

## B Case Studies

The following table details some examples of possible pathways through the Programme. These case studies are for illustrative purposes only and show the breadth and diversity of the programme. Many other paths through the course are possible — and in fact much more eclectic or more generalist selections of courses may be appropriate for students who have not settled on a specialisation they intend to pursue eventually. Indispensable courses (“core”) for each given case study are indicated in bold. 1 unit=16 lectures; at least 10 units have to be taken over three terms. Note that some of the Case Studies below are sufficiently broad to allow multiple pathways within them, however you should ensure that your chosen pathway allows you to fulfil the requirements for the overall number of units and the number of assessed units. Please see the examination conventions for further details of these requirements.

<i>Pathway</i>	<i>MT</i>	<i>HT</i>	<i>TT</i>
<p>Generalist Theoretical Physicist</p> <p><i>“TEORICA UNIVERSALIS”</i></p> <p><b>Core 6.25 units</b></p> <p>Total 10.25-12.25 units</p>	<p><b>1. QFT 24</b></p> <p><b>2. Kinetic Theory 28</b></p> <p><b>3. GR I 16</b></p> <p><b>4. Pert. Methods 16</b></p>	<p>1-3. <i>Three of</i></p> <p><b>Noneq. Stat. Phys 16</b></p> <p>Advanced QFT 24</p> <p>Renormalisation Group 20</p> <p>Advanced Quan. Th. 20</p> <p>Adv. Fluid Dyn. 16</p> <p>Collisionless Plasma Physics 18</p> <p>Random Matrix Theory</p> <p>Soft Matter 8</p> <p>Cosmology 16</p>	<p>1-3. <i>Three of</i></p> <p>Advanced Topics in Plasma Physics 8</p> <p>Quantum Matter 16</p> <p>The SM and Beyond I 16</p> <p>The SM and Beyond II 16</p> <p>QFT in Curved Space 16</p> <p>Dissertation</p>
<p>Applied Mathematician</p> <p><i>“APPLICATA”</i></p> <p><b>Core 7.75 units</b></p> <p>Total 10.25 units</p>	<p><b>1. Kinetic Theory 28</b></p> <p><b>2. GR I 16</b></p> <p><b>3. Pert. Methods 16</b></p> <p><b>4. Diff. Geometry 16</b></p> <p>5. Num. Lin. Algebra 16</p>	<p><b>1. Adv. Fluid Dyn. 16</b></p> <p>2. <i>One of</i></p> <p><b>Noneq. Stat. Phys 16</b></p> <p>Geophysical Fluid Dynamics 16</p> <p>Networks 16</p> <p>Collisionless Plasma Physics 18</p> <p>Galactic Dyn. 16</p> <p>GR II 16</p> <p>Random Matrix Theory 16</p> <p>Symbolic, Num. and Graphical Scientific Prog. 16</p> <p><b>3. Complex Variables 16</b></p>	<p>1. Adv. Topics in Plasma Physics 8</p> <p>2. Collisional Plasma Physics 16</p> <p>3. Dissertation</p>
<p>Fluid Dynamicist</p> <p><i>“CONTINUA”</i></p> <p><b>Core 3.75 units</b></p> <p>Total 10.75 units</p>	<p><b>1. Kinetic Theory 28</b></p> <p><b>2. Pert. Methods 16</b></p>	<p><b>1. Adv. Fluid Dyn. 16</b></p> <p>2. Soft Matter Phys. 8</p> <p>3. Collisionless Plasma Phys. 18</p> <p>4. Geophysical Fluid Dyn. 16</p> <p>5. Complex Variables 16</p> <p>6. Noneq. Stat. Phys 16</p>	<p>1. Collisional Plasma Physics 16</p> <p>2. Adv. Topics in Plasma Physics 8</p> <p>3. Dissertation</p>
<p>Mathematician with a physics streak</p> <p><i>“GEOMETRA”</i></p> <p><b>Core 5.5 units</b></p> <p>Total 10–11 units</p>	<p><b>1. QFT 24</b></p> <p><b>2. GR I 16</b></p> <p><b>3. Diff. Geometry 16</b></p> <p>4. <i>One of</i></p> <p>Groups &amp; Repr. 24</p> <p>Algebraic Topology 16</p> <p>Algebraic Geometry 16</p>	<p><b>1. String Theory I 16</b></p> <p>2. <i>One of</i></p> <p>Advanced QFT 24</p> <p>Astroparticle Phys. 8</p> <p>SUSY &amp; SUGRA 16</p> <p>GR II 16</p> <p>Geom. Group Theory 16</p> <p>Random Matrix Theory 16</p>	<p><b>1. String Theory II 16</b></p> <p>2. <i>Three of</i></p> <p>CFT 16</p> <p>The SM and Beyond I 16</p> <p>The SM and Beyond II 16</p> <p>QFT in Curved Space 16</p>

Particle Phenomenologist <i>“PARTICULATA”</i> <b>Core 5.5 units</b> Total 10 units	<b>1. QFT 24</b> <b>2. Groups &amp; Repr. 24</b> 3. <i>One of</i> GR I 16 Pert. Methods 16	<b>1. Advanced QFT 24</b> <b>2. SUSY &amp; SUGRA 16</b> 3. <i>Two of</i> String Theory I 16 GR II 16 Cosmology 16	<i>Two of</i> String Theory II 16 The SM and Beyond I 16 The SM and Beyond II 16 QFT in Curved Space 16
Hard-core String Theorist <i>“SUPERCORDULA”</i> <b>Core 7.5 units</b> Total 10.5 units	<b>1. QFT 24</b> <b>2. Groups &amp; Repr. 24</b> 3. <i>One of</i> GR I 16 Pert. Methods 16 Diff. Geometry 16 Algebraic Geometry 16	<b>1. Advanced QFT 24</b> <b>2. String Theory I 16</b> 3. <i>One of</i> SUSY & SUGRA 16 GR II 16 Cosmology 16	<b>1. String Theory II 16</b> <b>2. CFT 16</b> 3. <i>One of</i> The SM and Beyond I 16 The SM and Beyond II 16 QFT in Curved Space 16
Condensed Matter Theorist <i>“CONDENSATA”</i> <b>Core 3.5 units</b> Total 11.5–12.25 units	<b>1. QFT 24</b> 2. Advanced Quant. Th. 20 3. <i>One of</i> Kinetic Theory 28 Topological Quantum Theory 16	<b>1. Noneq. Stat. Phys. 16</b> 2. Advanced QFT 24 3. Adv. Fluid Dyn. 16 4. Random Matrix Theory 16 5. Renormalisation Group 20	<b>1. Quantum Matter 16</b> 3. CFT 16
Hard-core Hard Condensed Matter Theorist <i>“DURACELLA”</i> <b>Core 4.25 units</b> Total 10.5–11.25 units	<b>1. QFT 24</b> <b>2. Advanced Quant. Th. 20</b> 3. Kinetic Theory 28 4. Pert. Methods 16	<i>Three of</i> 1. Noneq. Stat. Phys. 16 2. Advanced QFT 24 3. String Theory I 16 4. Renormalisation Group 20 5. Adv. Fluid Dyn. 16 6. Random Matrix Theory	<b>1. Quantum Matter 16</b> 2. CFT 16
Soft Condensed Matter Physicist/Biophysicist <i>“MOLLIS”</i> <b>Core 5.25 units</b> Total 10.25 units	1. QFT 24 <b>2. Kinetic Theory 28</b> 4. Pert. Methods 16	<b>1. Adv. Fluid Dyn. 16</b> <b>2. Noneq. Stat. Phys. 16</b> <b>3. Soft Matter 8</b> 4. Networks 16 5. Collisionless Plasma 18	<b>1. Topics Soft Matter 8</b> 2. Dissertation

<p>All-round Astrophysicist  <i>“ASTRA-STELLA”</i>  <b>Core 3.75 units</b>  Total 10.75–11.75 units</p>	<p><b>1. Kinetic Theory 28</b>  <b>2. GR I 16</b>  3. <i>Two of</i>  QFT 24  Quantum Processes in Hot Plasma 16  Rad. Proc and High Energy Astro 18  Pert. Methods 16</p>	<p><b>1. Galactic Dyn. 16</b>  <b>2. Cosmology 16</b>  3. <i>Two of</i>  Adv. Fluid Dyn. 16  Collisionless Plasma Physics 18  Astroparticle Phys. 8  High Energy Density 16</p>	<p>1. <i>Two of</i>  Advanced Topics in Plasma Physics 8  QFT in Curved Space 16  Dissertation</p>
<p>Dedicated Cosmologist  <i>“COSMICOSMICA”</i>  <b>Core 3 units</b>  Total 10.75 units</p>	<p><b>1. GR I 16</b>  2-5.  QFT 24  Kinetic Theory 28  Pert. Methods 16  Rad. Proc. and High Energy Astro 18</p>	<p><b>1. Cosmology 16</b>  <b>2. GR II 16</b>  3. Galactic Dyn. 16  4. Astroparticle Physics 8</p>	<p>1. QFT in Curved Space 16</p>
<p>Geophysicist/  Climate Physicist  <i>“GAIA”</i>  <b>Core 2 units</b>  Total 7.75 units</p>	<p>1. Kinetic Theory 28  <b>3. Pert. Methods 16</b></p>	<p><b>1. Geophysical Fluid Dynamics 16</b>  2. Advanced Fluid Dynamics 16  3. Networks 16  4. Noneq. Stat. Phys. 16</p>	<p>1. Dissertation</p>
<p>Plasma Theorist  <i>“PLASMA”</i>  <b>Core 5.75 units</b>  Total 10.75 units</p>	<p><b>1. Kinetic Theory 28</b>  <b>2. Pert. Methods 16</b>  3. Quantum Processes in Hot Plasma 16</p>	<p><b>1. Adv. Fluid Dyn. 16</b>  <b>2. Collisionless Plasma Physics 18</b>  3. Noneq. Stat. Phys. 16  4. <i>One of</i>  Complex Variables 16  High Energy Density 16</p>	<p><b>1. Adv. Topics in Plasma Phys. 8</b>  2. Dissertation  3. Collisional Plasma Physics 16</p>