



Guidance on Mathematics by subject for Core Principles Curriculum 2019

It is expected that students joining the profession should be comfortable with algebraic manipulation. Students should have the following particular mathematical skills:

| | CS1 | CS2 | CM1 | CM2 | CB1 | CB2 |
|---|-----|-----|-----|-----|-----|-----|
| Pre-calculus | | | | | | |
| permutations & combinations; expansion of $(a+x)^n$ | Y | Y | Y | Y | | |
| using the sigma notation to express the sum of a series | Y | Y | Y | Y | | Y |
| summing the terms of an arithmetic progression and a geometric progression | Y | Y | Y | Y | | Y |
| interpolation and local approximation | Y | Y | Y | Y | Y | |
| Elementary calculus | | | | | | |
| the idea of a limit | Y | Y | Y | Y | | |
| differentiation of polynomial, exponential and logarithmic functions | Y | Y | Y | Y | | Y |
| product, quotient and "function of a function" rules for differentiation | Y | Y | Y | Y | | Y |
| definite and indefinite integration of polynomial and exponential functions | Y | Y | Y | Y | | Y |
| area under a curve | Y | Y | Y | Y | | |
| methods of numerical integration | Y | Y | Y | Y | | |
| integration by substitution and by parts | Y | Y | Y | Y | | |
| More advanced calculus | | | | | | |
| higher order derivatives | Y | Y | Y | Y | | Y |
| finding turning points of simple functions with polynomial and exponential terms; curve sketching | Y | Y | Y | Y | | Y |
| maximisation under constraints: method of Lagrange multipliers | Y | Y | | Y | | |
| Taylor's theorem; power series expansion for $\exp(x)$ | Y | Y | Y | Y | | |
| differentiation of definite integrals: Fundamental Theorem of the Calculus | Y | Y | Y | Y | | |
| solving first order differential equations: exact, separable (including logistic), linear | Y | Y | Y | Y | | |

| Calculus of two variables | CS1 | CS2 | CM1 | CM2 | CB1 | CB2 |
|---|------------|------------|------------|------------|------------|------------|
| partial derivatives of functions of two variables | Y | Y | Y | Y | | Y |
| maxima and minima of functions of two variables | Y | Y | | Y | | |
| double integrals and changing the order of double integrals | Y | Y | Y | Y | | |

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|--|---|---|---|---|---|---|
| Algebra | | | | | | |
| matrix addition and multiplication | Y | Y | | Y | | |
| determinant and inverse of a square matrix | Y | Y | | | | |
| using matrices and vectors to represent linear equations | Y | Y | | Y | | |
| solving simultaneous linear equations | Y | Y | Y | Y | | Y |
| complex numbers | | Y | | | | |
| linear difference equations with constant coefficients | | Y | | Y | | |
| Probability | | | | | | |
| sample spaces, events | Y | Y | Y | Y | | |
| the probability of an event | Y | Y | Y | Y | Y | Y |
| basic rules of probability | Y | Y | Y | Y | | Y |
| conditional probability | Y | Y | Y | Y | | |
| independent events | Y | Y | Y | Y | | |
| Bayes Theorem | Y | Y | Y | Y | | |

Students should also be familiar with the calculator they are to use in the exam and should be familiar with all its functions. Exam Regulation 7 covers calculators.