Integral for Higher Education

MEI is excited to launch Integral HE - a new collection of online maths resources to support undergraduates of Mathematics and other maths-rich degree courses.

Integral HE is designed for undergraduates who want to review and recap topics studied at A level and are learning new topics that build on them. It helps ensure students build a solid mathematical foundation for their degree course. It will be particularly valuable for students starting courses in 2020 who were unable to complete Year 13 due to Covid-19, and for those transitioning from foundation courses.

Over 800 schools and colleges subscribe to the A level Mathematics and Further Mathematics version of Integral. In developing this new version, we've drawn on our extensive experience of creating this platform. The result is a comprehensive set of high-quality resources, designed to engage undergraduates in self-learning, build confidence, and develop deep mathematical understanding.

Content

Integral HE covers the whole of the UK A level Mathematics specification and the compulsory pure mathematics content of the A level Further Mathematics specifications. The material is presented in topics, which are further divided into sections. Each section contains a standard set of resources including notes and examples, two on-screen tests, a written exercise, and other content including videos and interactive resources. Fully worked solutions are provided to all the questions that appear in the resources.

There are four main components:

Integral HE: Pure
The material covered in this component is based on the pure maths content of AS/A level Mathematics.

Integral HE: Mechanics
The material covered in this component is based on the mechanics content of AS/A level Mathematics.

Integral HE: Statistics
The material covered in this component is based on the statistics content of AS/A level Mathematics.

Integral HE: Further Pure
The material covered in this component is based on the pure mathematics content of AS/A level Further Mathematics.

A full list of the topics and sections for each of these components is available at the end of this document.

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Access

Access to Integral HE is by annual subscription, which runs from as early as 1 July through to 30 September the following year. This means you can provide new students with access as soon as their place has been confirmed.

The subscription fee includes access to the whole content; however, you can choose to restrict student access to the components that are relevant to their studies. This can set using the User Management system. Full documentation for the User Management system is provided and support is available via e-mail and phone during office hours.

Any number of staff accounts can be set up as part of the subscription. Staff can be associated with students and content using a system of 'teaching groups'. They can then view their students' performance in the on-screen tests.

Pricing for an annual subscription for a HE department is shown below.

No of student accounts	Annual fee
50	£400
100	£600
200	£800
500	£1000

With a cost as low as £2 per student, Integral HE represents excellent value for money. It can save time for support staff and course lecturers, helping you to deliver an excellent learning experience more efficiently.

Take a look for yourself

If you'd like to see the resources yourself, please contact Dr Richard Lissaman at richard.lissaman@mei.org.uk. Richard can arrange a free online tour and can set you up with a free trial account so that you can review them in detail.

We have received excellent feedback from those who have reviewed the material.

> *"I have reviewed all these materials – from my nearly 40 years' teaching and supporting first year mathematical sciences students, and the past 7 years being heavily involved with the design, development, accreditation, implementation, and monitoring of the 2017 reformed A levels with DfE, ALCAB, Ofqual, RS ACME and the learned societies, I can highly recommend these resources to all relevant colleagues in your institutions."*

> **Paul Glaister, Professor of Mathematics and Mathematics Education, Department of Mathematics and Statistics, University of Reading**

Topics and sections

Integral HE: Pure

Topic	Sections
Surds and Indices	Surds
	Indices
Quadratic functions	Quadratic graphs and equations
	The quadratic formula
Simultaneous equations and inequalities	Simultaneous equations
	Inequalities
Coordinate geometry	Points and lines
	Circles
Trigonometry	Trig functions and identities
	Trig equations
	The sine and cosine rules
Polynomials	Polynomial functions and graphs
	Dividing and factorising polynomials
Graphs and transformations	Sketching graphs
	Transformations of graphs
The binomial expansion	Positive integer powers
	The general binomial expansion
Differentiation I	Positive integer powers
	Maximum and minimum points
	Negative and rational powers
	The second derivative
Integration I	Introduction
	Finding the area under a curve
	Further integration
Vectors	Vectors in 2D
	Vectors in 3D
Exponentials and logarithms	Exponential functions and logarithms
	Natural logarithms and exponentials
	Modelling curves
Trigonometry II	Working with radians
	Circular measure and small angle approximations
Sequences	Sequences
	Arithmetic sequences
	Geometry sequences
Functions	Functions, graphs and transformations
	Composite and inverse functions
	Modulus function
Differentiation II	The shape of curves
	Product rule and quotient rule

	Chain rule
Trigonometry III	The reciprocal and inverse trig functions
	Compound angle formulae and alternate forms
Rational functions and partial fractions	Rational functions
	Partial fractions
Differentiation III	Differentiation exponentials and logarithms
	Differentiating trigonometric functions
	Implicit differentiation
Integration II	Finding areas
	Integration by substitution
	Integration with logs
	Integration by parts
Parametric equations	Parametric curves
	Parametric differentiation
Differential equations	Forming and solving
Numerical methods	Solving equations
	Approximating integrals

Integral HE: Mechanics

Topic	Sections
Kinematics	Displacement and distance
	Speed and velocity
	The constant acceleration formulae
	Motion in two dimensions
Forces and Newton's laws	Force diagrams and equilibrium
	Apply Newton's second law in one dimension
	Connected objects
	Resolving forces
	Newton's second law in two dimensions
Variable acceleration	Using calculus
Moments of forces	Rigid bodies
Projectiles	Introduction
	General equations of projectiles
Friction	Working with friction

Integral HE: Statistics

Topic	Sections
Collecting and interpreting data	Collecting data
	Single variable data
	Bivariate data
Probability	Working with probability
	Probability distributions
	Conditional probability

The binomial distribution	Introduction to the binomial distribution
Statistical distributions	Introduction to the normal distribution
Hypothesis testing	Introduction to hypothesis testing
	Hypothesis testing with the binomial distribution
	Using the normal distribution
	Correlation and association

Integral HE: Further Pure

Topic	Sections
Matrices	Introduction to matrices
	Matrices and transformations
	Invariance
	Determinants and inverses of 2x2 matrices
	Matrices and simultaneous equations
	Determinants and inverses of 3x3 matrices
Complex Numbers I	Introduction to complex numbers
	The Argand diagram
	Modulus and argument
	Loci in the complex plane
Roots of polynomials	Roots and coefficients
	Complex roots of polynomials
Sequences and series	Summing series
	Introduction to proof by induction
	Further series and induction
Vectors I	The scalar product
	The equation of a plane
	The equation of a line
	Lines and planes
Calculus	Improper integrals
	Inverse trigonometric functions
	Further integration
Polar coordinates	Polar coordinates and curves
	The area of a sector
Maclaurin series	Finding and using Maclaurin series
Hyperbolic functions	Introducing hyperbolic functions
	Inverse hyperbolic functions
Applications of integration	Volumes of revolution
	Mean values and general integration
First order differential equations	Introduction to first order differential equations
	Integrating factors

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Complex Numbers II	De Moivre's theorem
	Exponential notation and applications of De Moivre's theorem
Vectors II	The vector product
	Finding distances
Second order differential equations	Homogeneous differential equations
	Non-homogeneous differential equations
	Systems of differential equations