

BUILDING A MATHEMATICAL FOUNDATION FOR ENGINEERS

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THE PROBLEM:

Service teaching in mathematics, in Engineering for example, faces a couple of major challenges such as:

1. **Retention of knowledge** — students forget the information after only a few months.
2. **Transfer of knowledge** — students may know the techniques but not how to translate it into the context of their discipline.

THE GOAL:

We wish to create a Blackboard content area for each first-year service module with examples of how material gets applied in future modules. This will hopefully:

1. **Highlight the importance of mathematics** for students to encourage retention for future use.
2. Show how the **concepts they study can be transferred into their discipline** within relevant contexts.

The content area will be ready in advance of Michaelmas term for incoming students to try it out.

OUR SOLUTION:

We began with MAU11E01: Engineering Mathematics I. After examining the engineering curriculum, we:

- **Contacted lecturers** in the School of Engineering.
- **Collated online resources** highlighting applications.
- **Found examples of how the mathematics is applied** in future modules, such as exam questions.
- **Created an interactive flowchart** which shows how the mathematics weaves through the course.

EXAMPLE: THE MATHS BEHIND A CAPACITOR

$C \frac{dV}{dt} + \frac{V}{R} = 0$

How do I solve this differential equation?

How do I evaluate this integral?

$$\int \frac{dV}{V} = - \int \frac{dt}{RC}$$

What does the voltage look like?

$V(t) = V_0(1 - e^{-\frac{t}{RC}})$