Chemistry degrees

All Chemistry degree courses require students to have good mathematical skills. For most courses you are not required to have studied AS and A level Mathematics content prior to starting your degree as you will be taught these topics during your first year. However studying some topics post-GCSE will provide useful preparation for your Chemistry degree. The mathematical techniques required for Chemistry ranges from basic manipulation of fractions through to calculus, including vectors and differential equations.

- Whilst the mathematical content varies from course to course, the topics below appear in most:
- Fractions including algebraic and partial fractions
- Basic algebra such as solving simultaneous equations, understanding power laws and rearranging formulae
- Use of scientific notation and standard form; the ability to manipulate very large and small numbers
- Equations of straight line graphs
- Modelling techniques
- Exponential, Logarithmic and Hyperbolic Functions
- Properties of functions and limits of sequences
- Differentiation and Integration
- Forming and Solving Differential Equations
- Vectors

Overview of Mathematics covered in Chemistry Degrees

The table below shows typical areas of mathematics that might be studied in an undergraduate Chemistry degree course. The topics in red font have an associated resource in this Integral folder and show examples of how mathematics might be used in a Chemistry degree.

Arithmetic	Calculus	Functions
Fractions and Indices	**Derivatives**	Equation of a straight line
Decimal Places and Significant Figures	Equation of a tangent	Sequences
Proportion	**Stationary Points**	Inverse Functions
Changing Units	Partial Differentiation	**Trigonometry**
Percentages	Integration	Exponential Functions

Data Analysis	Algebra	
Logarithms	Solving Equations	
Errors and Uncertainties	Vectors	
Statistical Tests	**Matrices**	
	Complex Numbers	

Example Careers

Read how in the **Alternative Energy Industry**, Mathematics is helping to develop a method which harnesses the power of the Sun to unlock the energy of the hydrogen that lies hidden in water.
An **Environmental Chemist** needs strong analytical skills.
The laws of conditional probability are key part of the work of a **Forensic Scientist.**
Other possible career paths include **Teaching**, **Toxicology** and **Tomato Growing!**

Useful links

The following websites and books have useful information about the mathematical topics you will study during your Chemistry degree together with other resources to support your preparation for Chemistry at university.

ChemNet has a range of resources to support students' research into career paths - designed by The Royal Society of Chemistry.
Mathematical Issues for Chemists (NRICH) - a discussion of the need for the mathematics that Chemists learn to be put into context.
Royal Society of Chemistry - the RSC's own website brimming with resources.
Maths Careers - links to lots of careers that use Mathematics!
The Science and Math Connection - more on the application of Trigonometry to Chemical Bonding.
CPD for teachers - a course for teachers produced by the RSC.

University Texts

The following commonly used textbooks give potential Chemistry undergraduate students an idea of the mathematics covered in degree courses.

- Essential Mathematics and Statistics for Science, 2nd Edition. Dr. Graham Currell, Dr. Antony Dowman. ISBN: 978-0-470-69449-7
- Chemistry³: Introducing inorganic, organic and physical chemistry. Andrew Burrows, John Holman Andrew Parsons, Gwen Pilling, Gareth Price. OUP. ISBN: 978-0-199-69185-2
- Maths for Chemistry: A chemist's toolkit of calculations. 2nd Edition. Paul Monk and Lindsey J. Munro. ISBN 978-0-19-954129-4
- Beginning Mathematics for Chemistry. Stephen K. Scott, OUP. ISBN 978-0-19-855930-6