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Engaging with Mathematics:

How mathematical art, building mathematics, robotics and other activities are used to engage students with university mathematics and promote employability skills.

Dr Alison Megeney

Context

- Developing a new BSc and MMath in Mathematics.
- Content and structure of degrees.
- Consider the nature of Mathematical learning.
- What makes a Mathematician employable?
- How can we promote engagement with Mathematics?

Approach

Programme L&T Philosophy

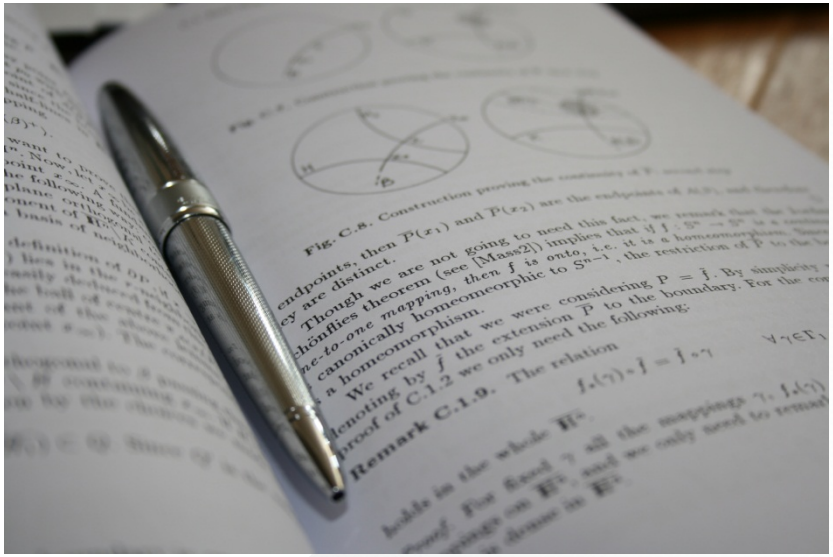
- Embedded skills across modules
- Mapped at all levels
- Motivated by material and problem solving approach

Engaging with Mathematics series

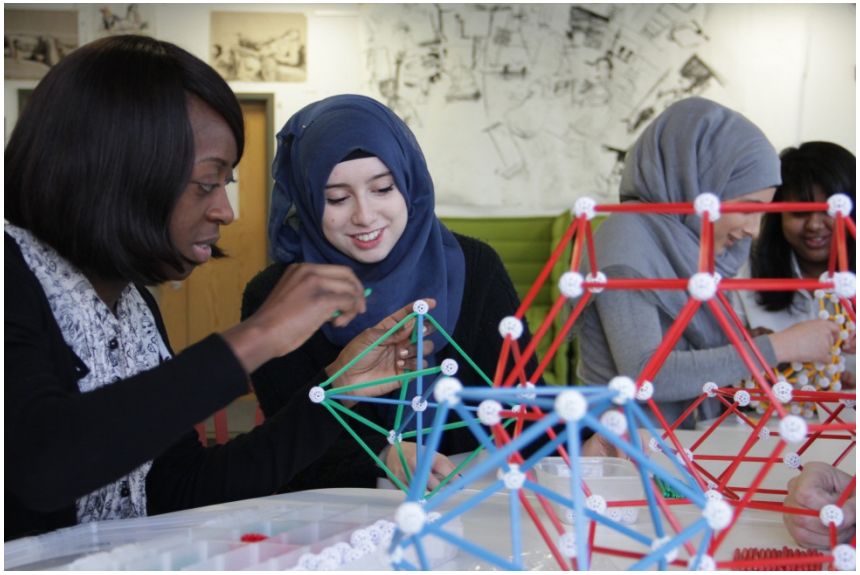
- Building Mathematics
- Robots
- Problem solving activities
- Outreach
- Seminar series
- Communication sessions
- Progress review and reflection

Mathematical learning

- Cumulative
- Understood
- Systematic
- Motivated
- Engaging
- Emotional
- Skills and techniques build and integrate



Mathematical skills



- Understanding patterns
- Being rigorous and logical
- Abstracting from real-world situations
- Clarity of thought and reasoning
- Problem solving
- Communicating results
- Critical approach
- Working as a team to solve a problem
- Using computers to solve mathematical problems

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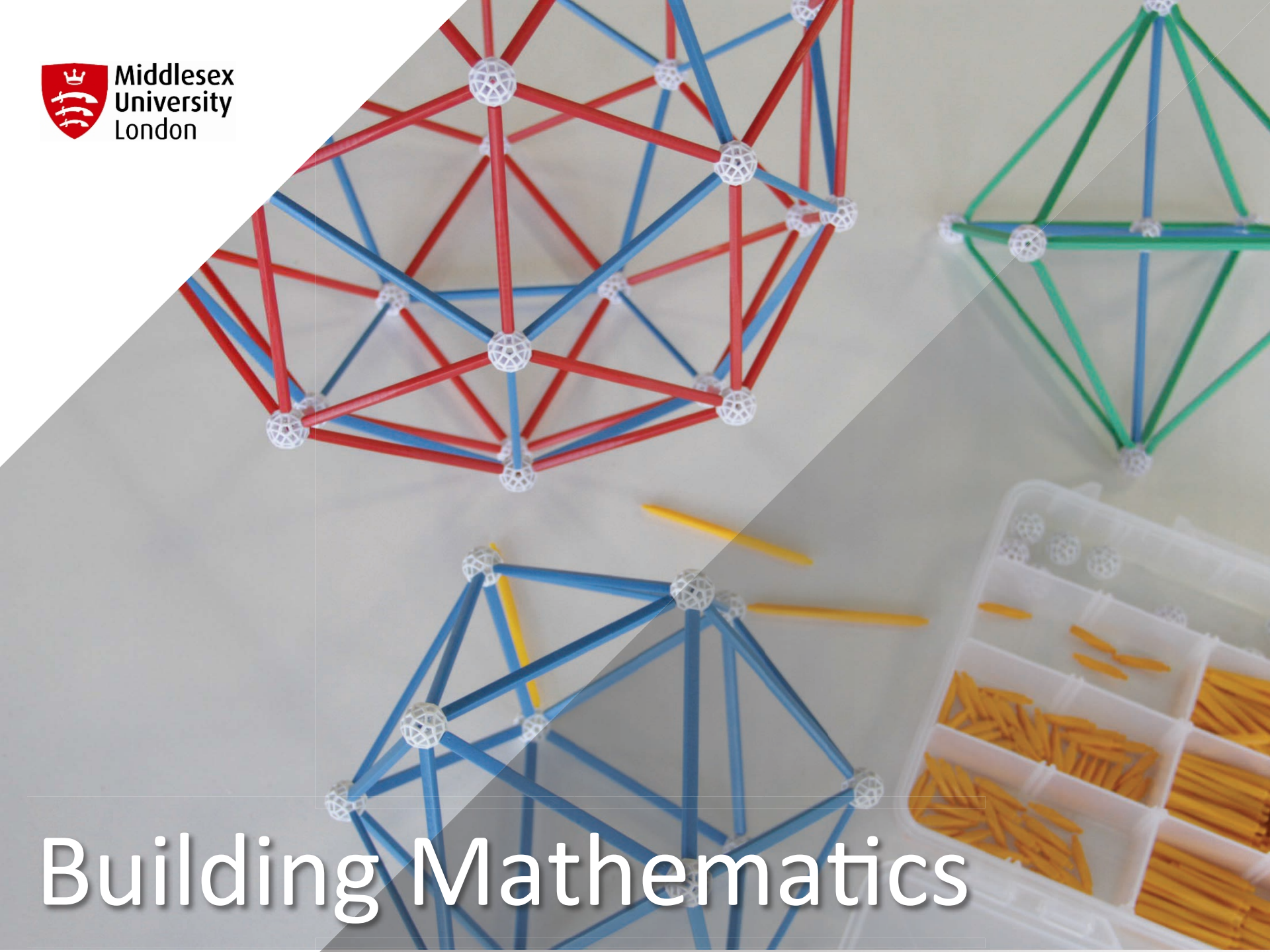


Building Mathematics

Mathematical Sculpture – Sword Dancing

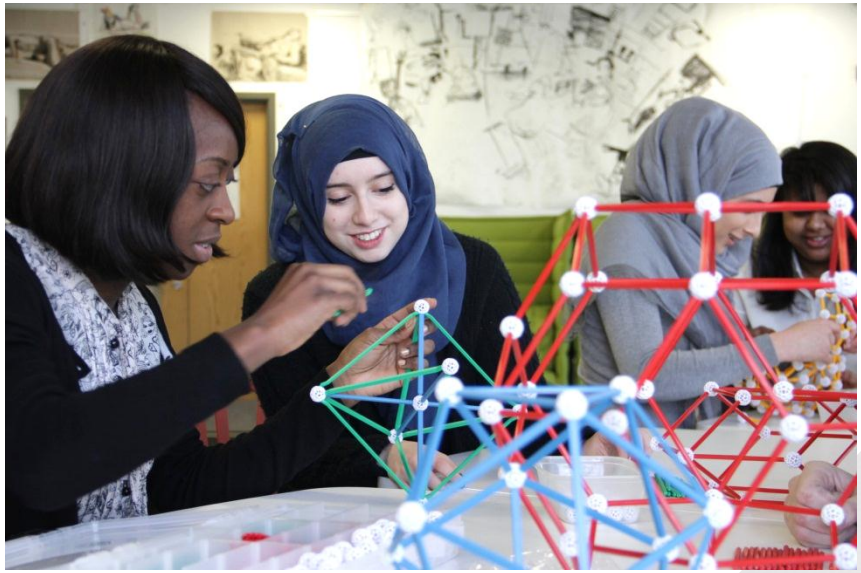
Sword Dancing is a sculpture comprising of two pieces that mirror each other, designed by Professor George Hart.

- Team work
- Communication
- Problem solving
- Logic and reasoning

Sword Dancing

Zometool construction activities

Maths students and staff work together to construct polyhedra and a three dimensional projection of the 120 Cell.



- Logic and reasoning
- Team work
- Problem solving
- Communication

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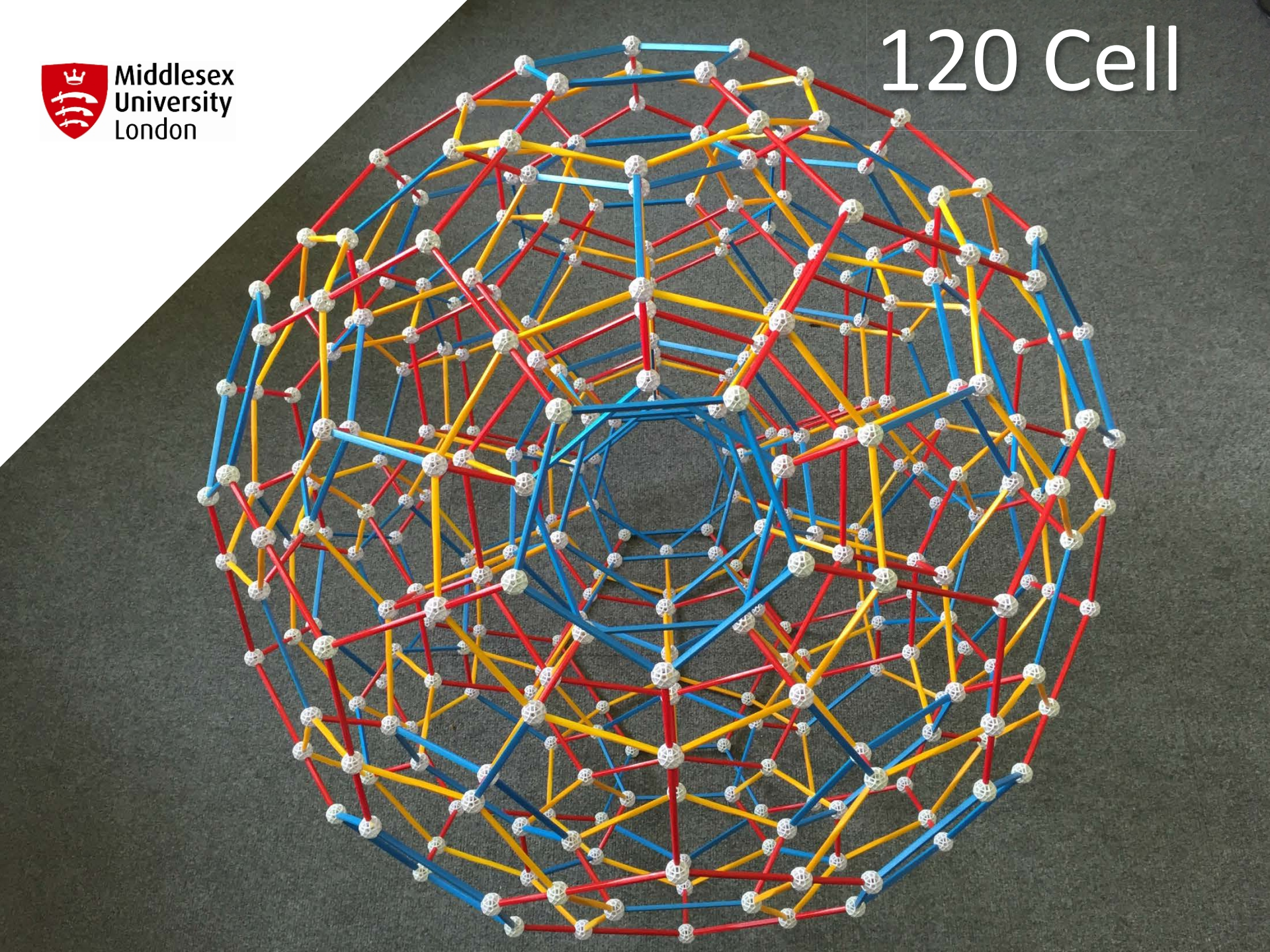
120 Cell



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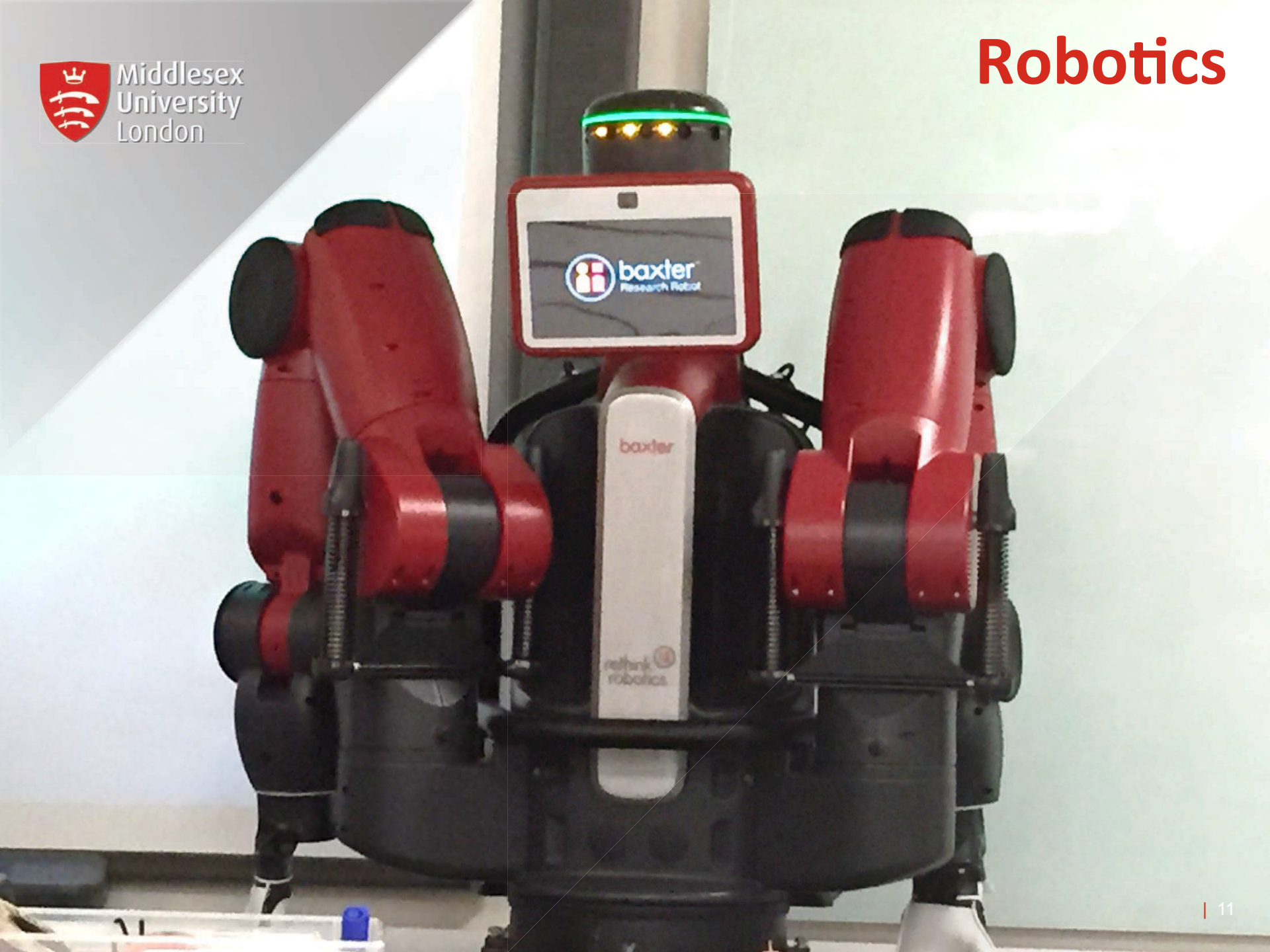
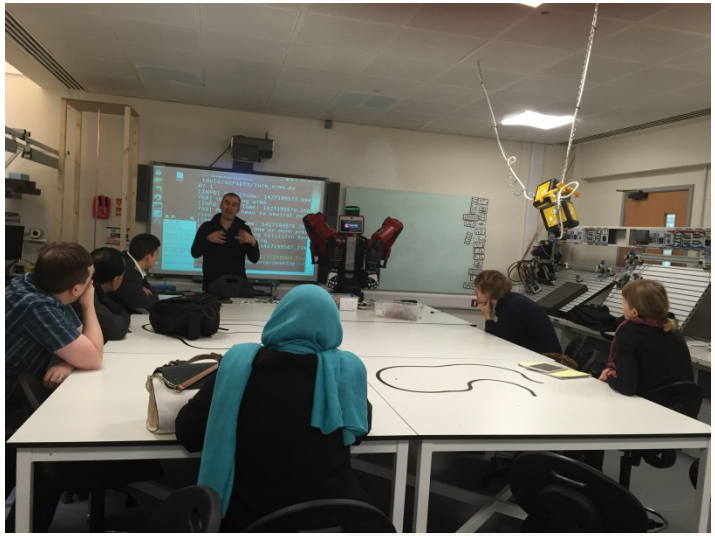
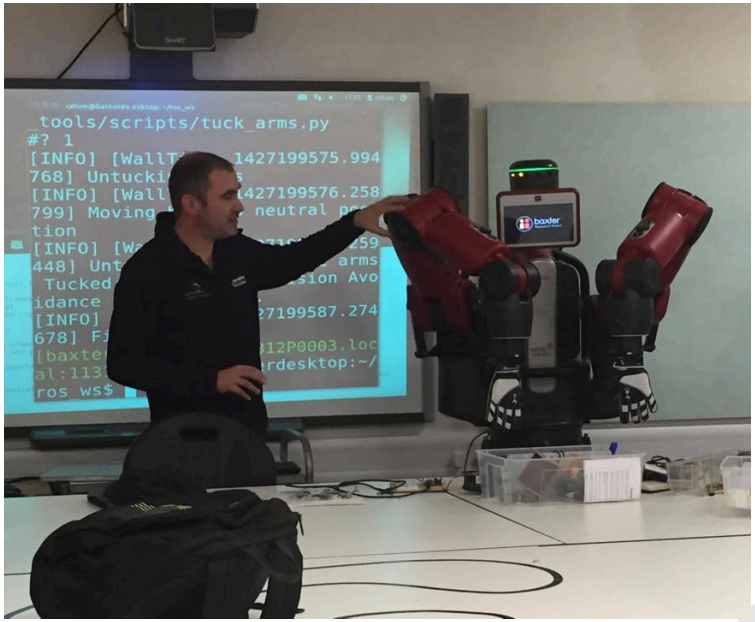
Robotics



Robots and vectors

Interactive sessions led by the technical team demonstrating how mathematics is the driving force behind movement in Robots.





- Building on mathematical knowledge
- Understanding and application
- Motivating and engaging

Problem solving

Problem solving

- Building Mathematics
- Mathematical puzzling
- Logic in the real world
- Outreach mathematics

- Logic and reasoning
- Team work
- Problem solving
- Communication

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Outreach

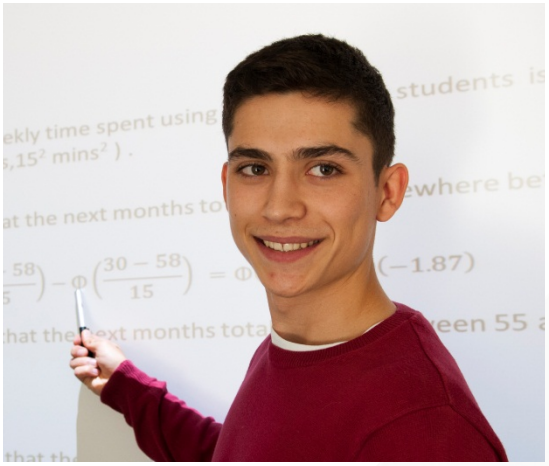
Outreach

- SmashFest2015
- Schools visits
- Supporting non specialists students
- World skills

- Logic and reasoning
- Team work
- Problem solving
- Communication

Communicating Mathematics

Communicating mathematics



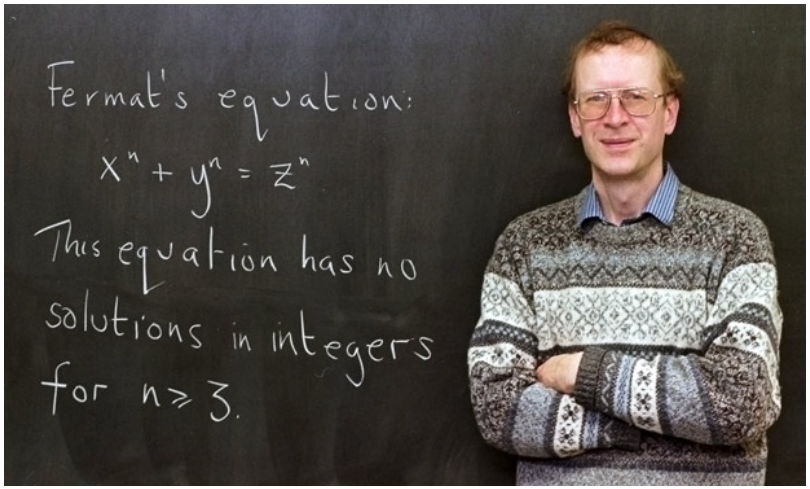
Writing mathematics

Developing mathematical arguments

Mathematics in word and powerpoint

Motivating mathematics

Fact of the week



Technical presentations

Communicating to specialists and non specialists

Maths in the media

Seminar series

Seminar series

‘What is the use of Maths anyway?’	Professor Adrian Rice, Randolph Macon College
‘Maths is Cool’	Professor George Hart, State University of New York in Stony Brook
‘Fractals and Alien Landscapes’	Professor Martin Loomes, Middlesex University
‘Symmetry reflecting reality, and how to solve Rubik’s cube in 20 moves’	Dr Thomas Bending, Middlesex University
‘The Mathematics behind the compression of graphics and audio.’	Dr David Dunn, Software Engineer Electric Imp
‘Mathematics for Business’	Dr Simon Best, Middlesex University

First year of the initiative

- Very positive feedback from students
- Students more confident
- Developed their skills and engagement with the discipline
- Timing of sessions could be improved
- How skills progress could be better recorded

Next year

- Integrate year 1 and 2 sessions
- Student voice
- Ensure mathematics and skills is focus of sessions
- Reflection
- Careers
- Get involved

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Questions