Mathematical Concepts and Skills (MCS)

The following learning outcomes underpin the contextual learning outlined in the modules and form the basis for all planning for teaching and learning in the LCA mathematical applications classroom.

Underpinning Learning Outcomes

Students should be able to:

- **MCS.1. reason mathematically about problems so that they can:**

a. make sense of a given problem and represent it using mathematics

b. apply their knowledge and skills to solve a problem, including decomposing it into manageable parts and/or simplifying it using appropriate assumptions

c. interpret and justify their solution in terms of the original problem and communicate their findings mathematically.

- **MCS.2. reason mathematically about problems so that they can:**

a. perform calculations on positive and negative numbers involving addition, subtraction,multiplication, division, square roots (positive numbers only), and positive whole number

b. use the order of arithmetic operations, including the use of brackets

c. present answers to the degree of accuracy required, for example to the nearest whole number, to the nearest thousand, to two decimal places

d. use appropriate units and convert between them, including, but not exclusively, mm, cm, m, km, seconds, minutes, hours, days, €k (i.e. thousands), €million, degrees, etc.

e. flexibly convert between fractions, decimals, and percentages

f. use and understand ratio and proportion.

- MCS.3. investigate 2D and 3D shapes so that they can:

a. draw and interpret scaled diagrams, using appropriate geometric tools (ruler, straight edge, set square, protractor, compass)

b. draw and interpret nets, including those of rectangular solids and cylinders

c. find the perimeter and area of 2D shapes made from combinations of discs, triangles, and rectangles

d. find the volume and surface area of 3D shapes, including those made from combinations of rectangular solids and cylinders

e. recognise and use the important facts regarding angles at a point, on a straight line, and in squares, rectangles, parallelograms, and triangles

f. apply the theorem of Pythagoras to solve simple problems.

- MCS.4. explore certain types of relationships and expressions so that they can:

a. evaluate expressions given the value of variables

b. represent linear relationships in tables, graphs, and generalised expressions (expressed in words)

c. select and use suitable strategies (including graphic, numeric, trial and improvement, and working backwards) for finding solutions to problems involving linear relationships.

- MCS.5. carry out a statistical investigation so that they can:

a. generate a statistical question

b. plan and implement a method to generate and/or source unbiased, representative data

c. select, draw, and interpret appropriate graphical displays of data, including bar charts, pie charts, trend graphs, and histograms (equal intervals)

d. select, calculate, and interpret appropriate summary statistics to describe aspects of univariate data, including measures of central tendency (mean, median, and mode) and of spread (range)

e. evaluate the effectiveness of different graphical displays in representing data

f. discuss misconceptions and misuses of statistics.