

Week One: 9th - 16th July 2019 Architecture, Maths and Design

Session length: 2.5 hours

Workshop leader: Mr Martin Jennings, *Architecture Workshop Cambridge*

Martin BA(Hons) Architecture with Interiors Manchester Metropolitan University. Martin has worked for Architecture Workshop since May 2000. He has worked extensively as an architectural technologist in architectural practices in Manchester, Bristol and Cambridge.

Architecture Workshop Cambridge is a small education association which has run hands-on, fun and educational activities for all Key Stages and abilities since 1996. These workshops are designed to enhance the curriculum, linking Maths and Science, with Design Technology, and History. The workshops help develop students as creative thinkers, effective participants, independent enquirers, reflective learners, self managers and team workers, through a combination of individual, group work, design, problem solving and creativity.

Find out more at architectureworkshops.org



| | Session Description | Learning Outcomes |
|--|---|---|
| Session 1 12 th July 2019 | Two exercises introduce students to the idea of building to scale and negative space. 1) Using dowel and rubber bands students build modular structures (tetrahedra) that form part of a larger whole. This is discussed, firstly as a geometric structure and then with the addition of 1:50 scale model figures as a piece of architecture. 2) With large pieces of dowel students work in teams to build a temporary shelter in one of three environments. These are discussed as 1:1 scale structures and photographed and sketched for later use. | <ul style="list-style-type: none"> • Understanding scale and ergonomics • Introduction to negative space |
| Session 2 14 th July 2019 | Students are made aware of the 'positive' and 'negative' spaces within the built environment. It is this relationship that differentiates architecture from other building. Using simple materials and these basic ideas students are asked to make a series of spatial maquettes, which are scaled using model figures. Students are asked to imagine what each maquette might be a model for and to rationalise their answer. They are asked to consider, discuss and evaluate their work, both with the workshop leader and one another. | <ul style="list-style-type: none"> • Understanding of positive & negative space • Insight into Architects' work |
| Session 3 15 th July 2019 | Photos taken of students maquettes positioned within a photo studio with scale model figures to be used for rendering within images of the locality. Using the sketches produced of previous activities, students explore the nature of the enclosures they produced by making these into maquettes. Students further explore their ideas of architecture by building large scale versions of their spatial maquettes. They construct models of the London and York Millennium bridges, exploring the differences and similarities between the two types of suspension bridge. | <ul style="list-style-type: none"> • Creative Development • Develop their understanding of scale • Understand suspension bridges |

Week Two: 16th - 23rd July 2019

Space, Mechanical Engineering, Electronics and Mechatronics

Session length: 2.5 hours

Workshop leader: Leanne Mee, *The STEM Workshop*

Leanne Mee founded The STEM Workshop following a successful career of 16 years working in secondary schools mainly leading and delivering Design and Technology and Engineering. Leanne founded The STEM Workshop to be able to have a wider impact on the lives of young people.

The Workshops Leanne delivers are hands-on, practical sessions that connect young people to the varying careers within the STEM industry (Science, Technology, Engineering and Maths).

Find out more at thestemworkshop.co.uk



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| Session 1 19 th July 2019 | <p>Students will take part in a Physics Masterclass by the National Space Academy using the challenges of space exploration and Earth observation.</p> <p>Led by an expert team, through a series of discussions and practical exercises, students will learn about the forces of extreme conditions and the effect it has on vehicles and objects in space.</p> <p>Students will use this knowledge to design their own vehicle to transport goods to the international space station</p> | <ul style="list-style-type: none"> Understand how we get to space, forces, motion and gravity Describe the forces of extreme conditions and its effect on vehicles and objects in space Design an vehicle for the international space station |
| Session 2 21 st July 2019 | <p>Students will be given an open challenge to design and make a series of mechanical devices in which to move a range of materials from A to B, this will be linked to a context.</p> <p>They will be given training on how to create a range of mechanisms from a range of materials and they will then work in small teams to make a range of devices as a solution to the given problem.</p> <p>They will be given support and guidance to explore and experiment with their own innovative ideas and solutions.</p> | <ul style="list-style-type: none"> Explore the world of Mechanical Engineering Design and build a range of mechanical devices from a selection of materials Explore various methods of movement and how we can build mechanical devices to create movement and carry heavy loads Explore the use of pulleys, gears and lever |
| Session 3 22 nd July 2019 | <p>Students will be given the challenge to improve efficiency of their designs from session two by introducing electronics and control technology.</p> <p>Integrating electronics into their models they will develop an understanding for electrical engineering and look at how to integrate a programmable board to control movement.</p> <p>They will also explore the use of components and introduce students to the use of Computer Aided Design and Computer Aided Manufacture.</p> | <ul style="list-style-type: none"> Explore the world of Electrical Engineering Modify their mechanisms from session two to consider how they could be automated & controlled Integrate electronic circuits into their models Examine how to use a programmable board to control movement Introduction to the use of Computer Aided Design and Computer Aided Manufacture for the design of engineered components |

Week Three: 23rd - 30th July 2019 Architecture, Maths, Design and Disaster Relief

Session length: 2.5 hours

Workshop leader: Dr Martin Carette, *Doctor Martin*

Dr Martin is a former research scientist with a passion for enthusing and inspiring young people about Science, Technology, Engineering and Maths (STEM).

He graduated in 1984 with first class honours in biochemistry/physiology. Subsequently, he gained a doctorate from Manchester University in 1992 for his research to help better understand how the roof of the mouth develops in mammals.

Dr Martin has been delivering fun, interactive and educational STEM activities into schools on a self-employed basis since January 2011.

Find out more at doctormartin.co.uk



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| Session 1 26 th July 2019 | <p>Giant Tetrahedron A highly motivational activity that combines construction, practical maths and problem solving skills. Students work independently, following step-by-step instructions, to construct individual tetrahedron structures using 6 (60cm) wooden dowels and 4 elastic bands.</p> <p>Working collaboratively, students will progressively assemble a total of 64 small tetrahedrons to create increasingly large tetrahedron structures culminating in the substantial and inspiring 4m tall Giant Tetrahedron. The activity will incorporate a short maths quiz including questions that relate to the structures made and a mini-team challenge.</p> | <ul style="list-style-type: none"> • Develops students' scientific and technological competence by involvement in the scientific or technological process and use of practical construction skills • Raises students' standards of achievement through improving their knowledge and understanding of STEM - understanding of structures |
| Session 2 28 th July 2019 | <p>Tall Towers Students compete in small teams to construct the tallest free-standing towers using an equal pre-allocated quantity of two different materials (small wooden dowels with elastic bands and K'Nex) within a fixed time. The winning team will be the one that achieves the greatest combined height of their two towers.</p> | <ul style="list-style-type: none"> • Develops the key skills of Numeracy and Communication • Develops the wider key skill of working together • Engenders a positive attitude towards Science and Technology in young people • Promotes student motivation from a sense of achievement |
| Session 3 29 th July 2019 | <p>Disaster Relief Challenge This is a competitive team challenge set in a real world scenario, following a volcanic eruption on the Caribbean island of Martinique, students perform the role of a disaster relief team to deliver food and medical supplies to the affected inhabitants.</p> <p>Following an introductory presentation students use a fixed allocation of resources to construct the longest bridge possible with wooden dowels and elastic bands and a K'Nex vehicle to transport as much aid (tins) as possible across the bridge. Results are revealed via an interactive Excel spreadsheet.</p> | <ul style="list-style-type: none"> • Application of practical design and construction skills within a real world context • Application of science and engineering principles to the solution of practical tasks • Develops team working, communication and problem solving skills • Engenders a positive attitude towards Science and Technology in young people • Promotes student motivation from a sense of achievement • Have fun participating |