

Pre Higher Education Maths



**For those looking to attend a
degree
(or equivalent)
in Astronomy and/or
Astrophysics**

$$E=mc^2$$



$$\frac{P_1^2}{P_2^2} = \frac{R_1^3}{R_2^3}$$

Tycho's Law's of
Planetary Motion

With rapid advances in Astronomy and Space Science there has never been a greater time to get more involved in Astronomy. If you're one of these people who wants something a little more challenging and academic than popular astronomy but maths is a problem, then this course is for you.

Mathematics is the key to open the doors to so many subjects, including Astronomy and Astrophysics. Yet so many struggle to obtain the skills they need to get there. Whether you are a mature student who fell foul to the lack of internet resources and text we have today or an existing student looking to get that edge over your contemporaries, this course is for you. To help fill the gap needed between GCSE to A-Level, equipping you with the skills needed to help you survive your journey through higher education into (hopefully) the realms of your chosen career.

We have long been aware that people have been looking for affordable, quality education to help them achieve their goals. This is our attempt to provide that. We hope you enjoy.

All the best with your studies

Alastair Leith FRAS B.Sc(hons)

Who is this course designed for?

This course is for anyone wishing gain the necessary mathematical skills and knowledge required to embark on a program of study in higher education in Astronomy or Astrophysics. The course is designed to complement any existing maths course a student may be completing or as a standalone course. The course is also ideal for ANYONE who might not have completed A-Levels maths at college, but may be looking to further their career.

Entry Requirements

It is recommended that you have higher-level GCSE Maths skills in order to complete the course. No formal proof of qualification will be requested before enrolling in this course; however, it is recommended that you be comfortable with the level of material. If the material seems too advanced, take a look at our GCSE – A Level bridging course!

How does it work?

The course is conducted entirely online by distance learning via the OASA's Virtual Learning Environment. All course materials are accessible online.

Is there a formal qualification at the end?

No, but we will offer a certificate of completion. If pre-arranged a letter can be written to whichever college you have applied to explain the course and its contents.

Is the course assessed?

Yes, there are end-of-module quizzes to complete. You will receive a mark at the end of the course.

Is the course led by an instructor?

While there is the opportunity to ask an instructor questions, the course is completed entirely at your own pace.

What is the time limit?

The course is expected to take 6 months, although existing student accounts will not be automatically unenrolled at that date. Once the account passes 90 days of inactivity (exceeding 6 months) the account will be deactivated. Access beyond this time limit will require an extension fee.

What is the cost?

The cost of the course is £175 payable in advance before beginning the course. No refund is permitted. This may seem a lot, but compared to other institutions (who charge in some cases up to three times this amount!) it is very inexpensive.

Is financing available?

We can arrange a pre-course installment plan, where for £60 per month you can save for the course. This plan costs slightly more in order to cover additional administration costs.



“Your key to helping you unlock the true wonders of the Universe
Mathematics no longer needs to be a barrier”

Module One Algebra and Algebraic Manipulation

One step equations

Solving linear equations using addition and subtraction

Solving linear equations using multiplication and division

Two step equations

Solving linear equations first using addition and subtraction, then using multiplication and division

Multi step equations

Solving linear equations using the distributive property, addition and subtraction, multiplication and division

Solving formulas for variables

Solving a given formula for a specified variable

Module Two Trigonometry and Trigonometric functions

Basic definitions

Covers the definitions of the six basic trigonometric ratios and how to compute them

State the domain and range of the six basic trigonometric functions

Solving right triangles

Find all side lengths and angle measures of a right triangle using given information

Inverse trigonometric functions

Define inverse trigonometric functions

State their domain and range

Compute exact values (when they exist)

Graphs of trigonometric functions & inverse trigonometric functions

Graph the six trigonometric functions and inverse trigonometric functions

Trigonometric Identities

Derivation of the ratio identities for tangent and cotangent, Pythagorean identities, double-angle and half-angle identities

Prove that an equation is an identity by transforming one side of the equation into the other

Solving trigonometric equations

Using standard algebraic techniques (collecting like terms, factoring)

Solving trigonometric equations of quadratic type

Solving equations involving multiple angles

Solving equations using inverse trigonometric functions

Module Three Scalars and Vectors

Definition of scalar and vector quantities

Vector operations

Definition of vector addition, vector subtraction, dot product and cross product

Definition of orthogonal projection

Using the concept of orthogonal projection to resolve a vector into orthogonal components

Module Five Introductions to Differentiation

Finding derivatives using the Power Rule, Chain Rule, Quotient Rule, and Addition Rule

Module Six

Introduction to Integration (non-definite & definite, integrand

Computing an anti-derivative of a function (finding the family of functions that has a particular derivative)

Finding an indefinite integral using the concept of anti-differentiation

Evaluating definite integrals

Does it sound like rocket science?

It needn't!

(there will be a more basic course available VERY Soon for those completely traumatised ;)



Meet the tutor

Dr. Billye Cheek



Billye first became seriously interested in astronomy at the age of 12 when Carl Sagan's Cosmos series made its debut on public television. She became an avid stargazer, studying the constellations and reading Ancient Greek mythology.

Billye took her involvement in astronomy to a higher level by joining the Texas Astronomical Society of Dallas in November 2008, where she served on the Board of Directors for three years and as Secretary for two years. Although she is no longer directly involved in club leadership, Billye continues to serve the club's public outreach efforts by volunteering for star parties (with her 6" Dobsonian telescope) and performing astronomy talks. In 2010 one of her lunar images won the Beginner Wide-Angle category in the International Observe the Moon Night photo contest, and had a narrow-angle lunar image featured in their 2011 calendar. In 2013 she also joined the Dallas Amateur Radio Club, and is one of the net control operators (hosts) for Skynet, a weekly astronomy program hosted on the DARC club repeater on Saturday nights.

Intertwined with Billye's passion for astronomy is her expertise in the field of mathematics. She holds Bachelor of Science, Master of Science, and Doctor of Philosophy degrees in Applied Mathematics, all from the University of Texas at Dallas in Richardson, Texas, USA. Her dissertation was in the area of knot theory ("Kauffman Bracket Skein Module for the Disk Sum of $A \times S^1$ and $A \times I$ "). In addition to working on her doctoral dissertation, she also collaborated with UTD math and engineering professors on a paper regarding optical lattice filters (B.E. Cheek, M.K. Dabkowski, A. El Nagdi, L.R. Hunt, T.J. LaFave Jr, Ke Liu, D.L. MacFarlane, and V. Ramakrishna. "Analysis of a Polynomial System Arising in the Design of an Optical Lattice Filter Useful in Channelization", *Acta Applicandae Mathematicae*, Volume 118 Issue 1, April 2012, pp. 107-123).

Billye has over ten years' experience as an educator at the community college and university level. She has worked as a math tutor, a university mathematics teaching assistant, and currently holds a position as a full-time community college math professor.



Enrollment Information

Course costs just £175

To include

- Tutor support
 - Access to material
 - 24/7 access to the portal
 - Assessments
 - Meet new friends
-
- Certificate at the end (electronic)

for enrollment information please visit:

www.onlineastronomycourses.co.uk/maths

Finance available, email OASAcademy@gmail.com

Unlock your potential today

