NEW COLLEGE

Reading Lists for Physics

Congratulations on obtaining a place at New College and we look forward to welcoming you in October.

After the stresses of A-level exams you will no doubt want a break from study. However during the summer your natural intellectual curiosity may return leading to a desire to learn more about physics before arriving at Oxford. Below we have provided some suggestions for summer reading in preparation for starting the Oxford physics course.

Three strands make up a successful degree in physics. These are physical insight and intuition, mathematical competence and experimental skills. The first makes the subject tractable, the second makes problems soluble, while the third raises the subject from idle speculation to first among the sciences.

Here are some suggestions for the summer that will enable you to improve your skills at the first two strands of the subject before you arrive at New College.

Physical insight and intuition can be developed through what are often called Fermi questions. These are short estimation questions where the aim is to grasp the essence of the problem (the classic original being 'How many piano tuners are there in Chicago?'). Posing and solving such questions regularly will keep your physics brain sharp.

A book full of such questions is ‘The Flying Circus of Physics', which also contains solutions. There are also very many examples of Fermi questions available on the web which can easily be found via Google.

For general inspiration, the Feynman Lectures on Physics provide a classic if personal take on physics. Note however that these do not contain problems. You will no more become a physicist without solving problems than become a musician without practising.

The more mathematics you have, the better prepared you will be for the physics course. If you have not done two full A-levels in mathematics, or have done so with a lot of focus on Decision Maths/Statistics, time spent over the summer learning more Mechanics or Further Pure will not go unrewarded.

A book which will cover much of the mathematics you need during the Oxford physics course is 'Mathematical Methods for Physics and Engineering' by Riley, Hobson and Bence. Read at least the first two chapters. If you would like to focus on further particular topics, we suggest calculus and differential equations.

There will be vacation work related to this material, which you will be sent in August. The first tutorials of term will be based on this work.

If you find Riley, Hobson and Bence difficult at first then we recommend a transition text -- "Further Mathematics for the Physical Sciences" by Tinker and Lambourne -- which you may find helpful.

We also have a final suggestion on summer reading. An excellent reason to study physics is because you are excited and motivated by the big questions and the big experiments: astrophysics and cosmology, understanding the early universe, particle physics and the LHC, and the depths of quantum mechanics. You are now setting off on a path that will enable you, in a few years’ time, to understand these topics deeply and honestly. Now is the time to move beyond the popular science books which could originally have sparked your interest in physics. By first mastering the basics of the subject thoroughly, you will be rewarded by a full and genuine understanding of the big questions that may have brought you into physics in the first place.

Enjoy the summer, and we look forward to welcoming you to New College and Oxford!

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