

# Further Mathematics

## Entry Requirements:

Grade 8 or above in GCSE Mathematics (Additional Mathematics is an advantage but not compulsory)

## Aims of the course:

Further mathematics is designed for students with an enthusiasm for mathematics, many of whom will go on to study degrees in mathematics, engineering, the sciences and economics. The qualification is both deeper and broader than A level mathematics. As well as building on algebra and calculus introduced in A level mathematics, the A level further mathematics core content introduces complex numbers and matrices, fundamental mathematical ideas with wide applications in mathematics, engineering, physical sciences and computing.

The non-core content includes different options that can enable students to specialise in areas of mathematics that are particularly relevant to their interests and future aspirations. A level further mathematics prepares students for further study and employment in highly mathematical disciplines that require knowledge and understanding of sophisticated mathematical ideas and techniques.

## Course Content:

The first year of the course will cover a full A level in Mathematics. The second year will cover a separate A level in Further Mathematics. The content of the first year is all compulsory, and consists of Pure mathematics, and Applied Mathematics (Statistics and Mechanics). The content of the second year includes some optional choices which will be made closer to the time.

- Understand mathematics and mathematical processes in ways that promote confidence, foster enjoyment and provide a strong foundation for progress to further study
- Extend their range of mathematical skills and techniques
- Understand coherence and progression in mathematics and how different areas of mathematics are connected
- Apply mathematics in other fields of study and be aware of the relevance of mathematics to the world of work and to situations in society in general
- Use their mathematical knowledge to make logical and reasoned decisions in solving problems both within pure mathematics and in a variety of contexts, and communicate the mathematical rationale for these decisions clearly
- Reason logically and recognise incorrect reasoning
- Generalise mathematically
- Construct mathematical proofs
- Use their mathematical skills and techniques to solve challenging problems which require them to decide on the solution strategy
- Recognise when mathematics can be used to analyse and solve a problem in context
- Represent situations mathematically and understand the relationship between problems in context and mathematical models that may be applied to solve them

- Draw diagrams and sketch graphs to help explore mathematical situations and interpret solutions
- Make deductions and inferences and draw conclusions by using mathematical reasoning
- Read and comprehend mathematical arguments, including justifications of methods and formulae, and communicate their understanding
- Use technology such as calculators and computers effectively, and recognize when such use may be inappropriate
- Take increasing responsibility for their own learning and the evaluation of their own mathematical development

### **Teaching and Learning Methods:**

A variety of methods are employed, including group and pair work, independent study and note-taking. Students are expected to do a significant amount of independent consolidation of topics taught, although there will always be extra support available for those who need it.

### **Skills and Commitment:**

The ability to work independently is essential as students must consolidate topics learnt. As students will be spending a significant amount of time working on the subject it is important they enjoy mathematics. Students must be prepared to attempt unfamiliar problems and able to quickly learn new concepts.

### **Cost:**

Students will be required to purchase two textbooks in September (for AS level maths), another two in December (for A level maths), and a calculator. The textbooks are available to purchase from the school, the cost will be £20 for two books, and when the books are returned in good condition, we will give the student £10 back per set of two books. The calculators (Casio fx991-EX Classwiz) will need to be purchased separately and are quite expensive, but we do have some in school that we can lend to students until they have the funds to purchase their own.

### **Progression:**

Mathematics and Further Mathematics are highly valued qualifications by all universities. Further mathematics may be of particular use to anyone considering studying Mathematics, Statistics, Engineering, Computer Science, Physics and other numerate degrees at one of the UK's leading universities.

### **School Contact:**

For further information please contact Mr S Evans (Head of Mathematics) or Miss J Lear (Key Stage 5 Maths Coordinator)