DM DYSON	Synopsis: This unit develops knowledge, skills and attitudes about teaching and learning in primary school mathematics. There will be a particular focus on children's mathematical development in early number concepts, written and mental computation, estimation, measurement and space. Students will explore a range of approaches to the teaching of mathematics including the use of information technology in the context of mathematics (eg., appropriate software, video, calculator use) Objectives: Upon successful completion of this unit students should be able to provide a rationale for the inclusion of mathematics in the primary school curriculum; be aware of all content areas outlined in appropriate documents; appreciate the importance of sorting, classifying and other early number activities appropriate to young children learning mathematics; have developed a sound approach to the teaching of the four operations with whole numbers; have developed techniques that link mathematics to practical applications particularly in relation to measurement and space; be developing an understanding of the role of information technology in the mathematics classroom. Assessment: A written report based on observation of mathematical tasks undertaken by children. 2000 words: 50% + An examination: 50% + Hurdle requirement: 80% attendance at tutorials.	6
Second Year		
Third year		
Fourth Year		
EDF 4501Early Childhood Mathematics, Science and Technology	Synopsis: Internationally, early childhood education has moved from framing teaching and learning from a developmental perspective to utilising sociocultural theory. In line with this recent theoretical shift, this unit examines how learning in science, technology and mathematics can be introduced to children following a socio-cultural approach Objectives: The broad aims of this unit are for you to demonstrate evidence of: 1. developing knowledge and understanding of how young children develop mathematical, scientific and technological understandings, abilities and attitudes; 2. analysing the construction and reproduction of knowledge in mathematics, science and technology and make judgments on the implications of this for young children's learning in these areas; 3. implementing a socio-cultural framework to observe, assess, and document maths, science and technology experiences in an early childhood setting, and 4. confidently be able to assess, plan, prepare and implement appropriate experiences in these areas across a range of early childhood settings following a socio-cultural perspective. Assessment: Research paper: 50% (2000 words) + Socio-cultural analysis of early childhood science, technology and mathematics: 50% (equivalent to 2000 words	6
	Total	12
Percentage of credit points dedicated to mathematics education		6.25%

University **Monash University**
Course Bachelor of Primary Education

Qualifies to teach chn aged 5-12 **Entry requirement** Units 1 and 2 - two units of mathematics (any).

Subjects	Subject Description	Credit Points
First Year		
EDF 1204 Curriculum Studies: Primary Maths 1wt Seah DM DYSON	Synopsis: This unit develops knowledge, skills and attitudes about teaching and learning in primary school mathematics. There will be a particular focus on children's mathematical development in early number concepts, written and mental computation, estimation, measurement and space. Students will explore a range of approaches to the teaching of mathematics including the use of information technology in the context of mathematics (eg., appropriate software, video, calculator use) Objectives: Upon successful completion of this unit students should be able to provide a rationale for the inclusion of mathematics in the primary school curriculum; be aware of all content areas outlined in appropriate documents; appreciate the importance of sorting, classifying and other early number activities appropriate to young children learning mathematics; have developed a sound approach to the teaching of the four operations with whole numbers; have developed techniques that link mathematics to practical applications particularly in relation to measurement and space; be developing an understanding of the role of information technology in the mathematics classroom. Assessment: A written report based on observation of mathematical tasks undertaken by children. 2000 words: 50% + An examination: 50% + Hurdle requirement: 80% attendance at tutorials.	6
Second Year		
EDF 2123 Exploring mathematics W T Seah	Synopsis: This unit is designed to build the competence and confidence of students in the discipline of mathematics. Students will explore a number of realistic situations in which the need for mathematical problem solving arises and will be expected to develop power to draw on and utilise personal skills and knowledge to enable them to solve mathematical problems. Content areas will include number, measurement, chance and data and geometry and involve the use of computers and calculators. Objectives: Upon successful completion of this unit students should be able to describe the relationship between multicultural real-world contexts and basic mathematical ideas; appreciate the power of mathematics to solve problems in a range of these contexts; consolidate their knowledge and skills across the various strands within the Mathematics CSF; and use a range of strategies to solve mathematical problems. Assessment: A folio of completed group and individual problem solving tasks(equivalent to 1500 words) 30% + Written report of a mathematical investigation (1000 words) 20% + Examination of key course content (2 hours) 50% Contact Hours: 2 hours per week	6
Third year		
Fourth Year		
EDF 4104 Curriculum studies: primary mathematics 2 WT Seah DM DYSON	Synopsis: This unit further develops knowledge, skills and attitudes about teaching and learning in primary school in the key learning area of mathematics. Topics include further study of the number strand with a focus on fractions and decimals, chance and data, and space (including the use of specific software). Focus will be given to the teaching of problem solving and a range of classroom teaching models and assessment strategies will be explored. Objectives: Upon successful completion of this unit students should be able to identify key aspects in children's development of concepts and skills related to fractions and decimals, chance and data and space; have developed techniques that link mathematics to practical applications using a problem solving approach as well as computer technology; be confident about planning and managing a range of learning activities which develop children's mathematical understanding and be able to use a variety of assessment techniques to evaluate student learning in mathematics; be able to analyse and discuss a range of issues in primary mathematics education. Assessment: Assessment: Assignment (2000 words): 50%; Teaching and assessment sequence based on a chosen topic (2000 words): 50%	6
	Total	18
	Percentage of credit points dedicated to mathematics education	9.38%

University **Murdoch University**
Course Bachelor of Education Primary
Qualifies to teach chn aged 5-12 **Entry requirement** yr 12

Subjects	Subject Description	Credit Points
First Year		
EDU162 Cultural Mathematics Rockingham Murdoch	Description: This unit is designed for future teachers and others who are interested in mathematics. In order to understand the nature and role of mathematics in our culture, attention will focus on its processes and pedagogy, its history and achievements, its relation to society and culture. Content: number, space, measurement, chance and data and aspects of mathematical modelling. Students in the 200-level offering will complete an additional independent studies project related to teaching secondary school mathematics. Optional online supplementation available. Contact time: Lectures/workshops: 4 hours per week for 13 weeks. External: no attendance requirement. prerequisites: Nil	3
Second Year		
Third year		
EDU285 Primary Curriculum III (Mathematics)	Description: This unit aims to assist students in acquiring knowledge and skills which will facilitate the active learning of mathematics. In particular, students will be expected to demonstrate sufficient knowledge of mathematics and of how children learn mathematics to understand and implement a program directed towards the development of children's mathematical skills and problem solving abilities. Attention is given to the demands and opportunities for numeracy across the curriculum. Contact time: 1 lecture and 3 hours workshops in Semester 1, plus 12 hours of workshops in the first four weeks of Semester 2. Introduction to Teaching.	4
Fourth Year		
	Total	7
	Percentage of credit points dedicated to mathematics education	7.29%

University Queensland University of Technology
Course BACHELOR OF EDUCATION (Primary)

Qualifies to teach chn aged 5-12 **Entry requirement**

Subjects	Subject Description	Credit Points
First Year		
Integrated Foundations Studies 2: Scientific and Quantitative Literacy	Synopsis: It is recognised that Mathematics and Science play crucial roles in the functioning of modern society through their contribution to our understanding of our physical, social and personal worlds, and their usefulness in solving problems a wide range of problems. As students engage with the content of the unit, for example, number, time, astronomy, navigation, measurement, geometry, probability, they will recognise that each is a discipline with a language and methods of thinking that have evolved in historical and social contexts. Knowledge of both areas is important for people to be critically reflective thinkers and active participants in society, and for their life long learning.	12
Second Year		
Primary Curriculum and Pedagogies: Mathematics 1	Synopsis: Mathematics is an essential key learning area of the primary school curriculum. Mathematics is closely linked to numeracy, but it extends beyond the day-to-day demands of society. Mathematics underpins and assists in the growth of technology, economics and finance, communication, and the new science of biotechnology. All students complete two units of Mathematics Education. Mathematics Education I focuses on the teaching of numbers, operations, and measurement. The content considers the role of technology in these three strands.	12
Third year		
MDB003 Primary Curriculum & Pedagogies: Mathematics 2		
Fourth Year		
	Total	
Percentage of credit points dedicated to mathematics education		6.25%

University **RMIT University**

Course Bachelor of Education (Primary Education)

Qualifies to teach chn aged 5-12 **Entry requirement** *Current Year 12 Prerequisite Units 3 & 4:* English (any)

Subjects	Subject Description	Credit Points
First Year		
CUED1073 - Literacy And Numeracy 1	The focus of this course is both a dynamic integration of literacy and numeracy and an active exploration of what makes each discipline area unique. No matter what sector of teaching you plan to be engaged in (Early Childhood, Primary or Adult Education and Training) a large portion of your day will be devoted to literacy and numeracy pursuits as a foundation for all other study. This course will endeavour to celebrate the role literacy and numeracy play in your lives, examine current demands on literacy and numeracy and address and strengthen the attitudes and skills and understandings you bring to these disciplines. As well, you will explore the major theories underpinning practice involved with the planning, teaching, and assessing of literacy and numeracy. Some of the issues to be addressed in this course are: · What does it mean to be literate and numerate? · How much literacy and numeracy is enough to function adequately in everyday life? · How has technology impacted upon literacy and numeracy learning and development? · What skills, knowledge and understandings does a teacher of literacy and numeracy teacher (at any level) need to have?	12
Second Year		
	Other maths ed subjects are offered as electives	
Third year		
	Other maths ed subjects are offered as electives	
Fourth Year		
	Other maths ed subjects are offered as electives	
	Total	
	Percentage of credit points dedicated to mathematics education	Less than 3.13%

University **University of Ballarat**

Course Bachelor of Education (p-6 science, p-6 literature, p-10 literature and SOSE, p-10 health and science)

Qualifies to teach chn aged 5-16

Entry requirement VCE including prerequisite Units 1 and 2 - one unit of general mathematics or mathematical methods. Units 3 and 4 - a study score of at least 25 in English (any), or Mature Age entry.

Subjects	Subject Description	Credit Points
First Year		
TJ591 learning and teaching mathematics 1	This unit focuses on the topics of Number and Numeracy, Measurement and Estimation, and Space, Shape and Location. Reference will be made to the topics Time, and Chance and Data as required. The connecting and continuing themes throughout the course will be: Mathematics in Language, Language in mathematics; Mathematical Modelling, Reasoning and Strategies, the use of technology in mathematics education and, use of the curriculum & Standards Framework II (2000) as a guidelines for the development of lesson, unit and curriculum plans for P-10 mathematics. The unit is designed to enable students to develop their understandings of the concepts, language and processes of mathematics in the primary and middle school mathematics curriculum and, as well, begin to develop their identities as teachers of mathematics.	15
Second Year		
Third year		
TJ792 learning and teaching mathematics 2	Current approaches to the learning and teaching of mathematics in diverse educational environments. Issues related to the contemporary teaching and learning of mathematics. Teaching and learning strategies associated with the Early years to the Middle years of Schooling. Planning, programming, assessment and reporting and their interconnections. The use and integration of information and communication Technologies in mathematics education. Studies related to number, numeracy and algebra, chance and data, modelling with functions for example, which will be approached as a P-10 progression. Analysis of the Curriculum and Standards Framework II as a guide for organising the scope, sequence and connectedness of a lesson, unit and curriculum plans for P-10 mathematics.	15
Fourth Year		
	Total	30
	Percentage of credit points dedicated to mathematics education	6.25%

University **University of Ballarat**

Course Bachelor of Education (p-10 maths and IT)

Qualifies to teach chn aged 5-16 **Entry requirement** VCE including prerequisite Units 1 and 2 - one unit of general mathematics or mathematical methods. Units 3 and 4 - a study score of at least 25 in English (any), or Mature Age entry.

Subjects	Subject Description	Credit Points
First Year		
TJ591 learning and teaching mathematics 1	This unit focuses on the topics of Number and Numeracy, Measurement and Estimation, and Space, Shape and Location. Reference will be made to the topics Time, and Chance and Data as required. The connecting and continuing themes throughout the course will be: Mathematics in Language, Language in mathematics; Mathematical Modelling, Reasoning and Strategies, the use of technology in mathematics education and, use of the curriculum & Standards Framework II (2000) as a guidelines for the development of lesson, unit and curriculum plans for P-10 mathematics. The unit is designed to enable students to develop their understandings of the concepts, language and processes of mathematics in the primary and middle school mathematics curriculum and, as well, begin to develop their identities as teachers of mathematics.	15
MA559 SPACE, SHAPE AND DESIGN (INTRODUCTORY LEVEL)	his unit is aimed at a broad audience interested in studying the patterns and order evident in the shapes of nature and the spatial design of art, architecture and industry. It will provide students with some experience of the thinking and techniques necessary to establish evidence of general patterns and calculations related to spatial measurement and design. Activities will be as diverse as: constructing 3D shapes, analysing art and architecture, working out fencing lines for land subdivisions, finding paths to fit constraints and analysing optimum shapes for industrial designs. This unit will be particularly valuable to prospective teachers and other students interested in improving their understanding of 2-D and 3-D shapes.	15
Second Year		
MA653 PROFIT LOSS AND GAMBLING (INTERMEDIATE LEVEL)	This unit forms part of a general sequence of mathematics units, and will be taught at an intermediate level. Through the investigation of popular gambling games, such as Lotto, Keno, casino games, and gaming machines, students will be introduced to the concepts of probability. Common gambling fallacies and misconceptions will also be investigated. A wide variety of statistical distributions and simulations are used to examine important probability concepts. Financial mathematics will also be covered to deal with common problems encountered in everyday financial decisions. This unit will be valuable to both primary and high school teachers interested in teaching with real-life illustrations.	15
TJ792 learning and teaching mathematics 2	Current approaches to the learning and teaching of mathematics in diverse educational environments. Issues related to the contemporary teaching and learning of mathematics. Teaching and learning strategies associated with the Early years to the Middle years of Schooling. Planning, programming, assessment and reporting and their interconnections. The use and integration of information and communication Technologies in mathematics education. Studies related to number, numeracy and algebra, chance and data, modelling with functions for example, which will be approached as a P-10 progression. Analysis of the Curriculum and Standards Framework II as a guide for organising the scope, sequence and connectedness of a lesson, unit and curriculum plans for P-10 mathematics.	15
MA656 MODELLING REALITY (INTERMEDIATE LEVEL)	This unit forms part of a general sequence of mathematics units, and will be taught at an intermediate level. It is aimed at students who have successfully completed either MA551 or MA651. The focus will be on applying a range of mathematical techniques to model real world problems. These techniques will include numerical methods, multivariate calculus, linear algebra and interpolation. It will build upon the concepts and techniques developed in modelling and change.	15
Fourth Year		
	Total	75
	Percentage of credit points dedicated to mathematics education	15.63%

University **University of Canberra**

Courses Bachelor of Education in Early Childhood Teaching (CIT) (446AA)
Bachelor of Education in Primary Teaching (383AE)

Qualifies to teach chn aged 0-8, 5-12 **Entry requirement** ACT-major in maths, NSW-hsc maths

Subjects	Subject Description	Credit Points
First Year		
Reconstructing Maths Understanding (4802)	Syllabus This subject will assist in the development of mathematical knowledge by the presentation of the content via practical applications, problem solving and mathematical modelling. It will provide students with the opportunity to reflect on previously acquired knowledge, new knowledge, and facilitate the construction of mathematical relationships. This will stimulate students to make connections and to develop a coherent framework for mathematical ideas. This subject will incorporate strategies to develop positive attitudes towards mathematics and in particular in the teaching of mathematics. Students will be required to demonstrate a sound knowledge of mathematical concepts, procedures and connections	3
Second Year		
Mathematics Education 1 (6735)	Syllabus This unit will provide a sound theoretical base for the teaching of mathematics within Early Childhood and Primary settings. Constructivist and Representational theories will provide the major focus. This unit will examine curricular expectations for Early Childhood and Primary years and assist students in developing strategies for effective implementation of such curricula. The unit will also promote: developing positive attitudes towards mathematics, problem solving, communicating mathematically and reasoning mathematically, as well as assisting students to develop mathematical programs that incorporate these issues.	3
Third year		
Mathematics Education 2 (4799)	Syllabus This subject will focus on preparing beginning teachers to present mathematics content in a meaningful manner. This will be achieved through applying the principles of relational understanding to the teaching of mathematical concepts. Each of the following strands will be examined using the theoretical framework developed in Mathematics Education 1 Space; number; measurement; chance and data and algebra. This subject will provide the beginning teacher with different modes of presentation (including IT) and alternative methods of assessing children's work in mathematics. Learning Outcomes On completion of this subject, it is expected that students will be able to facilitate children's understanding of mathematics; interpret the mathematics curriculum to focus on relational understanding; access and use technology for the teaching of mathematics; recognise the individual difference children have in the acquisition of mathematical knowledge and understanding and be aware of common problems encountered and how to deal with these	4
Fourth Year		
	Total	10
	Percentage of credit points dedicated to mathematics education	10.42%

University **University of Melbourne**

Course Bachelor of Early Childhood Education

Qualifies to teach chn aged Birth - 8yrs **Entry requirement** Satisfactory gen maths or maths methods

Subjects	Subject Description	Credit Points
First Year		
485-100 Learning Area: Mathematics 1 VICKI STEINLE	This subject deals with mathematical content in the number, chance and data strands of the Victorian primary mathematic curriculum. Students will deepen their own knowledge of these strands and study the way in which children think and learn about them. Developmental and constructivist perspectives on mathematical learning will be introduced. The use of calculators and other appropriate technology will be considered Assessment Written assignments equivalent in total to 2000 words and two 2-hour examinations (one mid-year and one end-of-year). Hurdle requirement: To gain a pass in this subject, students must satisfactorily complete a test of basic mathematics competence	12.5
Second Year		
485-201 Learning Area (EC): Mathematics 2HELEN CHICK	This subject deals with mathematics, especially in the areas of space and measurement in pre-school and primary schools. Students will extend their own knowledge by engaging in challenging mathematical tasks. They will examine knowledge of children's thinking and learning, analyse classroom teaching techniques and concrete and technological aids which develop different components of mathematical competence such as skills, concepts, practical ability and estimation. Current Victorian and national documents will be used. Students will design sequences of lessons related to selected learning outcomes and early childhood programs. Assessment Two assignments equivalent to 2000 words, and two 2-hour examinations (one mid-year and one end-of-year). Hurdle requirement: To gain a pass in this subject, students must satisfactorily complete a compulsory test of basic mathematics competence.	12.5
Third year		
Fourth Year		
485-301 Learning Area (EC): Mathematics 3 Helen Norbury	This subject deals with primary school mathematics programs and current issues in mathematics education. Students will learn to critically evaluate mathematics programs, materials and teaching methods. Alternative approaches to the teaching of mathematics across a primary school, such as the integrated curriculum, thematic instruction, problem-based instruction and other current curricular models will be discussed and compared. A range of methods of assessment and reporting will be examined. Contemporary national and international curriculum documents will provide a focus for the discussion of primary mathematics and associated issues. Important issues for the design of the school curriculum, such as fundamental goals of school mathematics, equity issues, the changing nature of appropriate curriculum content, teaching and learning styles will be examined in the context of a study of international and statewide comparisons of mathematical achievement. Students will develop a mathematics program for use in primary mathematics classrooms. Assessment One 2-hour examination (40%) and written assignments equivalent in total to 2000 words (60%).	12.5
	Total	37.5
	Percentage of credit points dedicated to mathematics education	9.38%

University **University of Melbourne**

Course Bachelor of Education (Primary) BEd (Primary)

Qualifies to teach chn aged 5-12 **Entry requirement** satisfactory gen maths or maths methods

Subjects	Subject Description	Credit Points
First Year		
485-100 Learning Area: Mathematics 1 VICKI STEINLE	This subject deals with mathematical content in the number, chance and data strands of the Victorian primary mathematic curriculum. Students will deepen their own knowledge of these strands and study the way in which children think and learn about them. Developmental and constructivist perspectives on mathematical learning will be introduced. The use of calculators and other appropriate technology will be considered. Assessment Written assignments equivalent in total to 2000 words and two 2-hour examinations (one mid-year and one end-of-year). Hurdle requirement: To gain a pass in this subject, students must satisfactorily complete a test of basic mathematics competence	12.5
Second Year		
485-202 Learning Area: Mathematics 2 HELEN CHICK	This subject deals with mathematics, especially in the areas of space and measurement in pre-school and primary schools. Students will extend their own knowledge by engaging in challenging mathematical tasks. They will examine knowledge of children's thinking and learning, analyse classroom teaching techniques and concrete and technological aids which develop different components of mathematical competence such as skills, concepts, practical ability and estimation. Current Victorian and national documents will be used. Students will design sequences of lessons related to selected learning outcomes and early childhood programs. Assessment Hurdle requirement: To gain a pass in this subject, students must satisfactorily complete a compulsory test of basic mathematics competence. Two assignments equivalent in total to 2000 words, plus two 2-hour examinations (one mid-year and one end-of-year).	12.5
Third year		
485-346 Learning Area: Mathematics 3 Anne Briner	This subject surveys the numeracy programs used in primary schools. Students will learn to identify the normal stages through which children pass in the development of additive and multiplicative thinking and to design appropriate teaching for each stage. The demands of mathematical notation and the characteristics of mathematics language is examined, along with strategies and resources for teaching those for whom English is a second language. Through a study of the reasoning and Strategies strand of the CSF, students will examine the teaching of skills for the conduct of mathematical investigations and real world problem solving. Assessment A 2-hour examination and written tasks equivalent in total to 2000 words. Hurdle requirement: Satisfactory completion of weekly tasks	12.5
Fourth Year		
485-449 Learning Area: Mathematics 4 GLORIA STILLMAN	This subject deals with primary school mathematics programs and current issues in mathematics education. Students will learn to critically evaluate mathematics programs, materials and teaching methods. Alternative approaches to the teaching of mathematics across a primary school, such as the integrated curriculum, thematic instruction, problem-based instruction and other current curricular models will be discussed and compared. A range of methods of assessment and reporting will be examined. Contemporary national and international curriculum documents will provide a focus for the discussion of primary mathematics and associated issues. Students will develop a mathematics program for use in primary mathematics classrooms. Assessment One 2-hour examination (40%) and written assignments equivalent in total to 2000 words (60%).	12.5
	Total	50
	Percentage of credit points dedicated to mathematics education	12.5%

University **University of Newcastle**

Course BACHELOR OF EDUCATION (Early childhood) The only primary course

Qualifies to teach chn aged 0-12 **Entry requirement** Mathematics and any two units of English.

Subjects	Subject Description	Credit Points
First Year		
Second Year		
EDST2420 Emerging Literacy and Numeracy	**Description:** Introduces students to development in literacy and numeracy which occurs in the years prior to school entry. Students will explore ways in which teachers facilitate emerging literacy and numeracy in early childhood programs and support children's early learning through building partnerships with families and communities. **Course Objectives:**The purpose of this course is for students to gain both awareness and understanding of early literacy and numeracy concepts developed by children in the years prior to school entry. As a result of participating in this course students will be expected to demonstrate: 1. an understanding of the importance of oral language, listening, reading, writing and viewing as the foundation elements of literacy and numeracy; 2. the ability to work effectively with children to facilitate their construction of knowledge in literacy and numeracy; 3. critical evaluation of the environmental and social contexts of children's literacy and numeracy. 4. the ability to plan and implement programs supporting emerging literacy and numeracy learning which demonstrate awareness of the role of children's literature, drama and movement. **Course Content:** 1. Children as problem solvers. 2. Development in oral, aural, written and spoken communication. 3. Influences on communication and learning eg sociocultural, environmental technological. 4. The role of literature in early literacy and numeracy. 5. Emerging mathematical processes. 6. The role of Information Technology in early literacy and numeracy.	10
STEC2900 Mathematics and Technology	Description: Provides a framework for the teaching of primary-level mathematics, including an introduction to the use of computers in the mathematics classroom. The course progresses through three stages: basic skills, classroom mathematics and mathematical thinking. Course Objectives: 1. Strengthen basic mathematical skills in students without a strong mathematical background. 2. Provide students with mathematical experiences and knowledge to broaden their command of mathematical concepts. 3. Provide students with familiarity with the K-6 syllabus, including the relationship between the syllabus and the discipline of mathematics. 4. Develop problem-solving skills, emphasising a lateral, non-formulaic approach that draws upon a range of resources. 5. Provide skills in computer use and critical evaluation of strategies for classroom computer use, including basic use, office software, internet resources, and specialist mathematics education software. Course Content: 1) Basic Skills a) Number systems: counting numbers, fractions, integers b) The Elementary Operations of Arithmetic: algorithms c) Elementary Geometry d) Measurement and SI units 2) Classroom Mathematics a) Sets, counting and arithmetic b) Number systems: rational and real numbers c) Introductory Problem Solving d) Geometry e) Graphical representation f) Internet resources 3) Mathematical Thinking a) Problem Solving b) Magic Squares c) Geometric Constructions d) Software in mathematics e) Statistics in the classroom f) Chance and probability	10
Third year		
Fourth Year		
EDST3200	Description: Introduces students to the major concepts in the teaching of mathematics for K-6. Lectures will present core understandings that will be developed experientially through tutorials	10

Teaching & Learning in Maths K-6	Lectures will present core understandings that will be developed experientially through tutorials. Emphasis will be placed upon the study of the special methodologies associated with the teaching of the content of the NSW K-6 Mathemtics Syllabus. Course Objectives: Graduates should be adequately and competently numerate, possess knowledge and understanding of numeracy as a fundamental component of learning, performance, discourse and critique. Students should be able to: - describe relevant mathematical concepts and skills from K-6 Mathematics Syllabus; - describe strategies for teaching mathematical thinking; - identify students at risk and devise appropriate learning strategies in Maths K-6; - plan a program of mathematics and assessment for any given K-6 class; - organise learning environments for Maths K-6; - select, develop and evaluate resources for Maths K-6. Course Content: Topics include: - approaches to teaching, learning and thinking mathematically; - planning and programming experiences in Maths K-6 with children's interests and developmental needs in mind; - using syllabus documents for programming, teaching and learning; - concrete materials and practical experiences in Maths K-6; - organising learning environments in Maths K-6; - selecting , developing and evaluating resources in Maths K-6; - assessing and recording children's progress in Maths K-6; - approaches to the inclusion of technology in K-6 Maths ; - problem solving approaches in Maths K-6; - the language of Maths.	
	Total	
	Percentage of credit points dedicated to mathematics education	9.38%

University **University of New England**

Course Bachelor of Education (Primary) (BEd)

Qualifies to teach chn aged 5-12 **Entry requirement** Any two units of mathematics at HSC level.

Subjects	Subject Description	Credit Points
First Year		
EDME 123 K-6 - Mathematics Curriculum Studies 1	Description: This unit examines strategies for facilitating learning in mathematics, using contemporary views of learning and teaching. Students will be involved in a wide range of activities that provide experiences in cooperative learning and problem-solving as well as the application of theoretical bases of children's learning. Assessment will involve two analytical/reflective submissions and a two hour examination. This unit is linked to professional experience	Not specified
EDME 133 - Enrichment Mathematics for Primary Teachers DR ROSEMARY CALLINGHAM	Description: This unit aims to study mathematics from a perspective that will provide enrichment for teachers of primary school children. Students in this unit will examine a variety of topics and puzzles selected mainly from number and geometry. Assessment is based on keeping a reflective journal for the semester.	Not specified
Second Year		
EDME 203 - Common Misconceptions in K-6 Mathematics	Description: This unit provides an introduction to common misconceptions developed by learners of primary mathematics. It focuses on the analysis of mathematical workings produced by primary students during problem solving to identify pointers to learners' understanding and cognitive development, which can be used to inform classroom practice. The content is drawn from all strands of mathematics. The unit aims to help students to become confident in understanding how learners construct their own mathematical concepts and processes and in assessing the validity of the outcomes. Assessment will consist of two written assignments and an oral presentation.	Not specified
EDME 233 - Mathematical Thinking for Primary Teachers AS-PRO CAROLINE AFAMASAGA-FUATAI	Description: This is the second of two units that provide access to further studies in mathematics to enrich teachers of primary school children. As in EDME 133, students are encouraged to widen their experience of mathematical topics and to increase their thinking skills in this area. Assessment is based on keeping a reflective journal for the semester, on eight modules of study.	Not specified
Third year		
EDME 333/433 - Mathematical Investigations for Teachers Gary Clarke	Description: This unit recognises the need of many teachers for a greater understanding of mathematical investigations. A number of investigations are undertaken from three of five areas of mathematics. Modern technology is used in many of the investigations. Students must have access to a computer and spreadsheet software. A version of LOGO will be supplied/downloaded as needed.	Not specified
EDME 338/438 - Educational Measurement and Evaluation	Description: This unit is aimed at those who wish to learn about different types of tests used in educational settings; procedures involved in constructing tests; analysing, interpreting and reporting test results; and models of evaluation and designing evaluations. There will be a particular focus on the use of Rasch modelling techniques, including some practical experience with appropriate software at the higher level. The unit is aimed at practitioners as well as observers. Assessment will consist of two written assignments, including some data analysis at the higher level.	Not specified
EDME 313 K-6 - Mathematics Curriculum Studies 2	Description: This unit builds on the content of EDME 123. It has a focus on linking teaching, learning and assessment within an outcomes-based approach to the K-6 mathematics curriculum. The developmental nature of mathematics learning will be emphasised. Students will have opportunities to analyse children's mathematical work and plan for effective teaching. Assessment will consist of two assignments of a practical nature that will include a presentation to peers.	Not specified
Fourth Year		
EDME 434 - Current Innovations in Mathematics Education DR ROSEMARY CALLINGHAM	Description: This unit requires students to read in and demonstrate understandings of aspects of mathematics education relevant to K–12 education. Students are required to analyse current innovations in the area and to develop appropriate implementation strategies for selected levels of K–12 education. The unit is based on modern theory of how children learn mathematics.	Not specified
	Total	
	Percentage of credit points dedicated to mathematics education	Not possible to say %

University **University of South Australia**
Course Bachelor of Early Childhood Education

Qualifies to teach chn aged 0-8 **Entry requirement** Yr 12

Subjects	Subject Description	Credit Points
First Year		
Second Year		
Third year		
EDUC 3021 Literacy and Numeracy 1 Birth - 8 Years	Assumed knowledge: Numeracy Strand: Ability to meet the following objectives: demonstrate and explain concrete understanding of mathematical concepts; analyse the mathematical principles in every day use; use the language of mathematics confidently; recognise historical and cultural contexts of mathematics; awareness of interrelationships within mathematical knowledge. Students who are unable to meet these requirements to the satisfaction of the course coordinator will need to undertake an appropriate course of study, for example EDUC 1032 The Context of Mathematical Competency.	4.5
Fourth Year		
EDUC 1043 Literacy and Numeracy 2 Birth - 8 years	Numeracy Strand: Application of detailed knowledge of all curriculum documents, materials and organisational requirements for mathematics birth to eight years; examination of numeracy in the contexts of young children's experiences at home, in the community, in school routines and integrated across curriculum areas, linking planning for mathematical development with these numeracy contexts in planning for extended sequential learning programs and examination of associated teaching approaches	4.5
	Total	9
	Percentage of credit points dedicated to mathematics education	Not possible to say %

University **University of South Australia**

Course Bachelor of Education (Junior Primary and Primary)

Qualifies to teach chn aged 5-12 **Entry requirement** Yr 12

Subjects	Subject Description	Credit Points
First Year		
EDUC 1049 Mathematics Curriculum for Early and Primary Years 1	Children's construction of mathematical understanding and their interaction with physical materials in a social context; research into children's learning in mathematics; the SACSA framework for mathematics; key ideas in the content strands of Number, Space, Measurement, Chance and Data, Patterns and Relationships; mathematical processes of problem solving, reasoning, communication, and application; conducting mathematical experiences with a small group of children in a school setting and reflecting upon the implications of children's responses; problem solving in a variety of situations and levels.	4.5
Second Year		
Third year		
EDUC 3051 Mathematics Curriculum for Early and Primary Years 2	Children's construction of mathematical understanding and their interaction with physical materials in a social context; the SACSA framework for mathematics; key ideas in the content strands of Number, Space, Measurement, Chance and Data, Patterns and Relationships; mathematical processes of problem solving, reasoning, communication, and application; planning mathematical experiences for a whole class of children and evaluating children's learning; research and implementation of a variety of suitable materials, including IT, for use with children at different levels and with a variety of learning needs.	4.5
Fourth Year		
	Total	9
	Percentage of credit points dedicated to mathematics education	6.25%

University **University of South Australia**

Course Bachelor of Education (Primary and Middle)

Qualifies to teach chn aged 5-14 **Entry requirement**

Subjects	Subject Description	Credit Points
First Year		
EDUC 4141 Studies in Science, Mathematics and Society and Environment Education 1	Constructivist perspectives of student learning; social constructivist pedagogies including interactive approaches to teaching; thinking and working mathematically scientifically and environmentally from socially inclusive and critical perspectives; planning for learning in mathematics, science and SOSE; key concepts embedded in data handling, sorting and classifying, living things, social justice, democratic participation, and sustainability components of Years 3 to 9 curriculum.	4.5
Second Year		
Studies in Science, Mathematics and Society and Environment Education 2	Constructivist perspectives of student learning with a focus on interactive approaches to teaching and student questions; thinking and working mathematically, scientifically and environmentally from socially inclusive and critical perspectives; planning for learning in mathematics, science and SOSE; student centred inquiry; governance (political, social and economic systems; key concepts embedded in pattern and algebra, base 10, measurement, fibres and fabrics, living things and social justice, democratic participation and sustainability aspects of Years 3 – 9 curriculum; resources that inform and support planning for learning and resources that support student learning including outreach sources such as the Global Education Centre, Zoo, Mangrove Trail, and more local community locations and organisations.	4.5
Studies in Science, Mathematics and Society and Environment Education 3	Classroom structures and practices that support constructivist andinteractive approaches to teaching; classroom practices that encourage students to pose questions and think and work mathematically scientifically and environmentally; planning, teaching and evaluating integrated units of work; key concepts embedded in pattern and spatial sense and geometric reasoning, rational number, soils and rocks, energy and student centred inquiry, governance (political, social and economic systems); aspects of Years 3 – 9 curriculum; analysis of curriculum policies and frameworks	4.5
Third year		
Fourth Year		
	Total	13.5
	Percentage of credit points dedicated to mathematics education	Less than 9.03%

University **University of Sydney**

Course Bachelor of Education (Primary Education)

Qualifies to teach chn aged 5-12 **Entry requirement** 2 units of Mathematics at the HSC

Subjects	Subject Description	Credit Points
First Year		
Second Year		
EDUP 2005 Mathematics 1: Exploring Early Number Sharne Aldridge	Session: 1. Assessment: Assessing and analysing a child's level of thinking using the Schedule for Early Number Assessment (SENA) and the Learning Framework in Number (LFIN) (80%); designing follow-up teaching activities based on the results of the assessment (20%). This is the first unit of study in Mathematics and students will be introduced to key issues associated with how children acquire early mathematical concepts, processes and knowledge. The Learning Framework in Number will be a major focus of content for this unit of study. As part of this study students will be required to assess a child from the K–2 grades using an interview schedule and to use the results to plan activities that demonstrate knowledge of worthwhile mathematical tasks.	4
Third year		
EDUP 3013 Maths 2: the Theory/Practice Link JANET BOBIS	Session: 1. Prerequisite: Maths 1: First three years of Schooling (EDUP 2013). Assessment: Assessment will be in the form of: (1) Report on the assessment of a Year 3 to 6 child in Mathematics; (2) In pairs or small groups, students will complete a miniprogram of work that covers the in-school experience. This unit of study will build on the work undertaken in Mathematics 1 by extending the range of information to the K–6 classroom. The focus of the unit of study will be on how children's mathematical thinking develops. In order to achieve this, the unit has both a theoretical and a practical component. Initially, students will deepen their existing understanding of how children's thinking develops through workshop sessions. These sessions will encourage participation in a broad range of mathematical investigations and involve exploration of teaching/ learning strategies. Students will then have an opportunity to apply this knowledge in a school context. This will involve the design and implementation of a series of lessons for a child over a three to four week period.	2
EDUP 3031 Maths 3: Space Measurement Chance & Data Sharne Aldridge	Session: 2. Prerequisite: EDUP 2013 Mathematics 1: The First Three Years of Schooling. Assessment: Students will plan, implement and evaluate four lessons at a local school. They will also be required to select two learning experiences from their four lessons and to provide a rationale on why they have selected them. The rationale must reflect the students' evolving understanding of how children learn and be well supported by references to the literature. Mathematics 3 will continue the process of building students' understanding of how children's mathematical thinking develops. In this unit of study students will focus on Chance and Data, Measurement and Space. A key focus will be on the selection of worthwhile mathematical experiences.	2
Fourth Year		
EDUP 4022 Maths 4: Teaching an Inquiry-Based Class JANET BOBIS	Session: 2. Prerequisite: EDUP 3031 Maths 3: Space Measurement Chance & Data. Assessment: (1) In groups, students will present a report of activities undertaken during school sessions; (2) A second assignment will deal with the development of resources and activities for teaching Mathematics in a child-centred way. This unit of study will focus on the development of a practical, professional rationale for learning in mathematics and how teaching practices and organisation of the classroom affect learning. It is hoped that students will gain experience as autonomous learners and widen their competencies (and choices) as teachers of mathematics. Students will gain experience in the planning, implementation and evaluation of a program of work that is organised in a child-centred manner.	2
	Total	10
	Percentage of credit points dedicated to mathematics education	5.21%

University **University of Tasmania**

Course Bachelor of Education (E3A)

Qualifies to teach chn aged 4-12 **Entry requirement** Normal University entry requirements apply.

Subjects	Subject Description	Credit Points
First Year		
Second Year		
EPC250 Curriculum Studies 2A (English, Mathematics, LOTE)	The mathematics component provides an overview of theory relating to mathematics curriculum and pedagogy. Topics include: the nature and importance of mathematics, the importance of affective factors in mathematics; teaching and learning, constructivism, understanding in mathematics, early number concepts; numeration and place value, concepts of addition and subtraction, basic facts, length and space. These topics provide contexts for consideration of appropriate pedagogies and the crucial role of language in linking verbal, concrete and symbolic representations of mathematics.	12.5
Third year		
EPC350 Curriculum Studies 3A (English, Mathematics)	The mathematics component provides further opportunities for students to examine the application of appropriate mathematics pedagogies to topics in the mathematics curriculum. These include further topics in number, space and measurement as well as chance and data, and pattern and algebra. The theoretical foundations of appropriate mathematics pedagogy and the key role of language are further developed in these contexts.	12.5
Fourth Year		
EPC450 Curriculum Studies 4A (English, Mathematics)	Both the mathematics and English components focus on issues of classroom planning including models of planning, assessment methods and tools, and curriculum frameworks. The mathematics component also extends key ideas from earlier units as well as emphasising the importance of providing rich mathematical learning environments that cater for the needs of individual learners.	12.5
	Total	
Percentage of credit points dedicated to mathematics education		Less than 11.54%

University **University of Wollongong**
Course Bachelor of Education primary

Qualifies to teach chn aged 5-12 **Entry requirement** Year 12 but Maths not specified

Subjects	Subject Description	Credit Points
First Year		
Second Year		
EDUM201: Mathematics Education I Ann Baxter Jan Turbill Mohan Chinnappan	This subject focuses on the teaching and learning of K-6 mathematics, based on the NSW K-6 syllabus and the National Statement on Mathematics. The subject requires students to develop a rationale for teaching mathematics, to examine approaches to teaching the content of infants and primary school mathematics, and emphasises the theoretical underpinnings both of the structure and sequence of the curriculum, and of specific teaching and learning strategies.	6
Third year		
	Extra subjects in mathematics are offered as electives	
Fourth Year		
	Total	

Percentage of credit points dedicated to mathematics education %

University **Victoria University of Technology**

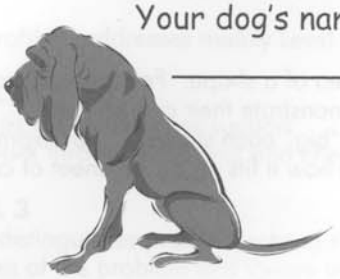
Course Bachelor of Education in Four Year Pre-Service (P-12)

Qualifies to teach chn aged 5-12 **Entry requirement**

Subjects	Subject Description	Credit Points
First Year		
HEB1200 Numeracy and Mathematics.	HEB1200 involves the revision and 'unpacking' of students mathematical knowledge and skills with the view to improving understanding and confidence in mathematics and competence with skills and content in the primary curriculum. We focus especially on content in the upper primary curriculum and encourage students to reflect on their content knowledge when working in schools in the partnership project.	20
Second Year		
HEB 2010 Mathematics and Numeracy Education	HEB2010 involves the learning and teaching of mathematics in primary school classrooms. General learning principles and teaching practices as well as specific strategies for content areas are included. Students are required to reflect up and evaluate their mathematics teaching in primary classrooms and to inquire into school practise as part of their assessment tasks.	20
Third year		
HEB 3010 Science, Technology and Numeracy	HEB3010 involves the learning and teaching of mathematics of science, technology and numeracy. General learning principles and teaching practices as well as specific strategies for content areas are included. Students engage with concepts of integrated curriculum and investigate the ways that numeracy can be included. Students are required to reflect up and evaluate their mathematics teaching in classrooms and to inquire into school practise as part of their assessment tasks.	20
Fourth Year		
HEB 4020 /1400 Mentoring Literacy and Numeracy	HEB1400 involves engagement with key issues in the teaching and learning of numeracy and literacy as negotiated with the students. This is an emphasis on developing professional engagement with these issues and this approached through mentoring relationships with their student colleagues.	20
	Extra subject in mathematics are offered as elective-minor/major study	
	Total	80
	Percentage of credit points dedicated to mathematics education	Less than 12.5%

B: Creating a Dog Enclosure !

Your dog's name _____



_____ keeps getting out of his yard! You have a 20 metre roll of chicken wire to create a dog enclosure for him. Your task is to design an enclosure and provide reasons for your choice.

Stage 1 Clarify

Tick these off as you do them

Read the question twice ☐

Highlight what you know ☐

Highlight what you need to find out ☐

What have you been asked to solve/investigate (aim)?

What key mathematical concepts are involved in this problem?

What is your prediction and why?

Stage 2 Choose

What do you need to do to solve this problem?

What equipment will you need?

How are you going to present your findings?

Stage 3 Use

Now in the space below follow the procedure you have outlined in stage 2.

Stage 4 Interpret

Summarise what you found out in the space below. (Can you summarise your results in a table? Was you prediction correct?)

"CREATING A DOG ENCLOSURE" LEVELLING GUIDE

STRAND: WORKING MATHEMATICALLY

LEVEL 2

Mathematical Strategies (Clarify/Use)
Asks questions to help understand the question with considerable teacher prompting and guidance
Represents dog enclosures using diagrams with teacher assistance

Reason Mathematically (Interpret)
Can respond to prompts from teacher about what they think will happen

Apply and Verify (Choosing and interpreting)
Checks and corrects answers when prompted

LEVEL 3

Mathematical Strategies (Clarify/Use)
Asks questions to help understand the question with some teacher prompting and guidance
Represents dog enclosures using clear diagram (labelled)

Reason Mathematically (Interpret)
Can make predictions about what they think will happen
Can identify answers/check work to ensure it makes sense

Apply and Verify (Choosing and interpreting)
Checks and corrects answers 1

LEVEL 4

Mathematical Strategies (Clarify/Use)
Asks questions to help understand the question with little teacher prompting and guidance
Identifies key information
Isolates relevant information to solve the problem

Reason Mathematically (Interpret)
Level 3 and
Can make and justify predictions

Apply and Verify (Choosing and interpreting)
Checks answers to see if make sense

LEVEL 5

Mathematical Strategies (Clarify/Use)

Identifies key information/mathematical terms with no assistance
Asks further questions to extend the question e.g. Can I use the existing fence?

Reason Mathematically (Interpret)
Level 4 and
Can use mathematical reasoning to explain something and will test it
Apply and Verify (Choosing and interpreting)
Can determine if answer makes sense without prompting
Consider the context of the question when choosing enclosure

STRAND: MEASUREMENT

LEVEL 2

Can draw different shapes with a *perimeter* of 20 metres with teachers' assistance

LEVEL 3

Students use perimeter correctly (all shapes drawn have perimeter of 20m)

LEVEL 4

Students use square grid paper to find the area enclosed by the 20m of fencing with teacher assistance
Students draw different shapes, all with perimeter 20m but with different area
Distinguish between area and perimeter consistently

LEVEL 5

Students can use formula to work out area
Students can find area of composite shapes
Students can determine area of triangle
Can distinguish length of slant and perpendicular height

STRAND	LEVEL OBTAINED
Working Mathematically	
Measurement	