The How, the What, and the Why of Undergraduate Mathematics
FYiMaths 2019 Workshop 8

Thursday 11th July	
9:30 – 10:00	Arrival Tea and Coffee
10:00 – 10:15	Welcome Deb King
10:15 – 11:15	**Veselin Jungic (TBA)** Simon Fraser University
11:15 – 11:30	Morning tea
11:30 – 1:00	**The How, the What, and the Why of undergraduate mathematics.** Workshop
1:00 – 2:00	Lunch
2:00 – 2:30	**Reflections from an incoming Associate Deans Learning and Teaching – First year maths at James Cook University** Shaun Belward James Cook University
2:30 – 3:00	**A survey of High School Mathematic curricula and First Year University Mathematics Units** Nazim Khan and Michael Jennings University of Western Australia and University of Queensland
3:00 – 3:30	Afternoon tea
3:30 – 4:00	**The 'who, what, where, why, when, how' of mathematics support.** Deborah Jackson La Trobe University
4:00 – 5:00	**Mathematics Support** Discussion Group
	Drinks and Dinner (TBA)

Friday 12th July	
9:30 – 11:00	**Statistics for education researchers (Wilson Lab)** Workshop: Jo-ann Larkins (TBA)
11:00 – 11:30	Morning tea
11:30 – 12:00	**Using narrative in the teaching of mathematics to first year science students** Paul Hernandez Martinez and Nathan Clisby Swinburne University
12:00 – 12:30	**What's in the curriculum: teacher and lecturer perspectives on high school students' understanding of the limit definition of the derivative** Michael Jennings University of Queensland
12:30 – 1:00	**Blended learning in a large first year mathematics course** Poh Hillcock University of Queensland
1:00 – 2:00	Lunch
2:00 – 3:00	**Talking Teaching** Open discussion forum: An opportunity to continue networking and talk about what's on your mind.

Abstracts

Reflections from an incoming ADLT – FYI maths at JCU

Shaun Belward
James Cook University

I have recently taken on the role of ADLT in the College of Science and Engineering at JCU. This has provided me with an opportunity to reflect on the mathematics offerings in the context of a bigger picture. This is in part is at the direction of those in leadership positions around me, but also through my own work in facilitating the needs of an increasingly diverse cohort at first year level in mathematics. In this presentation I will discuss the context in which we work with a focus on transition from secondary to tertiary mathematics, but also discuss how our maths offerings are evolving in response to demands from markets that are new to us.

A survey of High School Mathematic curricula and First Year University Mathematics Units

Nazim Khan and Michael Jennings
University of Western Australia and University of Queensland

Australia implemented a common year twelve mathematics curriculum in 2016. Nonetheless differences still exist in the state curricula.

We survey the mathematics curricula across Australia in the different states and compare them for similarity and differences. We further survey the first-year mathematics units at universities in Australia, their respective pre-requisites and study pathways. We focus on the G08 universities.

The 'who, what, where, why, when, how' of mathematics support.

Deborah Jackson
La Trobe University

With changing learning environments, shifts in student learning habits and availabilities, and the emphasis on mathematical skills excellence being part of the future visions of STEM education reports, mathematics support within universities is becoming more crucial, nearing new heights of popularity and necessity. Maths support must accommodate a variety of needs and a wide range of diversity. When developing and running support centres or programs, careful consideration must be made to address all issues faced by students, staff and the university. This talk discusses WHO needs to be supported, WHAT needs to be addressed, WHERE, WHEN and HOW support should be offered, and WHY it is essential. Also discussed are the issues faced in developing support programs, the difficulties, the challenges, and what works, particularly focusing on the developing and running of the Maths Skills Program (for students with maths skills deficiencies in many and varied disciplines), and the Maths Hub (a maths support centre for a wide range of diverse subjects and disciplines) at La Trobe University.

Using narrative in the teaching of mathematics to first year science students

Paul Hernandez Martinez and Nathan Clisby
Swinburne University of Technology

It is well documented that teaching mathematics to undergraduate students following degrees in science and other disciplines, for which mathematics is not the main academic pursuit, can be challenging. There are issues of motivation and student engagement, relevance of the topics taught and, in many occasions, low attainment and completion within mathematics units. Lecturers face questions about what to teach and how to teach it given that many of these students do not see the point of studying mathematics and, therefore, become very strategic in their learning approach to the subject. In particular, first year students that come without suitable secondary school mathematics qualifications and/or good skills for university study become lost and disengaged in large lectures.

To address this problem, we introduced a narrative style of teaching into the unit "Preliminary Mathematics", aimed at first year students of the Bachelor of Science. We understand curriculum as a certain way of telling a story about the world (Hannam, 2015), and therefore we linked the topics of the unit in a "story" that gives meaning, purpose and direction to what is learnt. Research has shown that a good story, well told, can trigger students' imagination, emotions and thinking, and make mathematics more enjoyable and memorable (Zazkis and Lilhedahl, 2009). In this presentation, we will show examples of this narrative style of teaching and present initial results of its evaluation. Because this is a developmental design research, we will invite feedback from the audience for improvement in the next iteration of the teaching design. In this way, we hope to contribute to the discussion of what, why and how of first year tertiary mathematics.

References

Hannam, F.D. 2015. *Teaching through Narrative*. Forum on Public Policy, 2015(2). Retrieved from: http://forumonpublicpolicy.com/journals-2/online-journals/vol-2015-no-2/

Zazkis, R. and Liljedahl, P. 2009. *Teaching Mathematics as Storytelling*. Rotterdam, The Netherlands: Sense Publishers.

What's in the curriculum: teacher and lecturer perspectives on high school students' understanding of the limit definition of the derivative

Michael Jennings
University of Queensland

The transition of students from studying secondary to tertiary mathematics has been the subject of increasing research interest in recent years. In this talk we will look briefly at teacher and lecturer perspectives on student responses to a question on the limit definition of the derivative. The results show differences in perspectives within and across teacher and lecturer groups, which have subsequent implications for how tertiary-level mathematics is taught. We will then discuss broader issues such who decides what mathematics is important at both high school and university.

Blended learning in a large first year mathematics course

Poh Hillcock
University of Queensland

The UQ2U program at The University of Queensland aims to redevelop UQ's large courses to deliver more flexibility and high value on campus activities. In 2018, MATH1051 (Calculus and Linear Algebra I), our largest first year mathematics course (yearly enrolment of 1500) was selected for the UQ2U program. The project has resulted in the development of online resources delivered through the edge.edx platform, and the subsequent re-design of MATH1051. In this presentation, I describe the UQ2U MATH1051 journey, from the development of resources to implementation in Semester 1, 2019. I will share lessons learned, what worked, what didn't, and where we go from here!