Oxford Master Course
in
Mathematical and Theoretical Physics

Information for Prospective MMathPhys Students on Suggested Academic Background

Note that in some cases, it might be useful to take a course early instead of waiting for the MMathPhys year. If an overlap occurs between courses you have taken previously and some of the courses in this programme, you will have the flexibility and opportunity to explore another area, which you otherwise might not have had time for.

Suggestions for physics students (MPhys)

Parts A and B of the MPhys only have a small optional component consisting of Short Options. We consider the first three years of the MPhys to be adequate preparation for the MMathPhys. This said, if you are thinking of taking up the MMathPhys option in your 4th year, you may wish to consider the following Short Options:

- *All students:* S01 Functions of Complex Variables, S07 Classical Mechanics
- *Students interested in specialisations involving Quantum Field Theory and related topics (e.g., Teorica Universalis, Geometra, Particulata, Supercordula, Condensata, and Duracella example pathways (see* `http://mmathphys.physics.ox.ac.uk/students` *)):* S18 Advanced Quantum Mechanics
- It is possible within the MPhys to take Mathematics courses en lieu of Short Options. If you decide to do this, some of the suggestions for the Mathematics students in Section 4.3 may prove useful to you (we particularly recommend Part B Numerical Solutions to Differential Equations I, II).

Suggestions for Physics & Philosophy Students (MPhysPhil)

Part B of the MPhysPhil has an optional physics component. We recommend that you consider the following Part B papers:

- *All students:* B7 Classical Mechanics
- *Students interested in specialisations involving relativistic Quantum Field Theory, General Relativity, Cosmology, etc. (e.g., Teorica Universalis, Geometra, Particulata, Supercordula, Condensata, Duracella, Astra-Stella, and Cosmicosmica example pathways (see* `http://mmathphys.physics.ox.ac.uk/students` *)):* B2 Symmetry and Relativity, B3 General Relativity and Cosmology
- *Students interested in specialisations involving physics of continuous media of various kinds (e.g., Applicata, Continua, Condensata, Mollis, Complicata, Astra-Stella, Cosmicosmica, Gaia, and Plasma example pathways (see* `http://mmathphys.physics.ox.ac.uk/students` *)):* B1 Fluctuations, Flows and Complexity

Suggestions for Mathematics Students (MMath)

Both Parts A and B of the MMath have a large number of options. Here are some general recommendations to help the students interested in the MMathPhys make an informed choice.

- *All students:* We recommend the following courses that will teach you the basic mathematical and numerical techniques common to most areas of Theoretical/Mathematical Physics and Applied Mathematics: Part A: Differential Equations II, Numerical Analysis; Part B: Applied Partial Differential Equations, Numerical Solutions to Differential Equations I, II.

  We also recommend recommend that you consider some of the suite of courses that cover the foundations of modern physics: Part A: Quantum Theory, Special Relativity, Fluids and Waves; Part B: Classical Mechanics, Further Quantum Theory, Electromagnetism.

  Some of these will be more important than others depending on the specialisation that you might choose in the MMathPhys (see example pathways at `http://mmathphys.physics.ox.ac.uk/students` and consult your tutor in the first instance if in doubt as to what courses might be relevant).

- *Students interested in specialisations involving physics of continuous media of various kinds (e.g., Applicata, Continua, Condensata, Mollis, Complicata, Astra-Stella, Cosmicosmica, Gaia, and Plasma example pathways (see `http://mmathphys.physics.ox.ac.uk/students`)):* Part B Viscous Flow, Waves and Compressible Flow, Nonlinear Systems, Numerical Solutions to Differential Equations I, II.

- *Students interested in mathematical physics specialisations that involve a substantial amount of modern geometry and algebra (e.g., Geometra, Particulata and Supercordula example pathways (see `http://mmathphys.physics.ox.ac.uk/students`)):* There are a number of pure mathematics options that may prove useful, e.g., Part A Group Theory, Projective Geometry, Topology; Part B Geometry of Surfaces, Algebraic Curves, Introduction to Representation Theory, Topology and Groups. Consult your tutor for further advice.