

The HELM Mathematics Learning and Assessment Regime for Engineering Students

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HELM (Helping Engineers Learn Mathematics) is a major three-year curriculum development project undertaken by a consortium of five UK universities funded by a £250,000 government grant (about \$450,000) now in its second year. HELM aims to enhance the mathematical education of engineering undergraduates by the provision of a range of flexible learning resources in the form of workbooks and web-delivered CAL segments, together with a computer-based assessment regime.

These workbooks, which cover the UK university undergraduate engineering mathematics curriculum, contain traditional text interspersed with worked examples and guided exercises with spaces for students to insert their own worked solutions. Related engineering examples, which help students learn to apply mathematics to solve engineering problems, are an important feature of the workbooks and include contexts specific to various branches of engineering such as mechanical, electrical and electronic, civil and chemical. They contain links to the associated CAL segments and are further complemented by case studies closely related to the mathematics presented.

Crucial to the HELM approach is a Computer Aided Assessment (CAA) regime, which facilitates the regular testing of large numbers of students. It involves both formative and summative aspects; this encourages students to check their progress at regular intervals and provides them with feedback in order that they may improve. Both an integrated web-delivered CAA implementation and an alternative stand-alone CD based version are provided. This CAA regime is essential to gain the full potential of the other HELM learning resources. The project team members are at the forefront of CAA testing in the UK with large student numbers and have many years of experience in this work.

This paper first describes the HELM learning resources with particular attention being paid to the engineering examples and case studies. Then the implementation of the HELM assessment regime and how it can be successfully used for both formative and summative assessment of engineering students learning mathematics are outlined. Finally the viability of implementing the HELM learning and assessment regime elsewhere is examined by reference to experiences at other universities.