



carmel
college

Inspiring minds.
Shaping futures.

SCIENCE

COURSE GUIDE 2017
BIOLOGY | CHEMISTRY | PHYSICS | APPLIED SCIENCE

“Science is a great game. It is inspiring and refreshing. The playing field is the universe itself.”

ISIDOR ISAAC RABI

Biology

Exam Board AQA

Why choose Biology at Carmel?

The Biology Department is excellent and students are highly successful. Out of the 100 students who studied Biology last year 59% achieved A*-C grades.

You will be taught by an enthusiastic, caring team who are committed to your success in the subject. All members of the department are very experienced teachers and some are current examiners. You will have the opportunity to experience a wealth of enrichment activities. Over the years, excursions have included visits to Chester Zoo and trips to London, Holland, Costa Rica, Yellowstone National Park, and The Gambia. Students have also visited the Life Science department at Manchester University to make use of a rare opportunity to look at their ground breaking current animal research and the Christmas lectures on microbiology at Liverpool University. The department also welcomes visiting lecturers every year.

What will the course involve?

You will enjoy a wide range of learning experiences, including practical work, practice exam questions, comprehensive printed notes and interactive activities. The practical work will reinforce and consolidate key concepts to help you achieve highly, as well as developing invaluable laboratory skills.

The course covers fundamental biological principles and how this knowledge is used in the 21st century. In your first year, you will study a wide variety of units from cells and mammalian transport and digestion, through to genetics and health and disease. In your second year, you will study more detailed aspects of Biology such as the nervous system, muscles and homeostasis, evolution and genetic engineering. Their applications in modern scientific research are emphasised.

Homework is set regularly to test your understanding, as well as end of unit tests. These are used to provide feedback on your progress, as well as providing you with targets to help you achieve your potential. We provide the opportunity to reflect on your own learning to help prepare you for your next steps.

How will I be assessed?

Biology is a linear A Level so assessment will take place at the end of the two year course. This will consist of three exams based on eight topics which will all be examined in May/June. There is a large practical element to the course and the students must complete certain practical tasks over the two years to pass the course. This is not examined but forms the practical endorsement on your exam certificate.

How successful are our Biology students?

		Number of entries	A*-B	A*-C	A*-E
2013	A2	142	44%	68%	99%
2014	A2	118	46%	68%	97%
2015	A2	107	47%	66%	99%
2016	A2	100	30%	59%	97%

Our students say...

Studying at Carmel has allowed me to achieve my full potential as the support provided by subject tutors is far beyond expectation.

Studying Biology has allowed me to gain many advantageous skills which are critical for pursuing higher education. The field of Biology is very dynamic and its architecture is constantly changing. Studying this subject with its understanding of life processes has never been more important. Carmel has its very own unique personality with a very welcoming atmosphere; everyone is very friendly and the tutors are always there on hand to help. My time here at Carmel has been truly amazing and has been a stepping stone to get to university. It has allowed me to develop the confidence and ability to be independent during my academic studies, and for that I cannot thank the tutors of Carmel enough!



Terrence Christie
Gateacre School

Studying:
Biology, Maths, Geography

Where does this course lead?

There are many careers for which Biology is either essential or very useful - zoology, medicine, nursing, dentistry, physiotherapy, forensics, criminology, veterinary science, pharmacy, pharmacology, biochemistry, sports therapy, psychology, speech therapy, forestry, biotechnology, food science, microbiology, radiography, teaching, business, science writing or art.

Chemistry

Exam Board OCR

Why choose Chemistry at Carmel?

In 2016, A2 results were outstanding with students achieving 71% A*-C grades. These results are significantly higher than the national average and much greater than those of other local colleges. The Chemistry tutors are extremely committed to ensuring that you will be given the help you need to achieve at your highest possible level.

All the tutors are very friendly and develop good relationships with students, so they will support you fully and ensure that you are successful. Two members of the Chemistry team are experienced OCR examiners, which is extremely valuable when helping to prepare you for external examinations.

What will the course involve?

You will be given a comprehensive set of interactive notes and access to online resources, which provide a detailed coverage of the course specification. The notes also include many practice questions that will allow you to consolidate your understanding of the material being covered. Regular practical sessions will help to develop your laboratory techniques and evaluative skills, which will be invaluable for future science related careers. These practical sessions are closely linked to the theory taught in lessons and are an effective way of developing your grasp of the theoretical concepts covered. Regular homework and end of topic tests are used to inform both you and your tutor of your progress throughout the course.

How will I be assessed?

Chemistry is a linear A Level so assessment will take place at the end of the two year course. This will consist of three exams based on six modules which will all be examined in May/June. You will also complete a range of practical tasks during the two years for which you will be awarded a practical endorsement, which will supplement your A Level certificate.

Where does this course lead?

As well as being an important subject in its own right, Chemistry is an essential requirement for medicine, dentistry, and veterinary science. In the past our students have entered university to follow many different courses - pharmacy, medicine, dentistry, physiotherapy, analytical chemistry, pure chemistry, forensic science, biological and environmental sciences, law, engineering and business.

How successful are our Chemistry students?

		Number of entries	A*-B	A*-C	A*-E
2013	A2	116	59%	79%	99%
2014	A2	125	46%	70%	100%
2015	A2	104	51%	74%	97%
2016	A2	97	47%	71%	98%

Our students say...

I have found the tutors and students to be really friendly and helpful and I'm really enjoying my time at college.

I hope to study Veterinary Science at university so Chemistry was a definite subject choice for me. I'm finding the course really interesting with interactive lessons where I can share my ideas freely, this allows me to develop my subject knowledge and helps me to get to know my classmates better too. One of the highlights of the course so far is the practical work we do which links to the theory we learn about. I'm also developing my practical skills which will be important for my career. There are lots of online resources and tutor support available to enhance your learning in Chemistry.

There are also many opportunities for enrichment in Carmel, for example I'll be taking part in the Cambridge Chemistry Challenge soon and in the Summer I'm going to Barcelona for four days with the Maths Department.



Sally Livesey

St Edmund Arrowsmith, Whiston

Studying:

Chemistry, Biology, Maths, Psychology

Physics

Exam Board AQA

Why choose Physics at Carmel?

The Physics department at Carmel is excellent and students taking Physics are highly successful. All the tutors are very friendly and approachable and have a wealth of experience. Three members of the department are established examiners and this expertise will help you to succeed at Carmel.

You will have the opportunity to experience a wide range of extra-curricular activities including our bespoke enrichment programme 'Tomorrow's Engineers'. In recent years, excursions have included visits to London, Jodrell Bank, Daresbury and CERN.

What will the course involve?

Over the two years you will study the following modules:

- 1 - Measurements and their errors
- 2 - Particles and radiation
- 3 - Waves
- 4 - Mechanics and materials
- 5 - Electricity
- 6 - Further mechanics and thermal physics
- 7 - Fields and their consequences
- 8 - Nuclear physics
- 9 - Astrophysics

You will be given a full set of resources which include many practice questions that will allow you to consolidate your knowledge and understanding of the content covered. Regular laboratory sessions will help to develop your practical and data analysis skills which are invaluable for physics related careers. Your progress will be very closely monitored with regular assignments and end of topic tests. You are advised to study A Level Mathematics alongside A Level Physics.

How will I be assessed?

A Level Physics is a linear course so assessment will take place at the end of the two years. This will consist of three exam papers based on the nine modules, practical skills and data analysis. There is a practical element to the course and the students must complete a minimum of 12 practical tasks over the two years. This forms the practical endorsement on your exam certificate.

How successful are our Physics students?

		No of Entries	A*-B	A*-C	A*-E
2014	A2	55	36%	53%	95%
2015	A2	64	52%	67%	100%
2016	A2	52	42%	62%	96%

Our students say...

Studying Physics at Carmel has been a brilliant and enriching experience.

The course has really tested my maths and problem solving skills in real life situations and helped me to better understand the forces, fields and particles which make up everything around us. The support and teaching in the department is fantastic and lessons are fun, thorough and challenging. A particular highlight was the visit to CERN in Switzerland in the January of my second year. It not only tied in well with several parts of the course, but my understanding of the amazing work that Scientists and Engineers carry out, and discoveries they have made, was vastly improved. It was truly a once in a life time experience. Carmel has inspired me to study Engineering at university, using Physics to solve problems in everyday life.



Emma Fairhurst
Sts Peter and Paul

Studying:
Physics, Biology, Maths, Further Maths

Where does this course lead?

Physics is a fascinating subject to study at higher level and Physics graduates are in demand because of their analytical and problem solving skills. Physics is an essential requirement for a number of careers and in the past our students have entered a broad range of areas including engineering, medicine, architecture, computer science as well as physics.

Applied Science

Exam Board PEARSON

Why choose Applied Science at Carmel?

Carmel College has a strong tradition of successful science teaching over many years.

Level 3 Applied Science is a very well structured, practical science course leading to nationally recognised qualifications: National Extended Certificate equal to 1 A Level; National Diploma equal to 2 A Levels. The course covers all three sciences of Biology, Physics and Chemistry but in an “applied” context. That means that you will learn the science in a “real life” context through specially developed assignments. You will sometimes work on your own and sometimes in small groups.

We will teach you the research and study skills you will need for success. There will also be opportunities to visit scientific workplaces to learn how science and scientific skills are used professionally. Such visits will allow you to gain ideas about career opportunities in science. As well as using ICT for presenting your work, you will also be encouraged to use it for research and for monitoring and recording experimental work.

You will benefit from extensive support and guidance throughout your time on the course and we pride ourselves on taking a personal interest in your success.

What will the course involve?

From the start of the course you will work towards the new Level 3 BTEC Extended Certificate in Applied Science. This is comprised of four units:

- Unit 1: Principles and Applications of Science**
- Unit 2: Practical Scientific Procedures and Techniques**
- Unit 3: Science Investigation Skills**
- Unit 8: Physiology of the Human Body Systems**

If you choose to study the Level 3 Diploma, equivalent to 2 A Levels, you will complete 8 units in total over the 2 years.

How will I be assessed?

Assessment is a combination of assignment based tasks and formal examinations. For the internally assessed assignments, clear objective criteria are used to assess competency in all the key science areas and you will be able to see how your achievements build up as the course proceeds.

Unit 1 and unit 3 are assessed by formal examination. Unit 1 takes the form of a 1.5 hour written examination, while unit 3 is a practical investigation designed to assess the skills you have learned during the completion of unit 1 and unit 2.

This combination of assignment tasks and formal examinations will provide you with an excellent skills base which will help you progress in your future career.

How successful are our Applied Science students?

		No of Entries	Distinction* - Distinction	Distinction* - Merit	Distinction* - Pass
2014	Subsidiary Diploma	34	82%	97%	100%
2015	Subsidiary Diploma	41	88%	98%	100%
2016	Subsidiary Diploma	38	82%	95%	100%

(Distinction* = grade A*, Distinction grade A at A Level)

Our students say...

The best aspect of this subject without a shadow of a doubt has to be the teachers and the way the course is delivered.

As a result of this I feel my learning and my ability to retain the information taught has dramatically improved. I really look forward to these lessons; even topics that I thought might not be as interesting are being taught in a way that is fun, relaxed and interactive. I have especially enjoyed the practical lessons as they have helped my organisation and preparation skills. I would definitely recommend this course to any student who is interested in a science based career as it can open many doors in the future. It has allowed me to secure a place at university studying for a BSc (Hons) in Diagnostic Radiography.



Lewis Almond
St Edmund Arrowsmith, Ashton

Studying:
BTEC Science, BTEC Sport, Biology, Geography

Where does this course lead?

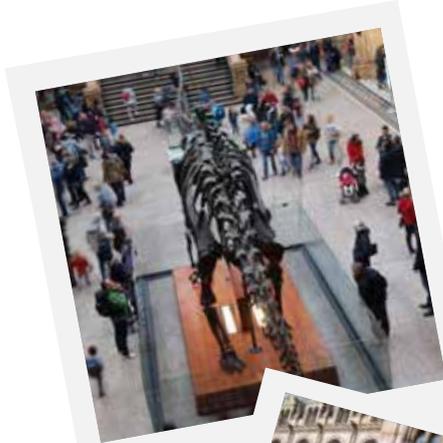
This course will prepare you for a career in many science-based industries as well as careers for which science is important such as Primary Teaching, Childcare, Nursing, Sports Management or Sports Training. Many students have progressed to study a wide range of subjects including Forensics, Construction, Animal Behaviour, Biochemistry, Physiotherapy and Biomedical Sciences. Other students have chosen to follow Apprenticeships in Laboratory Work or Engineering.

Biology trip to London

In April 2016, 29 students and 3 members of staff visited London. On arrival, students spent the afternoon in the Natural History Museum, visiting exhibits on everything from dinosaurs and earthquakes through to evolution and human biology. After this there was an opportunity for a spot of shopping in Covent Garden.

Following an evening meal in a French restaurant, the students went on the London Eye. This was great as all the Sights of London were visible, including historic landmarks such as the Houses of Parliament, Waterloo Station and Wembley. As part of this, the students experienced a 4D show prior to boarding the pods.

On the second day, students visited London Zoo before heading home. Favourite animals included the giraffes, painted dogs and the sloth!



Enriching

Applied Science visit to Power Station

BTEC Applied Science students had the opportunity to look behind the scenes at Fiddlers Ferry in Cheshire which is the 2nd largest coal fired power station in the country. The students who are working towards their 'Working in the Science Industry' unit found out about the company and learnt more about how electricity gets into our homes. It was a very educational and enjoyable trip.

Biologists attend Science and Technology Taster Day at Lancaster University

This event is designed to give students the chance to experience what it's like to study a science or technology degree at a top UK institution. Activities included meeting current students and lecturers, taking part in a campus tour and having a go at a variety of practical activities including a DNA investigation and techniques used to measure climate change.

Manchester University Trip

A small group of students made the most of a rare opportunity to visit the Manchester University Life Sciences Department to look at ground breaking current animal research.

The Upper Sixth Biology students also benefitted from listening to a visiting lecturer from Manchester University delivering a session on the Biochemistry of Cell Signalling.

Biology trip to Chester Zoo

In March, all of the Upper Sixth students spent the day at Chester Zoo. The main purpose of the trip was to attend talks given by the Zoo's education department on animal behaviour, including primate social behaviour. This is always a valuable experience as this is on the specification and included real examples of animals and behaviours at the Zoo itself.

After the lecture, students were free to enjoy the Zoo, see all the animals and of course, have an ice cream!





Merseyside Young Analyst Competition



Olympiad Competition

Royal Society of Chemistry Young Analyst Competition

Each March, a team of three Chemistry students take part in the Merseyside heat of the RSC Young Analyst competition. They spend a day working in the Chemistry labs at Liverpool University, carrying out chemical analysis and doing calculations as a team, with the winning answer being the closest to the standard.

Cambridge Chemistry Challenge

Every year Lower Sixth Chemistry students sit the CCC exam to stretch and challenge their ability to apply their chemistry knowledge to unfamiliar contexts beyond the A Level specification.

RSC Olympiad Competition

Every year, Upper Sixth Chemistry students sit the RSC Olympiad paper. This year 12 students took part and all were awarded certificates - 1 Gold, 2 Silver and 9 Bronze – congratulations!

STEM Masterclass at the University of Liverpool

Every June, students participate in Science and Engineering masterclasses at Liverpool University's state of the art Central Teaching Laboratories.



Cambridge Chemistry Challenge

Experiences

Physics CERN Trip

Carmel's Physics department took 20 students to CERN which has the world's largest particle physics laboratory. They stayed in Geneva for 4 days and were lucky enough to have tour guides who were physicists and engineers from all around the world.

The group stayed at the CERN hotel which had amazing views of the Jura Mountains. On the first day the group took a tram to Geneva city and explored the historical city.

The following morning they visited CERN's super conducting magnet test facility where they saw the main components that make up the LHC (Large Hadron Collider). In the afternoon they were taken 100m underground to see CMS which is one of the main detectors on the 27 km Large Hadron Collider. This is where the Higgs Boson was discovered.

On day three students spent the morning in CERN's 'Globe' Exhibition Centre and then walked back to the city along Geneva Lake, with the view of Mont Blanc.

On the final day they visited the LEIR (Low Energy Ion Ring) and the Data Centre where they saw the 'Worldwide LHC Computing Grid'. The trip proved to be very interesting and was a fantastic opportunity for our Physics students.



Meet the Tutors

BIOLOGY

Ruth Carey

Head of Department

Carmen Nunez

Eve McQueen

Andrea Stiles

Lindsey Delve

Kim Edgell

CHEMISTRY

Sarah Savage

Head of Department

Gill Townsend

Shaun Charles

Graham Marshall

PHYSICS

Mala Sandhu

Head of Department

Charlie Burton

Jamie Bickley

Mary Heaton

BTEC SCIENCE

Jim Ashbrook

Head of Department

Rachel Dickinson

Kim Edgell

Mary Heaton

TECHNICAL SUPPORT STAFF:

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Frequently Asked Questions

What is the Science Faculty like?

Science students study in the West Park building which provides a modern and spacious, state-of-the-art learning environment. The facilities for Science are outstanding with nine very well equipped laboratories, two computer suites and four tutorial bases. The majority of the laboratories "belong" to a single department and you will therefore generally attend the same room throughout the week for your lessons. All rooms are equipped with interactive white boards, multi-media projectors and wireless internet connection enabling internet research to be done in the laboratories.

What support will I receive in the Science Faculty?

Tutors within science will "go the extra mile" to ensure that you will succeed. In addition tutors will make themselves available should you feel that individual help is required. Revision skills tutorials are provided to help you to develop the techniques that you will need to succeed both at A Level and in Higher Education. Tutors have regular contact with your parents and will keep them informed regarding your progress.

Enrichment sessions will be provided to extend even the most able, including preparation for the BMAT exams and competitions such as the Physics and Chemistry Olympiads and National Competitions. Gifted and Talented Programmes are available in Science & Engineering as well as Medicine, Dentistry and Vet Science.

What other activities do Science students get involved in?

At Carmel we provide students with many opportunities to become involved with external activities. These range from involvement in Nuffield Research Placements and vocational work placements, to competitions such as the Physics and Chemistry Olympiads. All the departments regularly undertake trips and destinations include Daresbury Atomic Laboratories, Fiddlers Ferry Power Station, Chester Zoo and London. There are also opportunities for overseas visits which have included Biology trips to the Azores, Holland, Costa Rica and the USA, plus a Physics trip to CERN in Geneva. We have strong links with all the local universities and so use their expertise whenever possible, for example, the Chemistry department uses the spectroscopy equipment in both Manchester and Liverpool Universities. Enrichment options also include MedSoc and SciSoc.

What are the course requirements for these Science courses?

Biology

You will need grade B in GCSE Biology or BB in Core & Additional Science (not Applied) plus grade 5 in GCSE Maths and grade 4 in English Language.

Chemistry

You will need grade B in GCSE Chemistry or BB in Core & Additional Science (not Applied) plus grade 5 in GCSE Maths and grade 4 in English Language.

Physics

You will need grade B in GCSE Physics or BB in Core & Additional Science (not Applied) plus grade 6 in GCSE Maths and grade 4 in GCSE English Language.

BTEC Level 3 Applied Science

You will need grade 4 in GCSE Maths and English and grade C in Science.



More Information

The specification for Chemistry can be obtained from: www.ocr.org.uk

The specification for BTEC Science can be obtained from: www.qualifications.pearson.com

The specifications for Biology and Physics can be obtained from: www.aqa.org.uk