Science is a great game. It is inspiring and refreshing.

THE PLAYING FIELD IS THE UNIVERSE ITSELF.

ISIDOR ISAAC RABI
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.

Why choose Biology at Carmel?

The Biology Department is excellent and students are highly successful. Out of the 118 students who studied Biology last year 58% 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 visit universities to attend lectures on a variety of topics ranging from medical to brain function to future inventions. You will also get the opportunity to attend an annual trip. 2019 sees students visit Malham Tarn to study small mammals and other habitats. The Biology department also enters Olympiad competitions both onsite (national) and at Edge Hill University. This year saw one of our students awarded a Gold certificate in the national competition!

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 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.

Studying at Carmel has really helped me to become a well-rounded person. My teachers are very supportive and always happy to offer help and advice when I need it.

What I enjoy about Biology is the combination of practical and scientific knowledge that can be applied to theories and everyday life. I like that the Biology department provides concise booklets for each topic we study in class which provide valuable knowledge tailored to the specification.

The department also provides opportunities for students to achieve to the best of their ability by setting ‘stretch and challenge’ questions and involvement in competitions such as the Biology Olympiad. Not only does this stand out on university applications, but I’ve also found this really useful because it tests my knowledge of the course and allows me to go beyond the specification, aiding my lateral thinking skills.

When I leave college, I hope to study Medicine. Carmel has provided me with the support and confidence to aim to study such a competitive degree. Carmel’s MedDentVet Club, MedSoc, has helped me improve my personal statement and interview technique, as well as increased my knowledge of current affairs in the medical profession.

Jasmine Lee
Wade Deacon Studying: Biology, Chemistry, Maths

How successful are our Biology students?

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of entries</th>
<th>A* B</th>
<th>A* C</th>
<th>A* E</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>100</td>
<td>30%</td>
<td>59%</td>
<td>97%</td>
</tr>
<tr>
<td>2017</td>
<td>127</td>
<td>38%</td>
<td>58%</td>
<td>98%</td>
</tr>
<tr>
<td>2018</td>
<td>134</td>
<td>37%</td>
<td>55%</td>
<td>99%</td>
</tr>
<tr>
<td>2019</td>
<td>118</td>
<td>40%</td>
<td>58%</td>
<td>95%</td>
</tr>
</tbody>
</table>
**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 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 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.

**Choosing to study Chemistry at Carmel was a great decision for me, as I have found the course very interesting and the standard of teaching is consistently excellent.**

I always come out of my lessons understanding what we have covered, but if I ever need extra help outside of lessons, I know there are many opportunities to ask. This includes Chemistry Clinic, which is run twice a week by the Chemistry department, where students can drop in to ask for clarification with anything or help with any work. I can also ask any of the teachers in the department for help at any time in college by going to the science work base and I know they are happy to help.

I have really enjoyed the enrichment opportunities on offer for Chemistry, such as the Cambridge Chemistry Challenge and the RSC Olympiad, both of which I participated in and which have given me a broader view of the subject outside of the A Level course.

I am currently set to go to university to study a Masters in Chemistry. One of the ways the department at Carmel supports myself and others to do the best we can, is by putting on A/A* masterclasses. These give us further insight on more difficult questions bordering into degree level content to challenge us. I have found this really helpful as it has pushed me to improve my problem-solving skills and to think outside the box more when approaching difficult questions.

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**Emma Savage**

Rainford High

Studying: Chemistry, Biology, Maths

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**How successful are our Chemistry students?**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of entries</th>
<th>A*-B</th>
<th>A*-C</th>
<th>A*-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>97</td>
<td>47%</td>
<td>71%</td>
<td>98%</td>
</tr>
<tr>
<td>2017</td>
<td>120</td>
<td>56%</td>
<td>74%</td>
<td>98%</td>
</tr>
<tr>
<td>2018</td>
<td>110</td>
<td>50%</td>
<td>84%</td>
<td>100%</td>
</tr>
<tr>
<td>2019</td>
<td>116</td>
<td>59%</td>
<td>85%</td>
<td>99%</td>
</tr>
</tbody>
</table>
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, computer science, architecture as well as physics.

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. The department has experienced 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. Particle Physics
3. Quantum Physics
4. Waves
5. Mechanics and materials
6. Electricity
7. Further mechanics and thermal physics
8. Magnetic Fields
9. Electric Fields
10. Gravitational Fields
11. Nuclear physics
12. 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 strongly 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 listed modules, practical skills and data analysis. There is a practical element to the course and 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?

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of entries</th>
<th>A*-B</th>
<th>A*-C</th>
<th>A*-E</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>52</td>
<td>42%</td>
<td>62%</td>
<td>96%</td>
</tr>
<tr>
<td>2017</td>
<td>69</td>
<td>36%</td>
<td>61%</td>
<td>99%</td>
</tr>
<tr>
<td>2018</td>
<td>64</td>
<td>34%</td>
<td>59%</td>
<td>97%</td>
</tr>
<tr>
<td>2019</td>
<td>63</td>
<td>44%</td>
<td>67%</td>
<td>98%</td>
</tr>
</tbody>
</table>
Where does this course lead?
This course will prepare you for a career in many science-based industries 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.

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.

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 successful are our Applied Science students?

<table>
<thead>
<tr>
<th>Year</th>
<th>Level</th>
<th>No of entries</th>
<th>Distinction* - Distinction</th>
<th>Distinction* - Merit</th>
<th>Distinction* - Pass</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>Subsidiary Diploma</td>
<td>38</td>
<td>82%</td>
<td>95%</td>
<td>100%</td>
</tr>
<tr>
<td>2017</td>
<td>Subsidiary Diploma</td>
<td>36</td>
<td>92%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2018</td>
<td>Subsidiary Diploma</td>
<td>49</td>
<td>88%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>2019</td>
<td>Subsidiary Diploma</td>
<td>47</td>
<td>94%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

(Distinction* = grade A*, Distinction = grade A at A Level)
Biology Trip to Yorkshire Dales

Our Biology students spent five days at Malham Tarn Field Studies Centre in the Yorkshire Dales. This was a great opportunity to spend time learning and researching outside of the classroom, experiencing hands-on practical work. The trip covered a number of topics including freshwater ecosystem sampling, investigating the living organisms found in a nearby river and small mammal trapping. Students learnt how population sizes of mobile organisms are calculated using a mark, release, recapture method. The group also completed a research task which will contribute towards the practical criteria needed to pass the Biology A Level.

To end a really enjoyable week, our staff and students sat round the campfire. They said they’d formed new friendships and gained a renewed enthusiasm for the biology topics covered in the classroom.

STEM Masterclass at the University of Liverpool

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

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.

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.

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STEM Masterclass at the University of Liverpool

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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 natural selection and evolution. This is always a valuable experience as this is on the specification and included the opportunity to handle specimens kept at the Zoo. After the lecture, students were free to enjoy the Zoo, see all the animals and of course, have an ice cream!
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 and in 2019 Team Carmel's Chemists won!

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. Last year 15 students took part with 2 Gold, 3 Silver and 6 Bronze certificates being awarded – congratulations!

Physics trip to CERN

Thirty students visited CERN in Geneva, one of the world’s largest and most respected centres for scientific research and home to the renowned Large Hadron Collider. The group enjoyed a guided tour of the Antimatter Factory and they were shown the Antiproton Decelerator and the new ELENA Decelerator.

Experiences

Tomorrow’s Engineers

Physics students who take part in the department’s weekly enrichment, ‘Tomorrow’s Engineers’, built a LEGO robot ‘Jeremiah’ that can solve a Rubik’s Cube! It took 3 months to build, using Lego Mindstorms, and a huge amount of persistence to overcome obstacles and mechanical errors that presented themselves during the engineering process!

Physics trip to Daresbury Labs

Physics students visited Daresbury Laboratory which specialises in particle accelerator technology. The group saw demonstrations of vacuum, electrostatic acceleration and superconductivity and attended lectures on particle physics and magnetic fields.

Physics Olympiad

Fifteen of our high achieving physics students took part in the British Physics Olympiad AS Challenge. This exam, administered by Oxford University, is taken by the best students in the country and is designed to stretch them to their limits.
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, Biology and Chemistry Olympiads and National Competitions. High Achievers’ 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, Biology in action lectures and vocational work placements, to competitions such as the Physics, Biology and Chemistry Olympiads. All the departments regularly undertake trips and destinations include Daresbury Atomic Laboratories, Fiddlers Ferry Power Station, Chester Zoo, Malham Tarn and London. There are also opportunities for overseas visits including the 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 entry requirements for these Science courses?

Biology
You will need grade 5 in GCSE Biology or 55 in Combined Science plus grade 5 in GCSE Maths and grade 4 in English Language.

Chemistry
You will need grade 5 in GCSE Chemistry or 55 in Combined Science plus grade 5 in GCSE Maths and grade 4 in English Language.

Physics
You will need grade 6 in GCSE Physics or 66 in Combined Science plus grade 6 in GCSE Maths and grade 5 in GCSE English Language.

BTEC Level 3 Applied Science
You will need grade 4 in GCSE Maths, English and Science.