HARROW SCHOOL ONLINE

ELECTIVE PROGRAMME 2021/22

POWERED BY Pearson

HARROW SCHOOL ONLINE

INTRODUCTION TO OUR ELECTIVE PROGRAMME

The elective programme at Harrow School Online is designed to give our pupils the opportunity to explore areas of scholarship above and beyond the syllabus of their A Level courses. It affords our teachers the freedom to introduce subjects which are interesting, relevant or useful, and provides our pupils choice over what they learn. The programme promotes independent learning, extension work, lateral thinking and problem-solving skills.

Many of our courses do not culminate in examinations. Pupils taking these courses are encouraged to discover the joy of learning for pleasure and for the sake of expanding their knowledge of the world. Others prepare pupils for an examination. Some of these examinations are required for university applications, including those required for studying medicine, engineering, mathematics and natural sciences at leading UK universities. Others prepare pupils for professional examinations, such as Financial Advisor examinations from the Chartered Institute of Securities and Investments. We also offer pupils the opportunity to take an Extended Project Qualification; an internationally recognised qualification which many universities in the UK credit alongside A levels. For pupils intending to apply to a leading university in the US, we offer test preparation courses for the ACT and SAT from an external provider, for an additional fee. All other electives are inclusive for our full-time pupils.

All full-time pupils are expected to take at least one elective per term. Electives are taught in one forty-five minute live lesson per week, with one associated homework per week. Pupils may take as many elective courses as they wish, their timetable permitting. Most courses are structured to last a single term, but some run across multiple terms. Pupils submit their elective choices at the beginning of the Autumn term. Electives that do not culminate in an examination will run dependent on minimum pupil numbers, but those that result in examination will always be offered if requested.

Heather Rhodes
Principal

NUMBER THEORY

When	Autumn Term, year 12 or year 13
Teacher	Mr Harry Williams & Mrs Laurie Phippard (Mathematics Department)
Course Length	10 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	Pupils taking this course are required to be taking Mathematics or Further Mathematics at AS or A level

COURSE OUTLINE

The Number Theory course will introduce you to modular arithmetic and how to solve modular equations, both linear and quadratic. It will cover several different algorithms and theorems and look at multiplicative functions, divisibility and coprime integers. It will tie in with the solving of equations that is covered in the Mathematics AS level, and will appeal to everyone who enjoys playing with numbers and problem solving.

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CYPHER CHALLENGE

When	Autumn Term, year 12
Teacher	Mr Harry Williams & Mrs Laurie Phippard (Mathematics Department)
Course Length	10 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	Pupils taking this course are required to be taking Mathematics or Further Mathematics at A level

COURSE OUTLINE

Become an ACE code-breaker and prepare to meet the National Cypher Challenge! This elective will prepare you to attempt the early rounds of the UK National Cypher Challenge - 10 weeks of challenge cyphers to decode (1 challenge per week). The elective runs in Autumn term to prepare you for this competition which is held towards the end of the term and into the Christmas holidays. Training sessions will introduce standard cyphers and technology that can help with code-breaking including using Excel. This is open to all students who are keen to attempt the challenge or interested in learning about code breaking.

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THE CHEMISTRY OF ART

When	Autumn Term, year 12 or year 13
Teacher	Mr Crispin Davis (Chemistry Teacher)
Course Length	10 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	None

COURSE OUTLINE

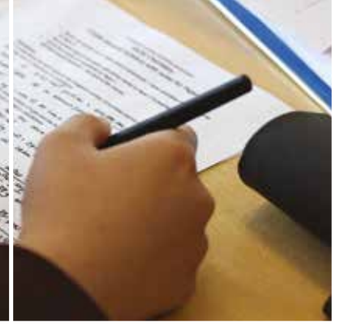
Explore how the artists created their masterpieces, from the 14th century to the modern day. What were the developments in the canvases and paints they used? How do chemistry and physics play a part in these developments and our experience of art? This elective will consider art from the perspective of science.

SPECIAL RELATIVITY

When	Autumn Term, year 12 or year 13
Teacher	Dr Lampros Andrinopoulos (Physics Teacher)
Course Length	10 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	Pupils taking this course are required to be taking Physics at AS or A level

COURSE OUTLINE

In this course you will learn about Einstein's exciting and ground-breaking Special Theory of Relativity. We will start by looking at frames of reference and Galilean transformations, then explore the idea that space and time are intertwined (space-time) and that the speed at which an object is moving affects time and length. We will discuss Lorentz transformations and derive formulas for time dilation and length contraction. Simultaneity of events and various "paradoxes" will be discussed in detail, such as the "twins paradox". You will then find out about the importance and applications of Special Relativity to particle physics. Finally, we will then look at relativistic momentum and mass-energy relations.



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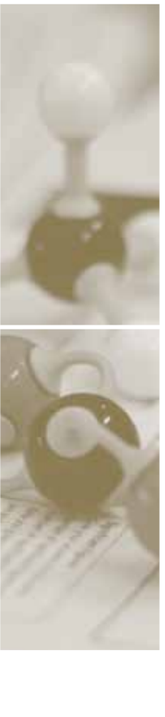

ADVANCED QUANTUM PHYSICS

When	Spring Term, year 12 or year 13
Teacher	Dr Lampros Andrinopoulos (Physics Teacher)
Course Length	9 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	Pupils taking this course are required to be taking Physics at AS or A level

COURSE OUTLINE

In this course you will explore some ideas that you would have already encountered in year 12 Physics and go beyond them. We will start by recapping wave particle duality and quantisation of energy. We will then look at explaining energy levels using a rectangular one-dimensional “potential well” and then discuss the quantum atom and the Bohr model and derive energy levels for the hydrogen atom using this model. You will learn about the concept of the wavefunction and the Copenhagen interpretation, Everett’s many-world theory and Feynman’s sum over histories theory. You will also learn about Schrodinger’s cat thought experiment and its use in explaining quantum phenomena. Finally, we will look at Heisenberg’s uncertainty principle and its importance.

THERMODYNAMICS

When	Autumn Term, year 13 only
Teacher	Dr Lampros Andrinopoulos (Physics Teacher)
Course Length	10 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	Pupils taking this course are required to be taking Physics at A level

COURSE OUTLINE

In this course, you will explore the topic of Thermodynamics beyond A-level. We will start by looking at the kinetic model, heat transfer and thermal equilibrium and then the laws of Thermodynamics. We will then discuss van der Waals gases, which is an improvement on ideal gases. We will learn about the concept of entropy and its importance. We will also look at the Maxwell-Boltzmann distribution and link it to concepts that you will encounter in your A-level course. Finally, we will look at heat engines, in particular Carnot engines and the limit to efficiency.

INTRODUCTION TO SPANISH

When	Autumn term, Spring term and end of Summer term, year 12 or 13
Teacher	Señor Tomas Gareta (Spanish Teacher)
Course Length	24 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	Open to pupils with beginner or basic level Spanish

COURSE OUTLINE

Spanish is one of the most widely spoken languages in the world, and is the first language of over half a billion people across more than 20 countries. Whether you want to backpack around Latin America, order with confidence from a Mexican restaurant or understand the lyrics to reggaeton, Spanish is your language. This introductory course will get you started with survival Spanish and fill you in on some of the culture and traditions of the Spanish-speaking world along the way.

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INTRODUCTION TO INVESTMENT (CISI LEVEL 3 AWARD)

When	Autumn term, Spring term and end of Summer term, year 12
Teacher	Mr Jonathan Shields (Economics Teacher)
Course Length	24 weeks, plus 40-50 hours of additional study time if taking the exam
Homework	Half an hour a week of knowledge checks via CISI Revision Express
Examination	Introduction to Investment, CISI level 3 award
Requirements	Pupils taking this course are required to be taking Mathematics, Further Mathematics or Economics at A level

COURSE OUTLINE

This elective will provide you with an introduction to the competency required by the financial services industry. Topics include the Economic Environment, Financial Markets, Bonds, Derivatives, Investment Funds, Life Insurance and Taxation. This elective can be chosen by a student who is interested in the basics of investment or the management of their own personal finances. There is the option at the end of the elective to sit a professional examination in investment that will give you an internationally recognised entry level qualification with the Chartered Institute for Securities and Investment (CISI). This is something unique amongst 16-18 year-old students.

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FINANCIAL ASSET MANAGEMENT (CISI LEVEL 3 AWARD)

When	Autumn term and start of spring term, year 13
Teacher	Mr Jonathan Shields (Economics Teacher)
Course Length	16 weeks, plus 40-50 hours of additional study time if taking the exam
Homework	Half an hour a week of knowledge checks via CISI Revision Express
Examination	Certificate in Asset Servicing, CISI Level 3 technical unit
Requirements	Pupils taking this course are required to have taken the Introduction to Investment Elective

COURSE OUTLINE

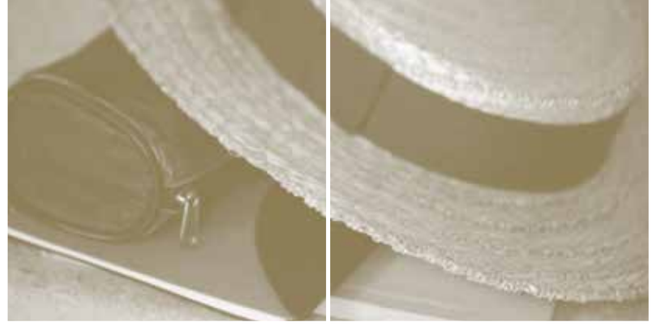
This elective focuses specifically on financial securities, building on the material learnt in the CISI Level 3 Introduction to Investment certificate. In this course you will learn, in greater detail, how assets such as equities, warrants and bonds are traded. This elective will provide you with a very high level of technical detail on the process, regulatory requirements and taxation treatment of purchasing financial securities on behalf of clients. There is the option of sitting a technical examination at the end of this elective that will part qualify you, at entry level, as a financial securities trader.

NUTRITION

When	Autumn Term, year 12 or year 13
Teacher	Miss Katrina Yerbury (Biology Teacher)
Course Length	10 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	None, but particularly suitable for pupils taking Biology or Chemistry A levels, including aspiring medics

COURSE OUTLINE

This elective will cover a range of aspects of nutrition and diet, including a grounding in dietary components and digestion, and consideration of food deficiencies. Other topics include performance enhancers and diet for athletes, food for mental well-being and how food can be used as a medicine.



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LIFE THROUGH A LENS

When	Spring Term, year 12 or year 13
Teacher	Miss Katrina Yerbury (Biology Teacher)
Course Length	9 weeks
Homework	Approximately half an hour a week
Examination	None
Requirements	None

COURSE OUTLINE

Learn how to successfully combine photography and microscopy, with an introduction to the use of biological subject matter as an art form, ranging from whole organisms to the cellular level with weekly tasks to create your own photographic artwork. This elective will prepare pupils to enter the Royal Society of Biology Photography Competition. No specialist equipment required other than a digital camera or a camera phone.

ENGLISH LANGUAGE SUPPORT & IELTS PREPARATION

When	Year 12 or Year 13, Autumn, Spring and Summer terms
Teacher	Ms Heather Rhodes (Principal)
Course Length	Between 10 and 24 weeks, depending on pupil need
Homework	Approximately half an hour a week
Examination	The option to take an IELTS examination, widely required by English-medium universities as proof of English language ability
Requirements	Pupils should have English as an additional language and not yet have achieved a grade of 7 in IELTS (across every band) or 65 in PTE

COURSE OUTLINE

The level of your academic English is vital for success at A level and beyond, and even if you have fluent spoken English you may find you need to improve the accuracy of your written English and develop the breadth of your vocabulary. In this elective we will look at a range of skills in English, including academic writing, reading speed and comprehension, and expressing yourself clearly and effectively in spoken English. You will also become familiar with the format of the IELTS exam, with a view to sitting this examination when you have reached a sufficient ability level, and ideally, at the latest, by the end of year 12.

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PAT & NSAA PREPARATION

When	Spring term and end of Summer term, year 12, and the first half of Autumn term, year 13
Teacher	Mr Lampros Andrinopoulos (Physics Teacher)
Course Length	20 weeks
Homework	Approximately half an hour a week
Examination	Preparation for the PAT and NSAA examinations
Requirements	Pupils taking this course are required to be taking Physics at A level

COURSE OUTLINE

This elective is aimed at those interested in applying to Oxford or Cambridge for a degree in physics. The Physics Aptitude Test (PAT) is a requirement for everyone who applies to study Physics or Physics and Philosophy at Oxford. The Natural Sciences Admissions Assessment (NSAA) is a written exam for prospective Cambridge natural sciences and veterinary sciences applicants, including a subject specialism in Physics. This preparation course helps you to develop your ability to apply your knowledge and understanding of physics when answering the challenging questions in these examinations.

UCAT & BMAT PREPARATION

When	Spring term and end of Summer term, year 12, and the first half of Autumn term, year 13
Teacher	Mr Crispin Davis (Chemistry Teacher)
Course Length	20 weeks
Homework	Approximately half an hour a week
Examination	Preparation for the UCAT and BMAT examinations
Requirements	Pupils are required to be taking Chemistry and/or Biology at A level

COURSE OUTLINE

The University Clinical Aptitude Test (UCAT) is an exam which is used in the selection process by the majority of UK university Medical and Dental Schools, including the University of Warwick and Kings College London. The BioMedical Admissions Test (BMAT) is used for a similar purpose by around ten UK universities, including the University of Oxford and the University of Cambridge. This elective helps you to develop your ability to apply scientific and mathematical knowledge, as well as problem solving, critical thinking and written communication skills in preparation for a degree in medicine.

MATHS UNIVERSITY EXAMS INTRODUCTORY PREPARATION

When	Spring term and end of Summer term, year 12
Teacher	Mr Harry Williams & Mrs Laurie Phippard (Mathematics Department)
Course Length	15 weeks
Homework	1 hour + per week
Examination	Pre-STEP, MAT, TMUA & CTMUA Introductory preparation
Requirements	Mathematics A level and preferably Further Mathematics A level

COURSE OUTLINE

This elective is aimed at those interested in applying to leading UK universities for a Mathematics or Computer Science degree. This course aims to give a taster of each of the following examinations:

- MAT (Mathematics Admissions Test) exam is taken in late October of year 13 and is required by some UK universities including Oxford and Imperial.
- STEP (Sixth Term Examination Paper) Mathematics exam is taken at the end of year 13 and is required by some UK universities including Cambridge and Warwick.
- TMUA (Test of Mathematics for University Mathematics) is accepted in universities such as Cardiff, Durham, Lancaster, LSE, Bath and Nottingham, and is taken in October/November of year 13. The CTMUA is taken for the Cambridge computer science course.

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STEP MATHEMATICS PREPARATION

When	Summer holiday self-study and throughout year 13
Teacher	Mr Harry Williams & Mrs Laurie Phippard (Mathematics Department)
Course Length	25 weeks
Homework	2 hours + per week
Examination	Preparation for STEP mathematics university admissions examination
Requirements	Pupils should be studying Further Mathematics and the STEP, MAT, TMUA, CTMUA Introductory Preparation elective must have been followed

COURSE OUTLINE

This elective prepares pupils to take parts II or III of the STEP exam at the end of year 13. STEP tests candidates on questions that are similar in style to undergraduate mathematics. Questions may test a candidate's ability to apply mathematical knowledge in novel and unfamiliar ways and will often require knowledge of several different specification topics. Solutions require insight, ingenuity, persistence and the ability to work through substantial sequences of algebraic manipulation.

MAT PREPARATION

When	Summer holiday self-study and Autumn Term of year 13
Teacher	Mr Harry Williams & Mrs Laurie Phippard (Mathematics Department)
Course Length	10 weeks
Homework	2+ hours per week
Examination	Preparation for MAT university admissions examination
Requirements	Pupils should be studying Further Mathematics and the STEP, MAT, TMUA, CTMUA Introductory Preparation elective must have been followed

COURSE OUTLINE

This elective prepares pupils to take the MAT (Maths Admissions Test) which is required for Maths and Computer Science based degrees at certain universities in the UK, including Oxford and Imperial, and is taken into consideration for relevant courses by other universities, including Warwick, Bath and Durham. The test lasts 2 hours and 30 minutes and is sat under timed conditions.

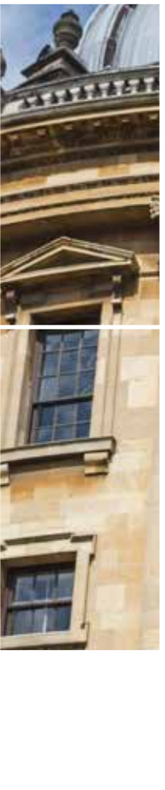
TMUA (AND CTMUA) PREPARATION

When	Summer holiday self-study and Autumn Term of year 13
Teacher	Mr Harry Williams & Mrs Laurie Phippard (Mathematics Department)
Course Length	10 weeks
Homework	2 hours + per week
Examination	Preparation for Mathematics University Admissions examination
Requirements	Pupils must have taken the STEP, MAT, TMUA & CTMUA Introductory Preparation elective

COURSE OUTLINE

This elective prepares pupils to take the TMUA (Test of Mathematics for University Mathematics) or the CTMUA, which is accepted by Mathematics/Economics/Computer Studies departments such as Cardiff, Durham, Lancaster, LSE, Bath, Nottingham, Sheffield, Southampton, Warwick (and Cambridge for computer science). This TMUA consists of 2 papers taken together (75 mins each) taken in October/ November with the aim of gaining a reduced A level offer from universities.

Paper 1 is based on material completed in AS Mathematics and paper 2 is a logic/proof paper.



SAT OR ACT PREPARATION

When	Year 12
Teacher	External Provider
Course Length	Between 11 and 25 weeks, depending on pupil need
Live Lessons	This elective requires two one-hour live lessons per week
Homework	2+ hours per week
Examination	Preparation for the ACT Test, or SAT Reasoning Test and Subject Tests
Requirements	This elective requires a significant time commitment. There is a cost involved in taking these preparation courses and the associated exams

COURSE OUTLINE

This elective is aimed at those interested in applying to a university in the US. Pupils take a diagnostic test to assess whether they are better suited to taking the SAT Reasoning Test or the ACT test. Both are long multiple-choice tests covering reading, writing and mathematics, with the ACT additionally covering science. These exams are sometimes used by university admissions departments in the US to help inform their decisions about candidate applications. Our external provider works with pupils interested in preparing for the SAT or ACT exam, and can additionally support pupils needing to prepare for a SAT subject test.

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EXTENDED PROJECT QUALIFICATION

When	Spring term and end of Summer term, year 12, and Autumn term, year 13
Teacher	Mr Crispin Davis (Chemistry Teacher)
Course Length	22 live lessons and 22 self-study lessons over three terms, plus fortnightly 1:1 meetings with your project mentor
Homework	Approximately an hour a week plus 40-80 hours to complete your project across the three terms and the year 12 summer holiday
Examination	Pearson Edexcel Level 3 Extended Project Qualification (EPQ)
Requirements	There are no requirements for entry to this elective, but pupils should be mindful of the time commitment involved

COURSE OUTLINE

The Extended Project is designed to develop learners' critical, reflective, problem-solving and independent learning skills, and supports pupils with the transition to higher education or the world of work. Pupils select a project topic which expands their learning in their field of study, in a related area, or an area that is relevant to their own personal interests.

There are four types of projects available: a dissertation, an investigation/field study, a performance or an artefact. The self-study lessons on this elective course guide pupils through the skills needed to plan, execute and evaluate their projects, including research skills, project management skills and presentation skills. Live lessons support this learning by ensuring pupils can apply these skill sets to their own project. Pupils are additionally required to make regular one-to-one appointments with their Extended Project mentor, who will act as a catalyst and facilitator of their research process. Pupils are assessed on their ability to plan, manage, complete and review their project. Projects are submitted for moderation in January.

Extended projects are recognised by leading universities in the UK and in some cases admissions tutors may make a reduced offer to applicants that involves successful completion of the Extended Project. Pupils can draw upon their experience of undertaking the project when writing their personal statement, and a successfully completed Extended Project is often taken into account if a pupil narrowly misses the grades outlined in a university offer to them.

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