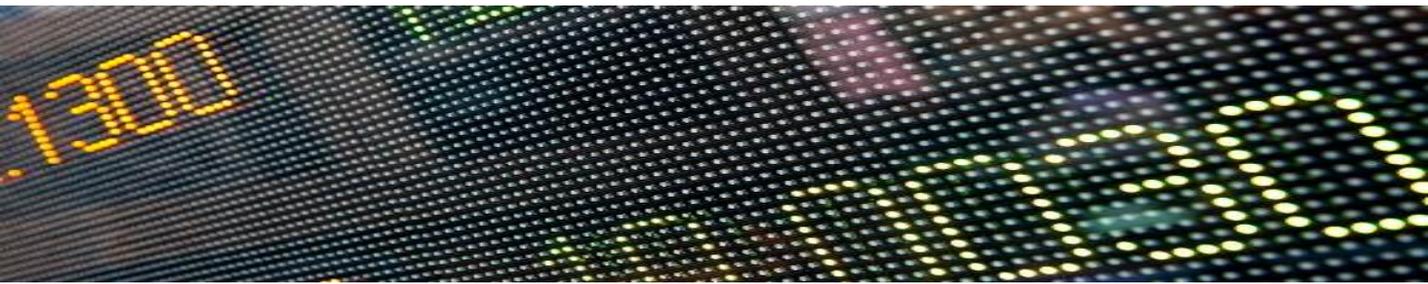


'Bringing Mathematics to Engineering: Digging Beneath the Topics'

FASE lunchtime Seminar



12.30 – 2.00pm

Tuesday 29 September

Oceans Institute Seminar Room
G.05, corner Fairway Street and
Edwards Street

Abstract:

Engineering students are required to learn fundamental mathematics in first year. Students often struggle with these units and cannot foresee their relevance to future engineering courses.

Threshold concepts are transformative concepts that are critical to future learning in a discipline (Meyer & Land, 2003). In a UWA study to identify engineering foundation threshold concepts, many mathematical threshold concepts were identified and engineering students raised the abstract nature of mathematics, and the apparent lack of relevance to engineering, as troublesome features of threshold concepts in mathematics (Male, 2012). They suggested indicating the engineering application of mathematical concepts when each is first introduced to students.

Elena Pasternak is a mathematician and engineer in an engineering school and teaches second, third and fifth (Masters) year engineering units. She collaborated with Alice Niemeyer, who taught mathematics to first year engineering students, in order to connect the teaching and application of mathematics between their units and thereby support students' learning. This interdisciplinary approach enabled a detailed analysis of the mathematics in both disciplines. Whereas other studies, including a thorough approach at UWA, have coordinated mathematics topics and their engineering applications as part of

curriculum development, this study delves deeper than previous studies by investigating the terminology and notation for the mathematics concepts and engineering applications.

Male, S. A. (2012). *Integrated Engineering Foundation Threshold Concept Inventory*. Sydney: Australian Government Office for Learning and Teaching.

Meyer, J. H. F., & Land, R. (2003). *Enhancing Teaching-Learning Environments in Undergraduate Courses Occasional Report 4*. Retrieved 31 May 2010, from <http://www.etl.tla.ed.ac.uk/docs/ETLreport4.pdf>

About the presenters:



Prof Elena Pasternak

School of Mechanical and Chemical Engineering, Faculty of Engineering, Computing and Mathematics

Elena Pasternak is a professor in the School of Mechanical and Chemical Engineering. She has PhD in Geomechanics from UWA in 2003, her Masters degree is in Mechanics of Solids and Applied Mathematics. Elena's research is in the area of multidisciplinary engineering with emphasis on Mechanics of Solids, mechanics of higher order continua and applications in Materials Science, Civil Engineering, Rock Mechanics, Petroleum, and Education in Engineering. Elena is passionate about education and enhancing the students' learning experiences.

She has taught at UWA at undergraduate and graduate level in Applied Mathematics, Petroleum, Rock Mechanics, Civil and Mechanical Engineering. Elena received

several nominations for the ECM Faculty Teaching and Learning Award in the categories Teaching Excellence and Research Supervision. The Faculty celebrated Petroleum Engineering unit which Elena coordinates and teaches is the top performing unit from the Students' Unit Reflective Feedback (SURF) surveys in 2014. Elena has several ARC Discovery, Linkage and LIEF grants, CRC project and an APD Fellowship in the past. Elena is a Member of FASE. She is the Chair of the Faculty Graduate Research committee.



Dr Sally Male

School of Electrical, Electronic and Computer Engineering

Sally Male is an electrical engineer with a PhD in engineering education and research interests in engineering education, women in engineering, and intensive mode teaching. She is a Senior Research Fellow in the School of Electrical, Electronic and Computer Engineering at UWA.

RSVP:

Please register your attendance to fase-ecm@uwa.edu.au by Friday 25 September 2015