

| <h1>First Year in Maths NSW</h1> <h2>Engagement and assessment in a changing world</h2>                         |  |
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| Wednesday 16 December 2020 via Zoom<br>Hosted by the School of Mathematics and Statistics, University of Sydney |  |
| 9:00–9:10   | <b>Welcome</b>   |
| 9:10–9:35   | <b>Claire Cornock</b><br>Team based learning: fostering group work online (or offline)   |
| 9:35–10:00  | <b>Pauline Kohlhoff</b><br>Supporting the derivation of compound angle formulae  |
| 10:00–10:05   | Break  |
| 10:05–10:55   | <b>Invited lecture: David Easdown</b><br>The utility of Massive Open Online Courses (MOOCs) in promoting learning and ameliorating disadvantage, especially in times of crisis |
| 10:55–11:15   | Morning tea - breakout rooms   |
| 11:15–11:40   | <b>Chris Tisdell</b><br>Fostering Community in Online Mathematics Courses: Practical Advice and Learnings from COVID-19  |
| 11:40–12:05   | <b>Deborah Jackson</b><br>Engagement in, and delivery of, mathematics and statistics support in a changing environment   |
| 12:05–12:30   | <b>Carlos Ponce Campuzano</b><br>GeoGebra Classroom: A virtual platform for remote learning to foster active engagement  |
| 12:30–1:15  | Lunch - breakout rooms   |
| 1:15–1:40   | <b>Igor Kontorovich</b><br>From students' systematic errors to interactive learning resources  |
| 1:40–2:05   | <b>Ayse Aysin Bilgin</b><br>Assessment of a large first year service business statistics unit under COVID-19 restrictions  |
| 2:05–2:10   | Break  |
| 2:10–3:10   | <b>Panel discussion</b><br>Assessment and educational integrity  |
| 3:10–3:30   | Afternoon tea - breakout rooms   |
| 3:30–3:55   | <b>Sara Herke</b><br>Support and interaction in the online environment   |
| 3:55–4:20   | <b>Anthony Morphet</b><br>Active learning, groupwork based online mathematics tutorials with Zoom and online whiteboards   |
| 4:20–4:45   | <b>Dmitry Demskoy</b><br>MathAssess - a system for creating and delivering formative mathematical assessments  |
| 4:45–5:00   | What's next?   |

## Abstracts

### Invited talk

**Associate Professor David Easdown (USYD, [David.Easdown@sydney.edu.au](mailto:David.Easdown@sydney.edu.au))**  
**The utility of Massive Open Online Courses (MOOCs) in promoting learning and ameliorating disadvantage, especially in times of crisis**

The MOOC Introduction to Calculus was conceived a few years ago and launched in December 2018. This talk will explain some of the underlying philosophy and pedagogy behind its creation, and mention the role this MOOC played in helping students during the recent COVID-19 crisis. Some background may include blends of classical and novel learning and teaching models or principles, such as the Leunig Model (as in Michael Leunig), the Central Limit Theorem for Elastic Bands, the hidden dimensions of the Passive-Active Interface, the Zone of Proximal Development (and its dual, the Zone of Proximal Failure), the Goldilocks Principle and the Plateau (or Helicopter) Principle.

### Other talks

**Ayse Aysin Bilgin (MQ, [ayse.bilgin@mq.edu.au](mailto:ayse.bilgin@mq.edu.au))**  
**Assessment of a large first year service business statistics unit under COVID-19 restrictions**

Assessment of statistical learning in a large first year service unit is challenging especially if the aim is to understand what students are thinking, in other words, hearing the student voice. In 2020, COVID-19 pandemic forced many of institutions to move to alternative ways of assessing student learning which usually meant that invigilated on campus assessments are replaced with non-invigilated online assessments. The challenges of online assessments are different depending on the level of the learning (first year versus third year) and depending on the class size (more than 1,000 and less than 50). Therefore, solutions to the challenges required careful thinking and planning of assessment tasks to provide opportunities for the students to achieve best learning outcomes without making it too onerous for the academics. In this talk, I will present a solution from my teaching. Specifically, I will provide examples of changes to the final exam in a large statistics service unit for Business students.

**Claire Cornock (Sheffield Hallam, [c.cornock@shu.ac.uk](mailto:c.cornock@shu.ac.uk))**  
**Team based learning: fostering group work online (or offline)**

Within this talk, the concept of team based learning will be presented. This involves students individually answering questions and then completing the same questions together within a group. This activity has the added advantage that it can take place either online or in a physical classroom. Evaluation from a recent online activity will be presented, which shows the levels of engagement and interaction between students. During the session, delegates will also have the opportunity to experience a short team based learning activity.

**Dmitry Demskoy (Charles Sturt University, [ddemskoy@csu.edu.au](mailto:ddemskoy@csu.edu.au))**  
**MathAssess - a system for creating and delivering formative mathematical assessments**

We describe a new system for creating and delivering formative mathematical assessments (MathAssess). MathAssess is a free and extensible system which allows teachers to write questions and conduct marking using the Maple language.

**Sara Herke (UQ, [s.herke@uq.edu.au](mailto:s.herke@uq.edu.au))**  
**Support and interaction in the online environment**

SCIE1000 is a quantitative interdisciplinary course at The University of Queensland and is compulsory in the Bachelor of Science degree. In Semester 1, 2020 we moved more than 900 students out of their energetic classroom environment and into the Zoom classroom. We used interactive online modules for students to gain practice and confidence with pre-requisite quantitative skills. To encourage online engagement, my co-lecturer and I experimented with pre-lecture chats, shared Zoom whiteboards, “Kahoot!” quizzes, and Zoom chat participation. I’ll discuss some of the engagement outcomes we achieved, and report on a study of attitudes toward mathematics before and after taking SCIE1000 in a COVID-19 affected semester.

**Deborah Jackson (La Trobe, [D.Jackson@latrobe.edu.au](mailto:D.Jackson@latrobe.edu.au))**  
**Engagement in, and delivery of, mathematics and statistics support in a changing environment**

Delivery of mathematics and statistics support this year had to change dramatically “overnight” due to Covid-19. The transition involved face-to-face support in a room changing to face-to-face support via zoom, and other challenges. Fully online support had to mirror what had been previously offered in a physical space, with personal interaction still paramount, but now with some restriction. Yet delivery was more flexible than before, and there were clear advantages to the new strategies that became apparent. This presentation outlines La Trobe’s Maths Hub support centre’s transition into “Covid” delivery, and how that “changed” us, yet kept us on track and innovative. The outcomes, feedback, impact on students, disadvantages and advantages, will be discussed, with surprisingly positive results emerging.

**Pauline Kohlhoff (UTS, [Pauline.Kohlhoff@uts.edu.au](mailto:Pauline.Kohlhoff@uts.edu.au))**  
**Supporting the derivation of compound angle formulae**

I recently submitted this idea as an article for Reflections (MANSW). It is a teaching method for formula derivation that appears to be very effective for student engagement in an online class. I had originally planned to demonstrate the teaching of this content as a groupwork task, but I felt that the groupwork task might not run so well as an online collaboration in breakout rooms. When I trialled this new method in Spring semester with one of my classes (all pre-service teachers), the students appeared to get a lot out of the task and noted its flexibility for supporting different teaching styles and different student cohorts.

**Igor Kontorovich (University of Auckland, i.kontorovich@auckland.ac.nz)**  
**From students' systematic errors to interactive learning resources**

Mathematics education research and university teachers are well-familiar with many systematic errors that undergraduate makes. Yet, it is known that some of these errors are difficult to overcome. In this talk, I will describe an ongoing project aimed at capitalizing on the affordances of one digital platform - STACK - to change students' ways of mathematical thinking through a personalized automated feedback. I will address some of the dilemmas, successes, and struggles that emerge when designing a feedback-providing resource.

**Anthony Morphett (University of Melbourne, a.morphett@unimelb.edu.au)**  
**Active learning, groupwork based online mathematics tutorials with Zoom and online whiteboards**

'Whiteboard' tutorials are a form of mathematics tutorial class where students work collaboratively in small groups at whiteboards to complete tutorial questions. They are a form of active learning, provide opportunities for peer learning and help build students' groupwork and communication skills. We have used this form of tutorials in most of our large undergraduate subjects for many years with great success: they result in high student engagement and are very well received by students, tutors and lecturers. Due to COVID-19, we had to move all our tutorials online in early 2020. In this presentation we will describe our model for 'online whiteboard' tutorials that can potentially preserve many of the strengths of the in-person whiteboard tutorial in a wholly online environment. The model uses a combination of Zoom breakout rooms and online collaborative whiteboards such as AWW (awwapp.com) or Miro (miro.com).

**Carlos Ponce Campuzano (UQ, j.ponce@uq.edu.au)**  
**GeoGebra Classroom: A virtual platform for remote learning to foster active engagement**

GeoGebra is dynamic mathematics software for all levels of education that brings together geometry, algebra, spreadsheets, graphing, statistics and calculus in one easy-to-use package. In response to the global pandemic the GeoGebra Team released, in June 2020, the virtual platform GeoGebra Classroom in which teachers can assign interactive and engaging tasks for students, view live updated progress of students working on a specific task, facilitate rich, interactive discussions among all students, groups of students, and individual students. In this talk, I will demonstrate how to create a virtual mathematics class in GeoGebra Classroom for remote learning.

**Chris Tisdell (UNSW and UQ, cct@unsw.edu.au)**  
**Fostering Community in Online Mathematics Courses: Practical Advice and Learnings from COVID-19**

"Loneliness, defined as a subjective experience of social isolation, has been identified as the next public health epidemic of the 21st century" (Lim, 2018). Given the global impact of COVID-19 on teaching and learning, advancing our understanding of belonging and community within the context of higher education forms a critical and timely challenge.

Mounting evidence points to student belonging as a foundation of engaged learning, persistence to graduation and student wellbeing (Schreiner, 2010; Hoffman et al, 2002; Freeman et al, 2007). However, understanding how to foster a sense of belonging to a community remains elusive as there is an absence of scholarly literature pointing to the practical activities and approaches that can be applied to foster students' sense of belonging - especially within online classrooms and courses in mathematics.

We aim to explore this gap in the literature and establish a foundation for future research into practical methods for fostering students' sense of belonging to a learning community within online mathematics classrooms.

As part of a quasi-experimental design, informal pedagogical interventions were delivered in tutorial and lecture settings to build relationships and foster students' sense of membership, partnership and ownership within a learning community - a first-year maths course with hundreds of local and international students. Our mixed method approach captured quantitative and qualitative data relating to students' experiences of interventions and their sense of belonging to the learning community.

Our results indicate that there are practical activities and approaches that teachers can incorporate to give students a sense that they belong to a learning community, such as those centered around flexibility, friendliness, interactivity, encouragement and support.

Our work supports the position that students' sense of belonging can be enhanced by structures and activities in the (online) classroom as well as approaches that draw on teacher-led pedagogy. Furthermore, instilling in teaching staff an awareness of the importance of cultivating community and enacting pedagogical warmth is also impactful, and can lay the necessary foundation for more specific interventions.