

UNCONFIRMED

Australian Council of Heads of Mathematical Sciences (ACHMS)**Meeting 2/2025****MINUTES**

The Meeting of the Australian Council of Heads of Mathematical Sciences (ACHMS) was held at 2:00 pm AEDT on Wednesday, 10 December 2025, online via Zoom and in-person at the AustMS Meeting 2025, TLC Building, Room 115, La Trobe University, Bundoora Campus, Victoria.

PRESENT**ACHMS Executive Committee**

Prof. Warwick Tucker (Chair), Prof. Inge Koch (Deputy Chair) and Prof. James Brown (Executive Committee Member).

University Representatives

Prof. Kuldeep Kumar, Prof. Andrew Bassom, Prof. Joe Grotowski, Prof. Dingxuan Zhou, Dr Gabe Sorrentino, Dr Trevor Langlands, Prof. Jeffrey Hogan, Dr Michael Kemp, Prof. Graeme Hocking, Dr Adam Harris, Prof. Tony Roberts, Dr Nargiz Sultanova, A/Prof. Richard Garner, Prof. Michael Giudici, Prof. Andrew Francis, A/Prof. Narelle Brack, Dr Iman Ardekani, Dr David Ompong, Prof. Song-Ping Zhu, Prof. Aaron Thornton, Prof. Nicola Armstrong, Prof. Anthony Dooley, Prof. Pablo Moscato, Prof. Bronwyn Hajek, Prof. Inge Kock, Prof. Finnur Larusson, Dr Nathan Clisby.

Friends of the Council

Dr Deborah Jackson, Prof. Jan De Gier, Prof. Katie Makar, Prof. Stephan Tillmann, Prof. Aidan Sims, Dr Kerri Morgan, Dr Judy-anne Osborn, Mr Ryan Winn.

AMSI Staff

Prof. Tim Marchant, Ms Elena Panfilova, Mr Michael Shaw, Ms Margo Brown, Ms Anna Muscara, Ms Jan Thomas.

Guest Speakers

Dr Dave Smith (University of Newcastle) and Emeritus Professor Marilyn Goos (University of Queensland)

BUSINESS**1. Welcome**

The Chair welcomed university representatives, friends of the Council, and invited guests to the Australian Council of Heads of Mathematical Sciences' second meeting of the year. The Chair acknowledged the traditional owners of the lands on which attendees were located and paid respects to Indigenous Elders past, present, and emerging.

1.1. Apologies and Proxies

Apologies were noted from Professor Frederico Frescoli, Professor Howard Bondell, A/Professor Volker Gerbhardt, Professor Charles Lemckert (proxy: Professor Aaron Thornton) and Professor James Brown (proxy: Professor Anthony Dooley). New member representatives were welcomed: Dr Adam Harris (University of New England), Professor Nicola Armstrong (Curtin University), Professor Ute Roessner (Australian Research Council). [NOTE: It was noted that the original meeting placeholder was cancelled and that the subsequent replacement invitation was not received by the President of the SSA, resulting in the President being unable to attend the meeting or formally tender apologies for this meeting.]

1.2. Agenda Changes

No changes were made to the agenda. The Chair noted a 10-minute break scheduled before the second presentation at 3 pm, which would be a joint meeting with the AustMS Education Afternoon participants.

1.3. Minutes of the Past Meeting

The minutes from the May 2025 meeting were circulated prior to the current meeting. With no objections raised, the minutes were taken as accurate.

2. Appointments to the ACHMS Executive Committee

The Chair noted that new nominations for the Executive Committee would be needed for the May meeting next year, as the current terms were ending. The Chair encouraged self-nominations, emphasising that the role was not demanding and was for the greater good of the community.

3. Report from the Chair

The Chair thanked AMSI Executive Assistants, Elena and Filip, for their behind-the-scenes work and reiterated Council's core purposes, which are facilitating best practices in mathematical science education, research, and community interaction. The Chair then highlighted recent achievements in the mathematical sciences, including:

- Professor Nalini Joshi from the University of Sydney being named New South Wales Scientist of the Year 2025.
- The announcement of the ARC Centre of Excellence in Mathematics for Quantum Era Security and Trust, led by Professor Nalini Joshi.
- Declining participation in higher mathematics units in schools, as reported by AMSI's Year 12 Mathematics Participation Report Card.
- The "Do the Math" outreach program at UNSW was celebrated for its 20th anniversary and success in attracting young women to mathematics. was recognised for its 20th anniversary and its success in attracting young women to mathematics.
- The 2026 National Research Infrastructure Roadmap Issues Paper was mentioned, highlighting the push for mathematical science infrastructure, also known as MATRIX.
- Upcoming 2026 AMSI Winter and Summer Schools were announced.

- The Chair noted that the current Mathematical Sciences Decadal Plan, published in March 2016, concluded at the end of this year and asked whether work had commenced on a new 10-year roadmap. Discussion confirmed that the previous strategy was led through the Australian Academy of Science, with significant advocacy from senior Fellows, and that there was currently no clear plan underway for a successor. Participants suggested that developing a new decadal plan would be timely, suggested noting lessons from the Astronomy decadal plan 2026-2035, mentioning differences in funding and administrative support, and uncertainty about current Academy resourcing. It was also noted that follow-up reporting on the existing plan had ceased several years ago.

Action Item:

The Chair agreed to contact the Australian Academy of Science to request documentation on the follow-up, implementation, and reporting framework of the 2016 decadal plan and to report back to the group in May.

The Chair concluded by emphasising the importance of the Council in pushing for positive changes in the mathematical sciences community and encouraged members to bring forward any issues for collective action.

4. Collaborative Peer Feedback

The Chair introduced the first speaker, Dr Dave Smith from University of Newcastle, who presented on collaborative peer feedback as a teaching and learning practice in mathematics education. Dr Smith explained that the approach had originally been developed through a small teaching grant during his time in Singapore and had since been implemented in multiple contexts, including a recent iteration at the University of Newcastle. His presentation focused on the rationale for peer feedback, its pedagogical benefits and challenges, and a detailed description of a collaborative model designed to improve feedback quality and student engagement.

Concept and Rationale for Peer Feedback

Dr Smith defined peer feedback as a process in which students reviewed and commented on each other's work, either as formative or summative assessment. He outlined several established models and emphasised that peer feedback could be implemented with or without assessment stakes and that his focus was on models where students did not determine each other's grades.

The speaker argued that feedback was one of the most effective learning interventions and that peer feedback offered additional benefits beyond reducing staff marking load. In particular, students who provided feedback engaged in deeper cognitive processes—such as evaluating arguments and appraising reasoning—which aligned with higher-order learning outcomes in Bloom's Taxonomy. This was especially valuable in upper-level undergraduate mathematics.

Challenges Associated with Peer Feedback

Dr Smith acknowledged several common challenges associated with peer feedback. These included variable student engagement, inconsistent feedback quality, and student scepticism regarding the value of peer-generated comments. He also noted the importance of anonymity, explaining that exposing students' work could cause embarrassment and undermine a constructive learning environment. These issues motivated the development of a more structured and collaborative peer feedback model.

Original Implementation

The original model was developed for a small, highly motivated cohort enrolled in a proof-based mathematics course focused on mathematical writing, reading proofs, oral presentation, and LaTeX. Students were new to formal mathematical writing and critical evaluation of proofs, making peer feedback both challenging and potentially valuable.

Dr Smith explained that the approach helped students learn to critically read mathematical arguments, recognise unclear writing, and engage in iterative drafting—skills that are standard in professional mathematical practice but unfamiliar to many students. Peer feedback was also used to support LaTeX learning without requiring direct instruction time.

Collaborative Peer Feedback Model

To address identified challenges, Dr Smith described a collaborative peer feedback model. Students submitted work in advance via the learning management system. Submissions were pseudonymised and assigned to small feedback groups. In class, students reviewed model solutions together before collaboratively generating feedback on assigned work. Only one student wrote at a time, and all feedback had to be agreed upon by the group.

This structure aimed to improve feedback quality, reduce variance, and increase student confidence in the feedback received. After class, feedback was scanned, mapped back to students, and returned electronically. Students then completed a short reflective task on what they learned from the process. Assessment was based on participation and completion rather than feedback quality.

The model was reported to be well received by students and colleagues, with consistently positive qualitative feedback. Administrative workload was manageable, supported by automation scripts, and the approach was considered sustainable and reusable across semesters.

Adaptation at the University of Newcastle

Dr Smith described a modified implementation at the University of Newcastle in a larger class context. The model was scaled to approximately 35 students and adapted for handwritten submissions rather than LaTeX. A greater proportion of tutorial time was dedicated to collaborative peer feedback, and additional discussion of model solutions was incorporated early in the semester.

While some elements, such as whole-class generic feedback discussions, were less effective in this context, Dr Smith observed higher levels of student engagement during peer feedback activities compared to traditional worksheet-based tasks. The model was delivered across multiple feedback cycles throughout the semester.

Audience Questions and Discussion

The audience asked about student acceptance of peer feedback, scalability, assessment, and the role of AI. Dr Smith reported no resistance from students, attributing this to clear communication of the learning approach and its integration into an active-learning model. He confirmed that the approach had scaled from small classes to around 35 students and could be expanded further. Feedback itself was not graded; students received credit for participation and completion.

Several questions focused on AI. Dr Smith noted that while AI might produce higher-quality feedback in some contexts, particularly with LaTeX, it was less effective with handwritten mathematics. AI use was not permitted in this activity, and the design minimised incentives for misuse because learning depended on engagement rather than grades.

Concerns about potential student resentment were raised, but Dr Smith indicated this had not occurred, citing transparent framing and alignment with graduate attributes. A final question addressed whether reviewing a correct proof reduced learning for the feedback provider. Dr Smith acknowledged this but noted that evaluating correctness and clarity remained valuable, and he supported the suggestion of using commonly incorrect proofs for whole-class discussion.

The Chair thanked Dr Smith for his engaging and informative presentation. The meeting then adjourned for a 10-minute break to allow additional participants to join, with the next session to be chaired by Professor Inge Koch.

5. Out-of-field Teaching in Mathematics

Professor Koch opened the second session by introducing herself as the Deputy Chair and offering brief context on out-of-field mathematics teaching from her earlier work with AMSI's Choose Maths program. She then introduced Emeritus Professor Marilyn Goos as a long-time leader in research on out-of-field teaching.

Professor Goos explained that Australia's major mathematical associations formed a consortium in 2022 to advocate for addressing out-of-field maths teaching, a persistent issue worsened by the current teacher shortage. She outlined three consortium publications (all available via AMSI): a review of existing university upskilling programs; a position paper defining the issue, why it mattered, and proposing a national upskilling program; and a design paper identifying key elements needed for an effective program. She defined out-of-field teaching as qualified teachers being assigned to teach outside their training and stressed that it was a structural problem rather than a failure of teachers.

She argued that reliable national data were hard to obtain because teacher subject specialisations were not consistently recorded across Australia (with NSW a partial exception) and because definitions of "in-field" varied. As an example, she cited AITSL survey reporting that 38% of maths teaching was out-of-field, while noting the survey's "in-field" threshold (one semester each of maths content and pedagogy) was far below accredited specialist maths teacher preparation (multiple semesters of maths content plus pedagogy). She then explained why the issue mattered for students, pointing to equity and achievement gaps: disadvantaged schools were more likely to have less-qualified maths teachers, and students taught by out-of-field teachers tended to have weaker outcomes.

Professor Goos argued that recruitment and retention strategies were necessary but too slow to fix the immediate problem, so priority should also be given to supporting teachers already teaching maths out of field. She described Ireland's nationally coordinated, government-funded upskilling program (delivered by a university consortium and linked to teacher registration) and reported that survey-based estimates there reduced out-of-field teaching from 48% to 25%, alongside improvements in teacher confidence, teaching approaches, and job satisfaction, while cautioning against simply transplanting the model to Australia.

She reported that Australia already had many university upskilling programs, but they were fragmented and highly variable in duration, content balance, cost, qualification type, and alignment with standards, and uptake was often low even when fees were subsidised. The consortium therefore advocated a national strategy with three parts: improved data infrastructure linking teacher qualifications to teaching assignments; a nationally coordinated, consortium-delivered upskilling program that reduced barriers such as time, cost, and lack of recognition; and a national steering group to coordinate stakeholders and develop consistent qualifications and broader professional learning pathways. She noted that progress required sustained advocacy and coordination across

governments and sectors, and she summarised recent engagement activities, including consultations, media work, meetings with government and policy stakeholders, and efforts to keep the issue visible through ongoing submissions and commentary.

Professor Goos then summarised an ARC Discovery Project led by Professor Linda Hobbs that treated out-of-field teaching as an “ecosystem” influenced by factors from classroom and school leadership through to system settings and societal attitudes. She described early qualitative work (policy analysis and interviews) and planned next steps (a national survey and Delphi study) aimed at mapping the current ecosystem and identifying what would need to change to create an ideal one. She highlighted three examples of ecosystem pressures: unstable short-term funding undermining upskilling partnerships; rigid initial teacher education accreditation limiting flexible pathways (especially for career changers or junior-secondary-focused preparation); and workplace cultures in some schools that undervalued specialist expertise (including attitudes that “anyone can teach maths”), reducing incentives and support for proper upskilling. She concluded that effective responses required flexible pathways for different out-of-field teacher profiles and stronger partnerships across stakeholders.

Audience Questions and Discussion

The discussion focused on accountability, culture, and practical barriers to addressing out-of-field mathematics teaching.

Professor Roberts questioned whether Australia lacked a legislative or policy mechanism requiring schools to disclose teachers’ subject qualifications to education departments and parents, suggesting greater transparency could raise awareness and political pressure around equity. Professor Goos acknowledged the idea but cautioned that a “name and shame” approach could face strong resistance from schools and principals, and might further stigmatise out-of-field teachers, as seen in Ireland where teachers were reluctant for parents to know their status.

Dr Osborn asked how school culture could realistically be changed and noted that qualifications were an imperfect proxy for teaching competence, citing examples of excellent teaching by non-specialist teachers. Professor Goos agreed that out-of-field teachers were a diverse group and that experience and practice also mattered. She emphasised the need for flexible, multiple pathways to becoming more “in-field”, starting with qualifications but complemented by other forms of professional learning. She also highlighted structural barriers, including principals’ reluctance to support maths-specific professional development for teachers who only teach limited maths loads or may not teach maths every year.

A representative from UNSW asked about challenges in making a planned out-of-field retraining program successful. Professor Goos advised clearly identifying the target cohort, aligning programs with state registration requirements (particularly in NSW), reducing barriers such as time and cost, and, critically, engaging school principals alongside teachers. She stressed that principal support was essential for teacher participation and long-term impact.

Professor Marchant provided a contextual comment drawing on AMSI Female Specialist Maths Scholarship data, noting that many disadvantaged schools lacked qualified maths teachers and did not offer specialist mathematics. While highly motivated students sometimes found alternative pathways, many others disengaged, reinforcing the scale and urgency of the problem.

The session concluded with agreement that the issue was complex, deeply concerning, and required sustained, coordinated effort beyond individual initiatives.

6. Other Business

Professor Tillmann highlighted another example of best practice for increasing diversity in the mathematical sciences, noting an initiative at the University of Sydney that increased gender diversity in advanced mathematics by over 30% over five years (see article: <https://theconversation.com/one-university-boosted-gender-diversity-in-advanced-maths-by-over-30-in-5-years-heres-how-270083>).

The Chair concluded the meeting by thanking attendees for their contributions and reminded members to submit suggested discussion topics for future meetings in advance.

The meeting concluded at 3:45 pm.

ACTION SHEET

Item #	Action	Responsibility	Comments	Status
10/12/2025 Item 1	The Chair will contact the Australian Academy of Science to request documentation on the follow-up, implementation and reporting framework of the 2016-2025 Match Sciences Decadal Plan and report back to the group in May 2026.	Chair		Underway

Signed by the Chair: _____

and dated: _____

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Professor Inge Koch, Deputy Chair

Professor James Brown, Executive Committee Member

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Professor Lilia Ferrario, Australian National University

Associate Professor Adam Butt, ANU School of Finance, Actuarial Studies & Statistics

Professor Kuldeep Kumar, Bond University

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Dr Aaron Wiegand, University of the Sunshine Coast
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Associate Professor Volker Gebhardt, Western Sydney University

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