ST. ANDREW'S COLLEGE
Cambridge

MEDICS & LIFE SCIENCE FOUNDATION SPECIFICATIONS

ST. ANDREW'S COLLEGE
Cambridge

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ABOUT ST ANDREW'S COLLEGE CAMBRIDGE

St. Andrew's College, Cambridge is a co-educational independent Sixth Form College providing boarding and day places for up to 147 students each academic year.

St Andrew's College is a member of the Dukes Education family. Dukes is a family of schools, teachers, learners, and parents connected by our pursuit of an extraordinary life for every member of our community.

Our philosophy is to support everyone to live with purpose, to encourage a love of learning, and to act as a team. All of this is underpinned by a quality standard that runs through everything we do.

St. Andrew's College, Cambridge is "international" in nature and is characterised by exceptional levels of academic and pastoral support at all stages. We accept students aged 15-22 years old.

We believe that education is a journey to be enjoyed and shared at every stage of life, unlocking extraordinary possibilities for every student.
St Andrew's College offers the following courses.

- Pre A-Level (September and January start)
- 2-year A-Level (September start)
- 18-month A-Level (January start)
- 3-year A-Level (September start)
- 2.5 -year A- Level (January start)
- 1-year University Foundation course (September start)
- 6-month university foundation courses (January start)
- 2-year university foundation courses (September start)
- 18-month university foundation course (January start)

Many of our applicants will commence courses in September, although we have up to 20 students each year who join the January intake. There are cases where students request to join the course as late joiners. These applications are reviewed on a case-by-case basis by the Principal and the Curriculum Manager. Where possible, late joiners are integrated into appropriate groups and receive additional tuition to make up for any time missed.

ADMISSIONS CRITERIA

Subject to real limits on student numbers imposed by boarding places, the availability of homestay hosts and resources, the college will admit applicants who have the potential to be successful on the course they've applied for.

Applicants must:

- Demonstrate a strong commitment to their studies
- Meet the entry requirements for the course applied for – Entrance exams & interview
- Agree to adhere to the college code of practice

The college aims to welcome students from all backgrounds, irrespective of nationality, race, religion, gender, sexual orientation, or disability.

SELECTION PROCESS AT A GLANCE

Our applicants go through a strict selection process based on three elements:

1. Application: in liaison with UKVI regulations (qualifications, Visa and language requirements)

2. Interview. Interviews are conducted by the Admissions Department with the purpose of:

- Explaining the academic, pastoral, and extracurricular provision available at the college and provide advice on courses appropriate to the student's age and academic ability
- Assess the suitability of the student for the course they have applied for (Entry criteria for courses are given at the end of this document)
- Provide an opportunity for a prospective student and parents / guardians / agents to look around the college.
- Provide advice about entry into Higher Education.
- Answer any questions about the college.

3. Testing and assessment. The college will request that prospective students take entry tests in Maths and English in order to determine if their proposed course for them.

REGISTRATION & ENROLMENT

OFFERS AND ENROLMENT

We will review a student's application once the stages above have been completed. If a student's application is successful a conditional or unconditional offer will be made.

ENGLISH REQUIREMENT

Those students enrolled on Foundation courses and for who English is not a first language, will be required to achieve a minimum IELTS score of 5.5 for September and 6 for January. Students who cannot provide satisfactory evidence of a pass at this level or proof of English level by means of an internal test and interview will not be allowed to join St. Andrew's College, Cambridge.

FOUNDATION COURSE REQUIREMENTS

9-MONTH FOUNDATION PROGRAMME

The 9-month Foundation programme is an intensive, fast-track programme and is suitable for students who have already completed one or more years of A-Level study, or who have graduated with good grades from a high school system abroad. Applicants will have to demonstrate a good level of academic ability. A pass at Grade A*-C in GCSE/IGCSE English Language, IELTS 5.5 or a result of 5.5 or above on our internal English test is required for students whose first language is not English.

The Foundation program is accredited by the NCFE

MEDICAL & LIFE SCIENCE FOUNDATION

ABOUT THE PROGRAMME

Welcome to the St Andrews College Cambridge Medical & Life Sciences Programme.

University admissions in medicine and related fields are fiercely competitive and successful candidates need to have an outstanding academic record as well as demonstrate exceptional commitment when applying for courses. The medical programme at the College has been designed to boost students' chances of securing their first choice medical/dental school or related degree (e.g. neuroscience, immunology, virology, genomic medicine, medical genetics, biomedical science, nursing, pharmacy or pharmacology).

In addition to core medical courses, the programme also prepares students who wish to study life sciences at leading universities such in the UK and beyond. The course helps students better understand their potential area of study and the College has over 30 years' experience and implicit knowledge of what is required to get a student successfully into medicine.

To achieve this, the College has a highly experienced and dedicated team who have between them considerable experience and specialist knowledge and insight into how best to secure a place.

The Medical Programme advises on preparing students who may wish to apply to Medical Schools West Indies, Hungary, UK and Ireland. Naturally, these institutions are extremely competitive and command significant financial resources. St Andrews College Cambridge has experience of placing students in foreign universities.

LEARNING ENVIRONMENT

The Foundation Course is classroom/lab based and you will be assisted by 1:1 and group tutorials. You have access to the relevant lab resources to support the activity being delivered.

External visits for research and observation are integrated into the course and we take full advantage of the college's convenient location close to London and all its amenities.

TEACHING STAFF

The teaching staff on the Foundation programmes are all highly qualified and experienced teachers who strive to empower their students with the confidence and skills needed to achieve their best and to prepare for university and their future careers. The teachers set high standards and reinforce them whilst assisting the students in their own individual needs and learning styles.

SUBJECTS AND HOURS OF STUDY PER WEEK

SUBJECT	NUMBER OF HOURS PER WEEK
	9-month course (34)
Biology or Human Biology	6
Chemistry	6
Maths	6
Tutor / UCAS	2.5
Total Hours **Hours over the duration of the course.**	**20.5** **697**

**Please see the scheme of work at the end of the document for more details on areas covered by each subject.*

SUBJECT WEIGHTING

Each of the core subjects (Chemistry, Biology / Human Biology / Human Biology and Maths) will carry a 33.33% weighting.

SUPPORT SUBJECTS

The foundation course will be supported by the following non-examined subjects:

- English
- PSHE Personal Social and Health Education
- English for Academic Purposes (EAP)
- General Studies
- Study Skills

The above-named subjects are put in place to build on and support academic performance whilst on the course.

PERSONAL, SOCIAL, HEALTH AND ECONOMIC EDUCATION / UCAS/ TUTORIAL

Each student is given guidance in tutor groups and then individually for their university application through UCAS and assistance at the end of the year with university placements.

Each student has a personal tutor throughout the academic year to provide not only academic support, but also pastoral care.

Extra lessons are arranged where necessary to support the progress of students. The students can use the student common rooms and a computer area to facilitate study groups and a community atmosphere.

Students are provided with a social programme consisting of various opportunities to improve their social skills and to broaden their horizons through sport, the arts, travel, and friendly competition.

Students are encouraged to attend special talks and lectures in various places throughout the UK during the academic year.

THE ASSESSMENT STRUCTURE FOR THE COURSE

DECEMBER EXAM

All students will take an exam in each of the core subjects (Chemistry, Biology / Human Biology and Maths) in December of each course. This exam is to gather an understanding of the performance to date. On completion of the results transcript the student will be spoken to by his/her tutor and an Individual Learning Plan (ILP) will put together if applicable. The first exam is to monitor performance in the first term it will not be used for the overall results of the course.

PRACTICAL

Students will carry out 6 practical assessments during the spring term. The collated results of these tests will give them an overall result, which will count for 40% of the overall mark.

FINAL EXAM

The final assessment of the course will take place in the penultimate week. Each of the core subjects (Chemistry, Biology / Human Biology and Maths) will be examined twice (2 hours per paper). The final exams will carry 60% of the total grade.

ATTENDANCE

Students must have an attendance rate 95% or above in all subjects to pass the course.

COMPLETION OF WORK

Students must complete all work on time.

NCFE ACCREDITATION & CERTIFICATION

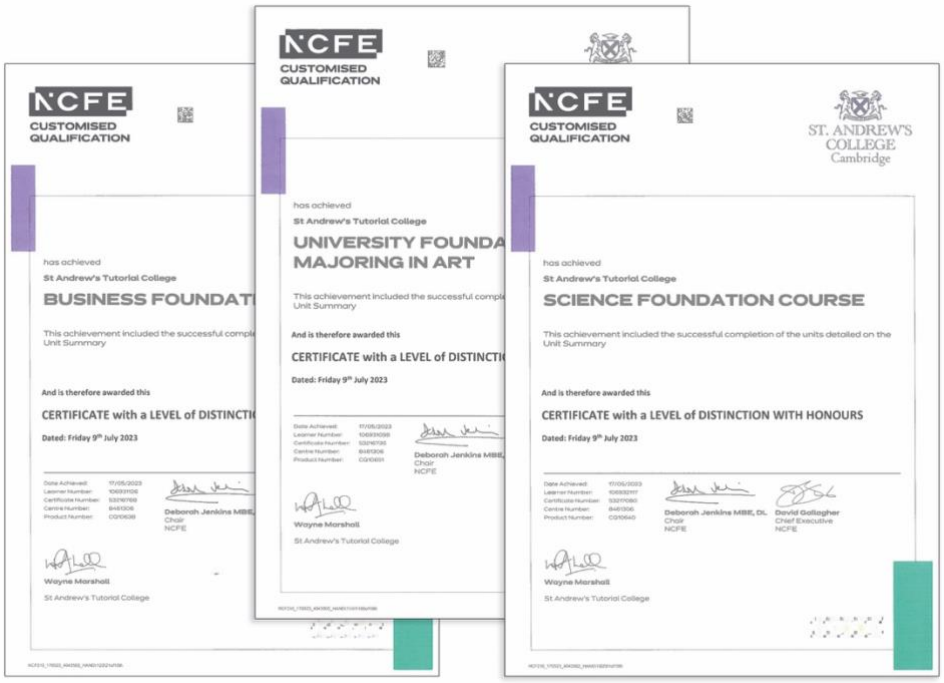
Our course has been accredited by NCFE, an awarding organisation recognised by the qualification regulators for England and Wales. NCFE's regulators are the Office of Qualifications and Examinations Regulation (Ofqual) in England, and the Welsh Government in Wales. This course isn't regulated by Ofqual but has been accredited by NCFE under our IIQ License.

St. Andrew's College provides the students with a Level 3 Diploma, and they will also receive a certificate and a transcript from the awarding body NCFE. (SEE SAMPLE BELOW)

Awards of Pass, Merit, Distinction and Distinction with Honours are only awarded when students meet the following criteria:

ACHIEVEMENT

Fail / Resubmit	**0-49%**
Pass	**50-59%**
Merit	**60-69%**
Distinction	**70-79%**
Distinction with Honours	**80% and above**



SYLLABUS CONTENT FOR EACH SUBJECT

CHEMISTRY – SPECIFICATION SUMMARY

Term 1	Term 2	Term 3
Introduction Atomic Structure / Amount of Substance Bonding / Periodicity Redox Reactions / Group 7, the Halogens Redox Reactions / Group 2, the Alkaline Earth Metals / Metal Extraction Coursework reports	Redox Reactions / Group 2, the Alkaline Earth Metals / Metal Extraction Energetics / Kinetics / Equilibria Collision Theory, Maxwell-Boltzmann Distribution, Le Chatelier's Principle, etc. Introduction to Organic Chemistry / Alkanes Coursework reports	The Haloalkanes, Alkanes / Alcohols / Analytical Techniques Presentations

SPECIFICATION DETAIL

PART A

Physical Chemistry

- Atomic structure
- Understand the importance of fundamental particles in the structure of the atom
- Mass number and isotopes
- Know the electron configurations of atoms and ions

Amount of substance

- Be able to define relative atomic mass and relative molecular mass
- Understand the concept of a mole and Avogadro's constant
- Be able to recall the ideal gas equation
- Understand the concept and relationship between empirical and molecular formulae
- Balanced equations and associated calculations

Bonding

- Nature of ionic, covalent, metallic, and dative bonds
- Learn about bond polarity
- What are the forces acting between molecules?
- Recognise the different states of matter

- Shapes of molecules and ions

Energetics

- Learn about and calculate enthalpy change (calorimetry)
- Be able to apply Hess's Law
- Understand bond enthalpies and calculations

Kinetics

- Understand collision theory
- Qualitatively understand the Maxwell-Boltzmann distribution
- Effect of temperature, concentration, and particle size on reaction rate
- Understand how catalysts work

Equilibria

- Understand the dynamic nature of equilibria including effects of changes in pressure, temperature, and concentration on a system in equilibrium (Le Chatelier's principle)
- Importance of equilibria in industrial processes

Analytical Techniques

- Understand the basic principles of mass spectrometry

PART B

Inorganic Chemistry

Periodicity

- Be able to classify elements in s, p, and d blocks
- Properties of Period 3 elements as an example of periodic trends
- Understand redox reactions, oxidation states and redox equations Group 2 (alkaline earth metals)
- trends in physical and chemical properties
- flame tests Group 7 (halogens)
- trends in physical properties, and oxidizing and reducing abilities
- identification of halide ions using AgNO3
- uses of chlorine and chlorate (I)

PART C

Organic Chemistry

- Nomenclature
- Structural isomerism
- Alkanes
- structure and properties
- fractional distillation of crude oils
- modification by cracking
- combustion

Alkenes

- structure, bonding and reactivity
- addition reactions
- polymerization

Haloalkanes

- Synthesis
- nucleophilic substitution
- substitution reactions

Alcohols

- nomenclature
- ethanol production
- classification of reactions
- elimination

Organic Mechanisms

BIOLOGY – SPECIFICATION DETAIL

Term 1	Term 2	Term 3
Introduction Cell Biology (Building Blocks of Life, Chemical Basis, Substances passing in and out of Cells, Prokaryotic and Eukaryotic Cells, Respiration, Photosynthesis) Organs at Work (Digestive System, Breathing System, Diseases of the Breathing System, Heart, etc.) Exchange and Transport (Blood Vessels, Gaseous Exchange, Transpiration, etc.) Coursework reports	Cells: Control and Adaptation Adaptations and Functions, Cell Cycle, Cancer Disease (Lifestyle Diseases, Pathogens) Fighting Disease (Immune System and Vaccines) Molecular Structure and Function DNA, Genes and Chromosomes Coursework reports	Ecology Classification and evolution Presentation

SPECIFICATION DETAIL

PART A

Cell Biology

- Understand that cells are the building blocks of life
- Studying cells
- Different substances are the chemical basis of cells
- Different substances pass into and out of cells
- What are the differences between prokaryotic cells and eukaryotic cells?
- Respiration
- Photosynthesis

Organs at Work

- Learn about the different parts of the digestive system
- Understand that enzymes catalyse the digestion of food
- Learn about the different parts of the breathing system
- How do different diseases affect the breathing system?
- Learn about the different parts of the heart
- What are the causes of heart disease?
- Reducing risks

Exchange and Transport

- Surface area to volume ratios affect the rate of exchange of substances across surfaces
- Understand how blood vessels work and link up with lymph vessels
- Learn about gaseous exchange
- How does water and nutrients reach the tops of the tallest trees?

PART B

Cells: control and adaptation

- Different adaptations enable cells to carry out different functions
- The cell cycle refers to events during the life cycle of a cell
- Cancer is a result of the cell cycle running out of control

Disease

- Lifestyle diseases
- Some diseases are caused by pathogens

Fighting disease

- Why does our immune system help us to stay healthy?
- How do vaccines protect us from disease?

PART C

Ecology

- Populations and ecosystems
- Investigating ecosystems

Energy transfer in ecosystems

- Food chains, food webs and ecological pyramids
- Energy transfer through ecosystems
- Energy and food production

Classification and the species concept

What are species?

- How many species are there?
- How are species maintained?

- How many species will be compared?

HUMAN BIOLOGY – SPECIFICATION SUMMARY

Course content

The course content includes the following areas of human biology:

Human Bells

The key areas covered are:

- division and differentiation in human cells
- structure and replication of DNA
- gene expression
- mutations
- human genomics
- metabolic pathways
- cellular respiration
- energy systems in muscle cells

Physiology and health

The key areas covered are:

- gamete production and fertilisation
- hormonal control of reproduction
- the biology of controlling fertility
- antenatal and postnatal screening
- the structure and function of arteries, capillaries and veins
- the structure and function of the heart
- pathology of cardiovascular disease (CVD)
- blood glucose levels and obesity

Neurobiology and immunology

The key areas covered are:

- divisions of the nervous system and neural pathways
- the cerebral cortex
- memory
- the cells of the nervous system and neurotransmitters at synapses
- non-specific body defences

- specific cellular defences against pathogens
- immunisation
- clinical trials of vaccines and drug

MATHEMATICS

This mathematics programme has been reviewed to reflect and cater for the actual mathematical requirements of students as they progress towards their university courses. It's designed to lay the foundation for developing and consolidating effective reasoning and a methodical approach while building a good set of mathematical skills relevant to most science and humanities studies. The programme aims to provide students with a valuable range of tools and techniques for analysing, modelling, formulating, and solving general mathematical problems that can arise in their further studies or future practice.

MATHEMATICS – SPECIFICATION SUMMARY

Term 1	Term 2	Term 3
• Elementary Algebra • Coordinate Geometry • Functions and their graphs • Differentiation • Integration	• Exponential and Logarithm functions • Sequences and Series • Probability and Statistics • Numerical methods • Linear programming	• Financial Mathematics • Composite functions • Inverse function • Further Differentiation

NB: To keep the same standard for assessment purpose, effort should be made to cover the material for each term in the term indicated. However, within each term the content may be covered in any suitable order and some components may be exceptionally moved from one term to another to respond to the students' level of attainment or if required for use by other subjects.

SPECIFICATION CONTENT TERM 1

1. Elementary Algebra

What students need to learn:

- Types of number: Natural, integer, decimal, rational, irrational, and real numbers
- Common sets of numbers N, Z, D, Q and R, together with the correct use of related set notations such as {}, ∈, ∪, ∩ …etc.
- Working with forms of number such as reciprocals, indices (or powers), fractions and surds. Students should learn the properties and know how to work with fractions, indices and surds including how to rationalise the denominator
- Working with ratios and percentages to express or find shares from a whole quantity
- Algebraic expressions and related operations including determining the degree and coefficients of a polynomial, addition, subtraction, multiplication, simplification, expansion, factorisation and completing the

square for trinomials

- Algebraic fractions and related operations including simplification, long division by a linear term, the remainder theorem, and the factor theorem
- Equations: differentiating between, expressions, equations, identities, and functions. Solving quadratic and simple cubic equations using factorisation, completing the square or the discriminant method for quadratic equations. Solving simultaneous linear equations using elimination or substitution as appropriate. Solving simultaneous mixed equations (linear and non-linear) and presenting the solutions in a suitable form
- Inequalities: solving linear, quadratic, and simultaneous inequalities. For quadratic inequalities, the curve can be used along the sign inspection methods

2. Coordinate Geometry

What students need to learn:

- Recognising common 2D shapes and recalling their basic properties with focus on quadrilateral shapes including Trapeziums, Parallelograms, Rectangles, Squares, and triangular shapes including Isosceles, Right-angled, and Equilateral triangles
- Determining and using the Cartesian equation of a straight line in a system of axes (Ox, Oy) in different forms such as Y= mX+c, aX+bY+c = 0 or Y – Y1 = m(X-X1)
- Parallel and perpendicular straight lines
- Intersection of 2 or more straight lines
- Coordinates of the midpoint of a segment AB
- Distance between two points A and B
- Cartesian equation of a circle in a system of axes in different forms such as (x – a)2 + (y – b)2 = r2 and x2 + y2 + px + qy + r = 0
- Circle properties and their use in solving problems
- Solving general problems involving straight lines and other common shapes

3. Functions and their graphs

What students need to learn:

- Precise definition of a function and the related concepts of domain and range. One-to-one functions.
- Basic combinations of 2 or more functions using addition, subtraction, multiplication, and division
- Sketching graphs of simple functions including linear, quadratic, cubic and simple homographic functions ($y = c/X$).
    - The concepts of limits and continuity are not in the scope of this specification, but the vertical or horizontal asymptotes and infinite branches must be determined and used where required
    - Transformation of curves: y = f(x + a), y= f(x) + a, y = f(ax), y= af(x), y=-f(x) and y =f(- x).
    - Students should be able to correctly describe each transformation and apply it to sketch the corresponding curve based on the curve y=f(x)

4. **Differentiation**

What students need to learn:

- Basic rules of differentiation for polynomials and algebraic functions with rational Indices
- Second derivative
- Equation of the tangent and equation of the normal at a given point on the curve Y = f(X)
- General problems involving differentiation and coordinate geometry
- Use of differentiation to determine the set of values for which a differentiable function is increasing or decreasing
- Use of differentiation to find stationary points and determine their nature
- Use of differentiation to solve simple optimisation problems

5. **Integration**

What students need to learn:

- Indefinite integration as the reverse process of differentiation
- Basic rules of integration for polynomials and algebraic functions with rational Indices
- Finding the constant of integration given the initial conditions
- Definite integral
- Area under a curve, area between a curve and a straight line

TERM 2

6. **Exponential functions and Logarithm functions**

What students need to learn:

- The function ax and its graph and properties
- Graph of logarithm function with base a
- Logarithm laws including the formula for changing the base
- Solving logarithm and exponential equations and simple inequalities
- Use of exponential and logarithm functions to model growth and decay in a population

7. **Sequences and Series**

What students need to learn:

- General concepts of a sequence and series: 1st term, general term, recurrence relation, sum of first n terms, the use of Sigma notation

- Arithmetic sequences and series
- Geometric sequences and series including sum to infinity where defined
- General problems involving sequences and series

8. Probability and Statistics

What students need to learn:

- Purpose and uses of statistical methods and statistical models
- Types of data, qualitative, quantitative, discrete, and continuous data
- Data representation and summary (for both discrete and continuous data): the use of frequency, cumulative frequency, mode, median and quartiles, inter-quartile range, mean and standard deviation. Stem and leaf diagrams, box plots, bar charts, pie charts and histograms
- Bivariate data: scatter diagrams, types of correlation, product moment correlation coefficient, explanatory and response variable and linear regression
- Probability concepts and probability tools: trial, outcome, sample space, event, complementary event, compound events, mutually exclusive events, independent events,
- Representation of events using multidimensional tables, Venn diagrams and tree diagrams
- Probability Laws
- Conditional probability
- Discrete random variables: probability distribution, expectation, and variance
- Particular discrete distributions: Uniform Discrete distribution and Binomial distribution
- Populations and Samples: making the distinction between a population and a sample, knowing some advantages and disadvantages of using a sample for a survey compared to using a census. Statistics and sample statistics

9. Numerical methods

What students need to learn:

- Approximate solution to the equation $f(x) = 0$
- Finding an interval in which the equation $f(x) = 0$ has a solution, by checking for a change in the sign of $f(x)$
- Interval bisection method
- Finding an approximation to $\int b\ f(x)dx$ using the trapezium rule

10. Linear Programming

What students need to learn:

- Standard form of a linear problem: the variables, the constraints, and the objective function
- Modelling a variety of problems using linear programming: examples can be drawn from business, transport, manufacturing, and other sectors
- Graphical representation of the feasible region

- Finding a solution graphically using the objective-line method
- Finding a solution using the vertex inspection method

TERM 3

11. Financial Mathematics

What students need to learn:

- Simple interest
- Compound interest: interest compounded annually, semi-annually, monthly or n times per year on regular intervals
- Continuously compound interest
- Annual percentage rate
- Future and Present values
- Debt repayment
- Annuities

12. Composite functions and Inverse function

What students need to learn:

- Composite function of 2 or more functions where it's defined
- Solving equations involving the composite function such as gf(x) = c where c is a given value
- Finding the inverse function of a one-to-one function
- Domain and range of the inverse function
- Inverse of simple functions such as linear, quadratic, cubic, exponential and logarithm functions. The domain and range will have to be restricted as required to ensure the initial function is one-to-one

13. Further differentiation

What students need to learn:

- Differentiating the exponential function $f(x) = ex$
- Differentiating logarithm functions $f(x) = \ln(x)$ and $f(x) = loga(x)$
- The chain rule
- The product rule
- The quotient rule

INFORMATION AND COMMUNICATION TECHNOLOGY (ICT):

Is an integral part of the Foundation course and all aspects of this area are included in the core subjects and the study skills components? Although individual lesson time is not given to this subject, the student must be able to demonstrate their appreciation of and ability to integrate ICT within the demands of the course.

ENGLISH:

English is approached on an individual basis, with each student being tested with in-house IELTS exams or based on previous achievements such as a C or above grade in GCSE or IGCSE English or a proven IELTS grade.

The IELTS classes are established by level and designed to meet the needs of the student at that level to enable progress at a satisfactory pace onto the next level in preparation for the IELTS exam.

Students who obtain a 6.5 in IELTS during their stay at the college or arrive with a 6.5 in IELTS or above will not be required to attend IELTS classes in college. If a student has gained 6.5 in IELTS but needs extra support for university this will be planned and reviewed by the IELTS coordinator on an individual student basis.

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St Andrew's College Cambridge is part of Dukes Education. Together we're extraordinary