

Submission to ACARA for the Draft Senior National Mathematics Curriculum

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Some good things

There are certainly some good things in the national curriculum which will improve the teaching of mathematics in NSW and these need to be pointed out.

- It is good that ACARA is attempting to provide senior maths courses (A & B) to students who will not necessarily be going on to university. This is now especially so, since the compulsory leaving age is being increased.
- Including matrices will be very good for NSW. Although this has been taught before in NSW (Level 1 and Year 10) it has since been removed from syllabuses in NSW. It has many applications and is one of the most common tools in mathematics.
- Notation $\csc \theta$ for the cosecant function is more internationally standard than $\operatorname{cosec} \theta$ which has been used more in NSW. So this change will bring NSW into line with the rest of the world.
- Including Euler's formula $e^{i\theta} = \cos \theta + i \sin \theta$ would be an improvement in NSW. This has often been taught by 4 unit teachers despite it not being in the syllabus, but this has meant that not every 4 unit student in NSW had been taught it before going to university.

Resources for new topics

NSW teachers may not be familiar with the new topics. These resources are available for free download on the internet as ebooks and can be read on ereaders such as the iPad or Kindle:

Balakrishnan, V.K., *Graph Theory*, McGraw-Hill, 1997

Bronson, R., *Differential Equations*, McGraw-Hill, 1973

Bronson, R., *Matrix Operations*, McGraw-Hill, 1989

Lipschutz, S., *Linear Algebra*, McGraw-Hill, 1968

Spiegel, M.R., *Statistics*, McGraw-Hill, 1961

Spiegel, M.R., *Vector Analysis*, McGraw-Hill, 1959 (Chapters 1 and 2 only)

Authority

There has been no indication from ACARA as to exactly how they are going to make teachers teach their curriculum. Many teachers haven't even read the documents on ACARA's website. There has been no mention of assessments except to say the states will continue to administer these. To many teachers, this means the state boards are the ones with the real authority, not ACARA.

Consequently there will not be consistency when the different states have different final examinations. Some will be harder than others so how will it be fair when universities select students?

Consistency at the expense of excellence

The Australian curriculum will sweep away structures that have allowed NSW to maintain its traditions of excellence for nearly a century. (See [P] for a more thorough discussion about this.) But ACARA want more consistency. (See [E] for an attempted explanation for the motivation for the national curriculum.)

Greater consistency should not mean that Australia becomes more consistently bad. If NSW replaces its existing curriculum with one which is essentially Victoria's, Australia will become more consistently bad.

The highest level course proposed by ACARA does not extend the best students anywhere near what our 4 unit course does. (See [SMH]). ACARA must therefore either provide a fifth E course of comparable difficulty to 4 unit, or improve the standard of the D course to 4 unit level. This would also benefit the rest of Australia.

Statistics should be removed from the syllabus. If it is done rigorously, (for example the central limit theorem) then it will be considerably more difficult than the ACARA document suggests. To illustrate this see the proof of the central limit theorem at

<http://mathworld.wolfram.com/CentralLimitTheorem.html>

which uses inverse Fourier transforms.

We must maintain rigour in NSW, so if we can't do this with a new topic then it is that topic which should be removed, not the rigour.

References

[E] Evans, M., *The Australian Curriculum for Mathematics*, Gazette, **Vol. 37[3]**, 2010, AustMS, pp160-164

<http://www.austms.org.au/Publ/Gazette/2010/Jul10/CommsAustCurrMath.pdf>

[P] Pender, B., *Structure, Content and Coherence in Mathematics and the Senior Curriculum*, 2010

<http://4unitmaths.com/11-12-BillPender.pdf>

[SMH] Patty, A., *National Curriculum Content Not Up To Scratch: Critics*, The Sydney Morning Herald, May 15, 2010

<http://www.smh.com.au/national/education/national-curriculum-content-not-up-to-scratch-critics-20100514-v4gt.html>