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ABOUT THE COURSE

Theoretical Physics is a four year honours degree course combining modules in physics and mathematics. The programme emphasises the theoretical side of physics but includes experimental aspects. It also includes a range of modules in pure and applied mathematics and an introduction to computing. Topics include condensed matter physics, quantum mechanics, computational physics, particle physics, relativity, cosmology and astrophysics. The course code in Trinity is TR035.
WHAT IS THEORETICAL PHYSICS?

Theoretical physics explores the natural world at its most fundamental level, using mathematical theories guided by experimental investigation. It can be the foundation for a career in industry or research where analytic skills are highly valued, as well as providing an entry to an academic career in mathematics or physics. Theoretical Physics graduates from Trinity College are in high demand for their technical skills and versatility.

Theoretical Physics is taught jointly by the Schools of Physics and Mathematics and is an excellent course for those with good mathematical ability, who wish to acquire a deeper physical and mathematical knowledge of the world.

In the first two years the course comprises 40 credits in Mathematics and 20 credits in Physics and includes both computational and experimental laboratory classes. In the third and fourth years students take a mixture of physics modules and specialist mathematics and theoretical physics modules in the School of Mathematics. Students also carry out a theoretical or computational physics project in their final year and have the option of undertaking further project work.

IS IT FOR ME?

Yes, if you are strong in both Maths and Physics. Yes, if you enjoy solving problems – especially mathematical problems!

The School of Physics offers scholarships to incoming first year students, information is available on physics.tcd.ie
COURSE STRUCTURE

Junior Freshman & Senior Freshman (1st & 2nd year)

The first two years of the course aim to provide students with the broad background in both mathematics and physics that is required for a proper understanding of present day theoretical physics. In these two years, Theoretical Physics students take physics lectures and practicals, together with a considerable part of the Moderatorship course in mathematics. Freshman physics modules include thermal physics, oscillations and waves, optics, materials, nuclear physics, special relativity, and astrophysics. Freshman Mathematics focuses on linear algebra, analysis, mechanics and mathematical physics & computing.

Junior Sophister & Senior Sophister (3rd & 4th year)

The final two years of the degree consist of modules in mathematics and theoretical physics (including quantum mechanics, classical field theory, general relativity, statistical mechanics, statistical physics and quantum field theory) provided by the School of Mathematics, and a selection of specialist physics courses (including condensed matter physics, atomic and nuclear physics, high-energy physics, quantum optics, and astrophysics) from the School of Physics. In the third year the physics course includes a practical laboratory based module and a communication skills module. In the final year, students undertake research projects in theoretical or computational physics.

This degree will provide graduates with a strong backbone in highly complex problem-solving skills as well as logical and abstract thinking.
CAREER OPPORTUNITIES

Many Theoretical Physics graduates go on to pursue MSc and PhD graduate studies, however, our students are also prepared for careers in complementary areas such as actuarial science, computing and other analytical fields. This degree will provide graduates with a strong backbone in highly complex problem-solving skills as well as logical and abstract thinking, all of which are in high-demand in the current economic climate. Many of our graduates pursue research both in Trinity College and other world class research institutes around the world.

I graduated from Theoretical Physics in Trinity College in September 2008. Since then I have been working in the research area of nano-thermosplamronics (which involves heating up really small things with lasers). I completed my PhD in the Centre for Research on adaptive nanostructures and nanodevices (CRANN) on the Trinity College campus in 2012 and since then I have been working as a postdoctoral researcher in the area.

“Theoretical Physics is a multidisciplinary course which introduces concepts from pure mathematics, and connects these with the physical world. It provides a broad grounding in analytical, numerical and experimental skills which are essential for a career in research, but are also highly transferable. Graduates can choose from a wide range of career possibilities in academia, industry and business. Most importantly the degree itself is addictively interesting, with each year building to our current understanding of the universe.”

David McCloskey,
Theoretical Physics graduate

For more case studies, go to www.tcd.ie/physics/theoretical
TRINITY COLLEGE DUBLIN

Trinity College Dublin is one of the great universities of the world and is consistently ranked in the top 100 in the QS World University Rankings. It is widely recognized for the high quality of its graduates, the international standing of its research and scholarship, and the value it places on contributing to Irish society and the wider world.

Trinity College provides a stimulating environment where independence of thought is highly valued. With a distinguished history, it also has all the facilities associated with a modern university. Located in the heart of Dublin city, it has some 16,600 students and 2,900 staff. Students can experience a well-rounded University life through the range of clubs, societies, volunteer groups and other social activities.

The School of Physics is affiliated and has access to state-of-the-art research facilities within CRANN and the advanced microscopy lab (AML). Researchers from the School of Physics are currently involved in the AMBER (Advanced Materials and BioEngineering Research) project funded by Science Foundation Ireland. This project provides a partnership between leading researchers in material science and industry. The School of Physics is a major participant in the Trinity Centre for High Performance Computing, www.tchpc.tcd.ie. Graduates from both Schools are in strong demand for a wide range of jobs in industry and commerce.
SCHOOL OF PHYSICS (physics.tcd.ie)

The study and teaching of physics at Trinity College has a long and distinguished history dating back to the 18th century and includes figures such as Hamilton, Lloyd, Fitzgerald and Walton, who made important contributions to physics. Ernest T. S. Walton was the first Irish-born recipient of a Nobel prize in science (1951). The Sami Nasr Institute for Advanced Materials, completed in 2000, houses the central part of the School of Physics today. The school’s buildings provide excellent modern facilities for teaching and research for a very lively community of over 200, including 25 academic staff, more than 50 postdoctoral fellows and over 100 graduate students, representing nationalities from all over the world. Several academic staff specialize in theoretical physics, conducting research in quantum and condensed matter physics, computational physics, soft matter, and complex systems, and providing specialist teaching for the Theoretical Physics course.

SCHOOL OF MATHEMATICS (maths.tcd.ie)

The School of Mathematics has a long tradition of teaching and research excellence. Research in the School is enormously varied, ranging from the abstract idea of differential geometry and analysis to practical ideas of numerical analysis, modelling and computer algorithms, the nature of fundamental particles and general relativity, non-linear systems and fluid mechanics. This research diversity is reflected in the specialist Sophister course modules available to our students.
ENTRY REQUIREMENTS

Theoretical Physics

» Course Code: TR035

» Duration: 4 years, full time

» Points 2014: 550

» Points 2015: 565

» Degree Awarded: B.A.

Special Entry Requirements

» Leaving Certificate

— B3 in Mathematics and B3 in Physics

Advanced GCE

» Advanced GCE (A-Level): Grade B in Mathematics and Physics

For further information email: physics@tcd.ie or mathdep@maths.tcd.ie

Individual course requirements are available at: www.tcd.ie/courses/undergraduate

International entry requirements are available at: www.tcd.ie/study/non-eu/undergraduate