

# COMPARISON OF MATHS IN ENGINEERING T LEVELS, ACCESS TO HE, AND A LEVELS

This is a curricular level mapping table, created by colleagues at Leicester University. It presents the gaps in terms of content area coverage between T Levels, Access to HE courses and A Levels. Leicester College is currently in the process of designing a 'bridging course' that T level students could take, so that their T level students would be more directly equivalent to their A level counterparts when it comes to Mathematics.

Subject	T levels Maths unit/topics	Access to HE (Additional Maths content)	A level Maths topics
Number	<ul style="list-style-type: none"> <li>Perform arithmetic operations on integers, decimal numbers and numbers in standard form using rules of arithmetical preference: brackets indices division multiplication adding and subtraction (BIDMAS).</li> <li>Work to a specified number of decimal places or significant figures.</li> <li>Carry out calculations using fractions, percentages, ratios and scale.</li> </ul>	<ul style="list-style-type: none"> <li>Not on syllabus, content assumed</li> </ul>	<ul style="list-style-type: none"> <li>I: Numerical methods</li> </ul>
Algebra	<ul style="list-style-type: none"> <li>Simplify, factorise and manipulate equations to change the subject</li> <li>Solve simultaneous and quadratic equations.</li> <li>Apply rules of indices.</li> <li>Interpret and express changes in an engineering system from a graph (straight line, trigonometrical and exponential relationships).</li> <li>Determine the equation of a straight line from a graph (<math>y=mx+c</math>).</li> </ul>	<ul style="list-style-type: none"> <li>Polynomial division. Factor theorem.</li> <li>Curve sketching.</li> <li>Algebraic fractions.</li> <li>Simultaneous equations with quadratics.</li> </ul>	<ul style="list-style-type: none"> <li>B: Algebra and functions</li> <li>C: Coordinate geometry in the (x,y) plane</li> </ul>
Logs and Exponentials	<ul style="list-style-type: none"> <li>Apply laws of logarithms (base 10 and natural) – problem-solving including problems involving growth and decay.</li> </ul>	<ul style="list-style-type: none"> <li>Exponential graphs. Log graphs and use of log graph paper.</li> </ul>	<ul style="list-style-type: none"> <li>F: Exponentials and logarithms</li> </ul>
Sequences and series	<ul style="list-style-type: none"> <li>Determine numbers in a sequence using arithmetic and geometric progression, power series.</li> </ul>	<ul style="list-style-type: none"> <li>Binomial expansion up to and including negative powers. Pascal's Triangle. Limit of a sequence. Small value expansion.</li> </ul>	<ul style="list-style-type: none"> <li>D: Sequences and series</li> </ul>
Calculus	<ul style="list-style-type: none"> <li>Determine standard differentials and integrals (basic arithmetic operations, powers/indices, trigonometric functions).</li> <li>Determine standard differentials and integrals (basic arithmetic operations, powers/indices, trigonometric functions).</li> <li>Calculate maximum and minimum values in engineering contexts using differentiation.</li> </ul>	<ul style="list-style-type: none"> <li>Differentiation: product, quotient, chain rule, implicit differentiation.</li> <li>Integration: areas under a curve and between curves. Mean and RMS. Volumes of solids of revolution.</li> <li>Integration by substitution, integration by parts.</li> <li>Simple differential equations.</li> </ul>	<ul style="list-style-type: none"> <li>G: Differentiation</li> <li>H: Integration</li> </ul>
Trigonometry	<ul style="list-style-type: none"> <li>Use of Pythagoras' theorem and triangle measurement.</li> <li>Circular measure including conversion between radians and degrees.</li> <li>Application of trigonometric functions (sin, cos, tan), their common values, rules and graphical representation.</li> <li>Determining dimensions of a triangle using sine and cosine rules.</li> <li>Common trigonometric identities (sec, csc, cot).</li> </ul>	<ul style="list-style-type: none"> <li>Analysis of sine waves. Sketching trig waves. Trigonometric identities. Trigonometric equations.</li> </ul>	<ul style="list-style-type: none"> <li>E: Trigonometry</li> </ul>
Statistics	<ul style="list-style-type: none"> <li>Calculation of range, cumulative frequency, averages (mean, median and mode) and standard deviation for statistical data in an engineering context.</li> <li>Determination of probabilities in practical engineering situations.</li> </ul>	<ul style="list-style-type: none"> <li>Statistical diagrams, including histograms, box and whisker, cumulative frequency curves.</li> <li>Scatter diagrams, regression, and correlation.</li> <li>Normal distribution.</li> <li>Binomial distribution</li> </ul>	<ul style="list-style-type: none"> <li>K: Statistical sampling</li> <li>L: Data presentation and interpretation</li> <li>M: Probability</li> <li>N: Statistical distributions</li> <li>O: Statistical hypothesis testing</li> </ul>
Functions		<ul style="list-style-type: none"> <li>Equation of a circle, including tangent and normal.</li> <li>Inverse functions.</li> <li>Composite functions.</li> <li>Transformation of graphs.</li> <li>Parametric equations.</li> <li>Modular functions.</li> </ul>	<ul style="list-style-type: none"> <li>F: Exponentials and logarithms</li> </ul>
Vectors and Matrices	<ul style="list-style-type: none"> <li>Addition, subtraction and multiplication of matrices in engineering context.</li> <li>Use of vectors including addition, dot and cross product</li> </ul>	<ul style="list-style-type: none"> <li>Binomial expansion up to and including negative powers. Pascal's Triangle. Limit of a sequence. Small value expansion.</li> </ul>	<ul style="list-style-type: none"> <li>J: Vectors</li> </ul>