Theoretical Physics

CAO code: DN200 Option: Mathematical, Physical & Geological Sciences (MPG)

Sample pathway for a degree in Theoretical Physics *

YEAR 1 — ENGAGE WITH THE PRINCIPLES

PHYSICS *Topics include:*
- Foundations of Physics
- Frontiers of Physics
- Thermal Physics and Materials
- Quanta, Particles and Relativity

MATHEMATICS *Topics include:*
- Calculus in the Mathematical and Physical Sciences
- Linear Algebra in the Mathematical and Physical Sciences

APPLIED & COMPUTATIONAL MATHEMATICS *Topics include:*
- Applied Mathematics: Mechanics and Methods
- Applications of Differential Equations

- Two Elective modules
- One Small-Group Project

YEAR 2 — CHOOSE YOUR SUBJECTS

THEORETICAL PHYSICS – *Topics include:*
- Electronics and Devices
- Introductory Quantum Mechanics
- Fields, Waves and Light
- Methods for Physicists
- Calculus of Several Variables
- Oscillations and Waves
- Classical Mechanics and Special Relativity
- Vector Integral and Differential Calculus
- Computational Science

PHYSICS *Topics include:*
- Students who choose Theoretical Physics as their main subject for second year also cover the requirements for Physics.

- Two Elective modules

YEAR 3 — FOCUS ON YOUR CHOSEN SUBJECT

THEORETICAL PHYSICS – *Topics include:*
- Analytical Mechanics
- Partial Differential Equations
- Electromagnetism
- Foundations of Fluid Mechanics
- Thermodynamics & Statistical Physics
- Quantum Mechanics
- Functions of One Complex Variable
- Advanced Laboratory

- Two Elective modules

YEAR 4 — REFINE YOUR KNOWLEDGE

THEORETICAL PHYSICS – *Topics include:*
- Applied Quantum Mechanics
- Advanced Mathematical Methods
- High Energy Particle Physics
- Nuclear Physics
- General Relativity & Cosmology
- Quantum Theory of Condensed Matter
- Projects in Theoretical Physics
- Computational Biophysics
- Relativistic Quantum Mechanics
- Theoretical Astrophysics
- Quantum Field Theory
- Advanced Statistical Physics

BSc (Honours) Theoretical Physics

MSc
- MSc NanoBio Science
- MSc Meteorology
- MSc Space Science and Technology
- MSc Research
- MSc Physics by Negotiated Learning
- MSc Nanotechnology
- MSc Applied Mathematics & Computational Physics
- MSc Computational Physics

PhD
- Students can pursue a PhD in universities in Ireland or abroad in areas as diverse as theoretical physics, atomic physics, computational nanobio physics, particle physics, biophysics, nuclear physics, medical physics and astrophysics

Industry
- Financial Sector
- ICT industry
- Material Science & Nanotechnology
- Medical Physics and Biotechnology
- Geoscience & Exploration
- Energy Technology Sector
- Meteorology

Conversion Courses
- Professional Master of Education (PME)
- MA Economics
- Graduate Medicine
- Master of Business Administration
- Master in Management

**See page 42 for more information on subject choices. Potential combinations shown here are examples only and are not guaranteed by UCD. Topics are subject to change each year.*

Physics student Lána writing the Rydberg formula for the wavelengths of Hydrogen atomic transitions.

- Learn to understand and predict the behaviour of physical systems ranging from subatomic to astronomical scales using advanced mathematics

> "Theoretical physics at UCD provided me, not only with a solid grounding in both experimental and mathematical physics, but also with some of the most enjoyable years of my life, including a two-month internship at NASA."
>
> **Dr Joe Fitzsimons, Graduate**

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