

QAMT Senior Mathematics Day
Monday 19 November 2018

Abstracts

Keynote Address: Mathematics is the basis of everything!

Dr Sara Herke, UQ School of Mathematics and Physics

Abstract:

A mathematician may view maths as a beautiful and precise language that can be used to study and understand the world around us. How can a student develop their mathematical intuition and begin to see the maths all around them? This discovery can start with everyday questions like “How does my weather app know what the apparent temperature is?” and “What affects blood alcohol concentration?” These questions are begging to be explored in the language of mathematics!

Mathematical literacy is important in science and in society more broadly. At UQ, one of the core compulsory first year courses for all BSc students is SCIE1000: Theory & Practice in Science, which demonstrates how mathematical models underpin modern science. The pre-requisite mathematics is Maths B or equivalent, and one of the main goals is to get students to use their “tool kit” of familiar mathematics to study a range of phenomena that are of interest to them. The course also introduces computer programming and philosophical issues in science.

We will explore some of the mathematics underpinning topics such as apparent temperature, blood alcohol, and climate change. We will also discuss our students’ mathematical preparedness for these topics, and some SCIE1000 pedagogy.

About the Speaker

Dr Sara Herke is a Lecturer at The University of Queensland and teaches into a large first year core course (SCIE1000) that covers quantitative methods in science. She holds an MSc and PhD in mathematics, both with a research focus in pure mathematics (graph theory), and has published a dozen research papers in leading journals. After completing her PhD in 2014, her love of teaching led her to develop and create engaging mathematics videos, and she has since has created more than 250 educational videos. At UQ, first year discrete mathematics (MATH1061) is now being delivered with Sara’s videos, as the course has moved to an active learning model. Sara is passionate about mathematics education and loves to spark curiosity in students as they see mathematics underlying so much of the world around them.



Session A

Workshop 1

Title	Content Workshop: Designing Problem Solving & Modelling Tasks
Presenter	Abigail Twyman, Brisbane Grammar School
Time	10.10am – 12.10pm
Abstract	<p>The purpose of this session is to start a discussion about the PSMT, including how to prepare students to complete one for the 2019 syllabuses, and the implications for teaching and learning.</p> <p>As a Maths department, we wanted to introduce to our current Year 9 cohort the PSMT, the Instrument-Specific Marking Guides (ISMG), and the approach to problem solving and mathematical modelling given in the new syllabuses. We did this by giving them a worked example and a task to complete. We tried to mark their task using the ISMG. This session will talk about how we chose a task, what the students did in response to the task, what we learnt, and what we will do differently next time.</p>

Workshop 2

Title	Assessment Forum (General Mathematics)
Facilitated by	Teachers and QCAA
Time	10.10am – 11.10pm
	This is a session for teachers implementing General Mathematics. In preparation for this forum, you are encouraged to bring along any assessment item drafts and queries. A representative from the QCAA will be present to facilitate the forum and provide advice.

Workshop 3

Title	Assessment Forum (Mathematical Methods)
Facilitated by	Teachers and QCAA
Time	11.15am – 12.10pm
	This is a session for teachers implementing Mathematical Methods. In preparation for this forum, you are encouraged to bring along any assessment item drafts and queries. A representative from the QCAA will be present to facilitate the forum and provide advice.

Workshop 4

Title	Content Workshop: Statistics in Specialist Mathematics
Presenter	Dr Michael Bulmer, UQ School of Mathematics and Physics
Time	10.10am – 11.10pm
Abstract	This session is a revision and extended version of this workshop and will introduce statistics relevant to the new Specialist Mathematics syllabus.

Workshop 5

Title	Content Workshop: Proofs
Presenter	Dr Barbara Maenhaut, UQ School of Mathematics and Physics
Time	11.15am – 12.10pm
Abstract	This session will be a content refresher on 'proofs' for the Specialist Mathematics syllabus.

Workshop 6

Title	Content Workshop: Special Relativity
Presenter	Dr Ian McCulloch, UQ School of Mathematics and Physics
Time	10.10am – 12.10pm
Abstract	This session will cover content related to special relativity for Unit 4 of the new Physics syllabus. This will be a revision and extended version of this workshop.

Session B

Workshop 1

Title	QCAA Q&A
Facilitated by	QCAA
Time	12.10pm – 1pm
This is a session for a representative from the QCAA to address any queries relating to the implementation of the new Mathematics syllabuses.	

Workshop 2

Title	Content Workshop: The Standard Model
Presenter	Dr Ian McCulloch, UQ School of Mathematics and Physics
Time	12.10am – 1pm
Abstract	This session will cover content related to the Standard Model for Unit 4 of the new Physics syllabus. This will be a revision and extended version of this workshop.

Session C

Workshop 1

Title	Content Workshop: Graphs and Networks
Presenter	Dr Barbara Maenhaut, UQ School of Mathematics and Physics
Time	1.45pm – 3.45pm
Abstract	This session will cover some of the graphs and networks topics relevant to the new General Mathematics syllabus, with a focus on Hamiltonian and Eulerian graphs, and using the Hungarian algorithm to find matchings in bipartite graphs. Other topics from the syllabus will be included if time permits.

Workshop 2

Title	Content Workshop: Statistics in Mathematical Methods
Presenter	Dr Michael Bulmer, UQ School of Mathematics and Physics
Time	1.45pm – 3.45pm
Abstract	This session is a revision and extended version of this workshop and will introduce statistics relevant to the new Mathematical Methods syllabus.

Workshop 3

Title	Assessment Forum (Specialist Mathematics)
Facilitated by	Teachers and QCAA
Time	1.45pm – 2.45pm
Abstract	This is a session for teachers implementing Specialist Mathematics. In preparation for this forum, you are encouraged to bring along any assessment item drafts and queries. A representative from the QCAA will be present to facilitate the forum and provide advice.

Workshop 4

Title	Content Workshop: Vector Calculus
Presenter	Poh Wah Hillock, UQ School of Mathematics and Physics
Time	2.45pm – 3.45pm
Abstract	This session is a revision and extended version of vector calculus, vectors, and matrixes relevant to the new Specialist Mathematics syllabus.

Workshop 5

Title	Content Workshop: Quantum Mechanics
Presenter	Dr Ian McCulloch, UQ School of Mathematics and Physics
Time	1.45pm – 3.45pm
Abstract	This session will cover content related to Quantum Mechanics for Unit 4 of the new Physics syllabus. This will be a revision and extended version of this workshop.