

Briefing paper for universities on Core Maths

Professor Paul Glaister, University of Reading

Introduction

Core Maths qualifications are a suite of new Level 3 qualifications for students in post-16 education. Core Maths courses are aimed at students who have passed GCSE mathematics at grade C or above but who are not taking A or AS level mathematics. The qualifications will help students retain, deepen and extend their mathematical skills and understanding through the use of meaningful and relevant problems, preparing young people for university, employment and life.

Core Maths is ideal for a wide range of students progressing to education courses with distinct mathematical or statistical elements such as psychology, geography, business and management, sociology, health sciences, biology, education and IT.

The government's aim is that by 2020 the vast majority of students will continue to study some form of mathematics as part of their post 16 education. Therefore, as the number of students taking Core Maths is expected to grow steadily over the next few years, this information is to help universities become aware of the skills and knowledge that students with this qualification will bring to their higher education.

Why is Core Maths important for higher education?

A number of recent reports have demonstrated how students in the UK lag behind their peers in other countries when it comes to participation in mathematics after the age of 16, and that as a consequence many are not well-prepared for the demands of their university courses, for example:

- A report from the Higher Education Academy: *'Mathematical transitions: a report on the mathematical and statistical needs of students undertaking undergraduate studies in various disciplines.'*¹ studied the mathematical needs of students in seven disciplines: Business and Management, Chemistry, Computing, Economics, Geography, Sociology and Psychology. The report found that all the disciplines in the study require mathematics and/or statistics to some extent. It found that many students arrive at university with unrealistic expectations of the mathematical and statistical demands of their subjects and that lack of confidence and anxiety about mathematics/statistics are problems for many students.
- The 2010 Nuffield report *'Is the UK an outlier? An international comparison of upper secondary mathematics education.'*² showed that, in a survey of 24 countries, England, Wales and Northern Ireland had the lowest levels of participation in mathematics to age 18, with fewer than 20 per cent of 16-19 year olds in England studying the subject.

The number of students taking A and AS level in mathematics has grown healthily in recent years and for many students A/AS will be the qualification of choice. However, at present many students encounter no mathematics after GCSE and their understanding, fluency and confidence are inevitably weakened. A large number of students are missing out on the mathematics that would help them with their studies in higher education. Core Maths is designed to help these students.

What is Core Maths?

Core Maths is a Level 3 qualification, normally taken over two years alongside A levels or other Level 3 qualifications such as BTEC. It is designed to help students retain, deepen and extend mathematical knowledge and skills gained at GCSE. It focuses on using and applying mathematics to address authentic problems drawn from study, work and life. The Core Maths courses include new level 3 content such as statistics, financial mathematics and using algebra. Core Maths qualifications attract the same UCAS points tariff as AS Mathematics.

¹ https://www.heacademy.ac.uk/sites/default/files/resources/hea_mathematical-transitions_webv2.pdf

² http://www.nuffieldfoundation.org/sites/default/files/files/Is%20the%20UK%20an%20Outlier_Nuffield%20Foundation_v_FINAL.pdf

There are six qualifications offered by the five Awarding Organisations. These are all 'badged' as Core Maths qualifications. Details, including sample examination papers, can be found through the Core Maths Support Programme website: <http://core-maths.org/information/awarding-organisations/>.

All Core Maths qualifications:

- deepen competence in the selection and use of mathematical methods and techniques;
- develop confidence in representing and analysing authentic situations mathematically and in applying mathematics to address related questions and issues;
- build skills in mathematical thinking, reasoning and communication;
- consolidate and build on students' mathematical understanding and develop further mathematical understanding and skills in the application of mathematics to authentic problems;
- foster the ability to think mathematically and to apply mathematical techniques to variety of unfamiliar situations, questions and issues with confidence;
- provide a sound basis for the mathematical demands and varied contexts that students will face at university.

By following a Core Maths course students will be expected to:

- use a variety of mathematical and statistical approaches to represent and analyse relatively well-defined situations, including complex and unfamiliar situations;
- address authentic issues and questions by applying mathematical approaches with purpose to generate solutions, insights or answers;
- evaluate the relevance of solutions in the context of the situation, establish how they could be used and communicate findings accurately and meaningfully;
- generate and apply mathematical solutions to non-routine questions and problems;
- interpret new situations in terms of mathematical and quantitative characteristics;
- make judgements about strategies and methods to achieve a solution;
- take creative approaches where appropriate; and test and evaluate answers and conclusions;
- explain mathematical reasoning and conclusions to others and justify specific approaches taken to the problem;
- interpret conclusions on the basis of mathematical understanding and explain limitations to answers and conclusions.

Summary

By taking Core Maths students will have continued using and applying GCSE material in mathematics and statistics, as well studying and applying some level 3 material, all in context, for the two years prior to entry to university. At present many of these students experience a two-year 'maths gap' which results in a lack of fluency and confidence in applying mathematical skills, even when applying known techniques and methods to new problem areas. This has a knock-on effect for provision of student support in universities and graduate-employability. Core Maths will fill this gap.

Further details

Paul Glaister³ is Professor of Mathematics and Mathematics Education at the University of Reading, and for the last five years Head of the Department of Mathematics and Statistics there. Paul is an ambassador for Core Maths, a consultant to the Core Maths Support Programme (CMSP), a member of the A level Content Advisory Board (ALCAB) for AS/A levels in Mathematics and Further Mathematics, and a higher education external expert adviser to The Office of Qualifications and Examinations Regulation (Ofqual).

Paul would very much welcome the opportunity to give institution-wide briefings on Core Maths to senior staff and staff responsible for admissions in universities. All universities are encouraged to take up this opportunity to find out more about Core Maths, its relevance to higher education, and to discuss any aspects of Core Maths. Please contact Paul at p.glaister@reading.ac.uk to arrange a mutually convenient time for him to visit.

³ <http://www.personal.reading.ac.uk/~smsglais/GlaisterCV.htm>