

# AN ASSESSMENT STRUCTURE TO FOSTER SUCCESS IN TERTIARY MATHEMATICS

Griffith Ware<sup>a</sup>, Adam Piggott<sup>a</sup>, Linda Stals<sup>a</sup>

Presenting Author: Griffith Ware ([griffith.ware@anu.edu.au](mailto:griffith.ware@anu.edu.au))

<sup>a</sup>Mathematical Sciences Institute, Australian National University, Canberra ACT 2600, Australia

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**SUBTHEME:** Assessment

## PROBLEM

Many students enter Australian Universities underprepared for the mathematical content in the degrees they are pursuing. As well as being underprepared for the material, many are unskilled in how to learn mathematics and unenthusiastic about the subject. To overcome these disadvantages, it is crucial that first-year mathematics courses engage students using the best pedagogy principles and practices, especially those related to transition pedagogy.

## PLAN

In the Mathematical Sciences Institute at the Australian National University (ANU), we are undertaking a holistic redesign of our first-year mathematics to directly address issues transition pedagogy. A key piece of the project has been to redesign the assessment structure of our first mathematics course for engineers and others to incorporate the principles of Mastery Learning. Mastery Learning was pioneered by Benjamin Bloom in the late 1960s (Block et al., 1971) and has recently been adopted with success as the principle pedagogical design of first-year mathematics courses at the University of Technology Sydney (Groen et al., 2015). Rather than adopting Mastery Learning wholesale, we built on a hybrid model recently implemented by Sam Kault at the University of Queensland by blending Mastery Learning with a more traditional assessment and learning design.

## ACTION

In Semester 1, 2024 we ran our course *Mathematics and Applications I* with an assessment structure that explicitly encourages students to develop basic skills until they are mastered, to reflect on their learning, and to learn how best to succeed at studying tertiary mathematics. The new assessment structure combined two midsemester Mastery Hurdle Exams, each of which may be taken multiple times (different problems, but similar content) until a student correctly answers at least 80% of the problems, with ambitious assignments and a final exam that is designed to determine the appropriate passing grade for each student rather than to determine which students should pass the course. The new assessments were supported by new lecture notes, new workshops, and newly developed supporting materials including videos to address gaps in prerequisite knowledge.

## REFLECTION

The new assessment structure has radically changed the way that students engage in the course, and has also changed the grade outcomes, in mostly positive ways from the faculty perspective. It was noted that, of the students who needed multiple attempts at the Mastery Hurdle exams, the majority did not actively seek assistance from the teaching team in between sittings. Further, most students found the final exam very difficult. The course will run in a similar way in Semester 2, 2024 with small adjustments to the Mastery Hurdle exam content, new mechanisms to encourage engagement with the teaching team between sittings and better support for final exam preparation.

## REFERENCES

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