

## School of Physics & Astronomy

### Important Degree Information:

#### **B.Sc./M.A. Honours**

The general requirements are 480 credits over a period of normally 4 years (and not more than 5 years) or part-time equivalent; the final two years being an approved honours programme of 240 credits, of which 90 credits are at 4000 level and at least a further 120 credits at 3000 and/or 4000 levels. Refer to the appropriate Faculty regulations for lists of subjects recognised as qualifying towards either a B.Sc. or M.A. degree.

#### **B.Sc./M.A. Honours with Integrated Year Abroad**

The general requirements are 540 credits over a period of normally 5 years (and not more than 6 years) or part-time equivalent; the final three years being an approved honours programme of 300 credits, of which 60 credits are gained during the integrated year abroad, 90 credits are at 4000 level and at least a further 120 credits at 3000 and/or 4000 levels. Refer to the appropriate Faculty regulations for lists of subjects recognised as qualifying towards either a B.Sc. or M.A. degree.

#### **M.Phys. Honours**

The general requirements are 600 credits over a period of normally 5 years (and not more than 6 years) or part-time equivalent; the final three years being an approved honours programme of 360 credits, of which 120 credits are at 5000 level and a further 210 credits (minimum) at 3000 and 4000 levels.

#### **M.Sci. Honours**

The general requirements are 600 credits over a period of normally 5 years (and not more than 6 years) or part-time equivalent; the final three years being an approved honours programme of 360 credits, of which 120 credits are at 5000 level and a further 210 credits (minimum) at 3000 and 4000 levels.

#### **B.Eng. Honours**

The general requirements are 480 credits over a period of normally 4 years (and not more than 5 years) or part-time equivalent; the final two years being an approved honours programme of 240 credits, of which 90 credits are at 4000 level and a further 150 credits at 3000 and 4000 levels.

#### **M.Eng. Honours**

The general requirements are 600 credits over a period of normally 5 years (and not more than 6 years) or part-time equivalent; the final three years being an approved honours programme of 360 credits, of which 120 credits are at 5000 level and a further 240 credits at 3000 and 4000 levels.

**Other Information:** In the case of students who spend part of the Honours Programme abroad on a recognised Exchange Scheme, the Programme Requirements will be amended to take into account courses taken while abroad.

**Physics & Astronomy – Sub-honours 2007/08 – August 2007**

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
(B.Sc. Honours): <b>Astrophysics</b>	<p><b>Single Honours Astrophysics (B.Sc.) Degree:</b>  <b>Level 1:</b> 80 credits comprising: PH1011, PH1012, MT1002 and AS1001. For those who enter at second level, the PH modules are not required.</p> <p><b>Level 2:</b> At least 120 credits comprising: 11 or better in AS2001, PH2011, PH2012, and in MT2001.</p> <p><b>Level 3:</b> 105 credits comprising: AS3011, AS3013, PH3007, PH3012, PH3014, PH3061, PH3062 PH3066 and PH3075 (except for students who have taken MT2003).</p> <p><b>Level 4:</b> At least 60 credits comprising: AS4103, PH4022 and at least two of AS3015, AS4021 - AS4025, and PH4031.</p>
(M.Phys. Honours): <b>Astrophysics</b>	<p><b>Single Honours Astrophysics (M.Phys) Degree:</b>  <b>Level 1:</b> 80 credits comprising: PH1011, PH1012, MT1002 and AS1001. For those who enter at second level, the PH modules are not required.</p> <p><b>Level 2:</b> At least 120 credits comprising: 15 or better in AS2001, PH2011 and PH2012, and 11 or better in MT2001 .</p> <p><b>Level 3:</b> 110 credits comprising: AS3011, AS3013, AS3015, PH3007, PH3012, PH3014, PH3061, PH3062, PH3066 and PH3075 (except for students who have taken MT2003).</p> <p><b>Level 4:</b> At least 55 credits comprising: AS4022, AS4023, PH4022 and at least two of AS4021, AS4024, AS4025 and PH4031.</p> <p><b>Level 5:</b> At least 90 credits comprising: AS5101 and at least two of AS5001, AS5002, AS5003.</p>
(B.Sc. Honours): <b>Physics</b>	<p><b>Single Honours Physics (B.Sc.) Degree:</b>  <b>Level 1:</b> 60 credits comprising: PH1011, PH1012, and MT1002. For those who enter at second level, the PH modules are not required.</p> <p><b>Level 2:</b> At least 90 credits comprising: 11 or better in PH2011, PH2012, and in MT2001.</p> <p><b>Level 3:</b> 105 credits comprising: PH3002, PH3007, PH3012, PH3014, PH3061, PH3062, PH3066, PH3075 (except for students who have taken MT2003) and PH3101.</p> <p><b>Level 4:</b> 70 credits comprising: PH4021, PH4022, PH4105 and PH4111.</p>

**Physics & Astronomy – Sub-honours 2007/08 – August 2007**

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
<p>(B.Sc. Honours):  <b>Physics and - Computer Science, Internet Computer Science, Logic &amp; Philosophy of Science, Mathematics.</b></p>	<p><b>Physics element of Joint Degree:</b>  <b>Level 1:</b> 60 credits comprising: PH1011, PH1012, and MT1002. For those who enter at second level, the PH modules are not required.   <b>Level 2:</b> At least 90 credits comprising: 11 or better in PH2011, PH2012, and in MT2001   <b>Level 3:</b> 60 credits comprising: PH3007, PH3012, PH3061, PH3062, PH3066 and PH3075 (except for students who have taken MT2003).   <b>Level 4:</b> 10 credits comprising PH4022.</p>
<p>(B.Sc. Honours):  <b>Physics with French^;</b>  <b>Physics with Spanish^</b></p> <p>^ available also as 'With Integrated Year Abroad Degrees'</p>	<p><b>Physics element of Major Degree Programmes:</b>  <b>Level 1:</b> 60 credits comprising: PH1011, PH1012, and MT1002. For those who enter at second level, the PH modules are not required.   <b>Level 2:</b> At least 90 credits comprising: 11 or better in PH2011, PH2012, and in MT2001.   <b>Level 3:</b> 90 credits comprising: PH3002, PH3007, PH3012, PH3061, PH3062, PH3066, PH3075 (except for students who have taken MT2003) and at least one of PH3101, PH4105.   <b>Level 4:</b> 55 credits comprising: PH4021, PH4022 and PH4111.</p>
<p>(M.Phys. Honours):  <b>Physics</b></p>	<p><b>Single Honours Physics (M.Phys.) Degree:</b>  <b>Level 1:</b> 60 credits comprising PH1011, PH1012, and MT1002. For those who enter at second level, the PH modules are not required.   <b>Level 2:</b> At least 90 credits comprising: 15 or better in PH2011 and PH2012, and 11 or better in MT2001   <b>Level 3:</b> 135 credits comprising: PH3002, PH3004 or PH3074, PH3007, PH3012, PH3014, PH3061, PH3062, PH3066, PH3073, PH3075 (except for students who have taken MT2003) and PH3101.   <b>Level 4:</b> 60 credits comprising: PH4021, PH4022, PH4028, PH4030 and PH4105.   <b>Level 5:</b> 60 credits comprising: PH5101.</p>

**Physics & Astronomy – Sub-honours 2007/08 – August 2007**

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
(M.Phys. Honours): <b>Physics with Photonics</b>	<p><b>Physics with Photonics (M.Phys.) Degree:</b></p> <p><b>Level 1:</b> 60 credits comprising: PH1011, PH1012, and MT1002. For those who enter at second level, the PH modules are not required.</p> <p><b>Level 2:</b> At least 90 credits comprising: 15 or better in PH2011 and PH2012, and 11 or better in MT2001</p> <p><b>Level 3:</b> 165 credits comprising: PH3002, PH3007, PH3010 or PH4035, PH3012, PH3014, PH3061, PH3062, PH3066, PH3073, PH3074, PH3075 (except for students who have taken MT2003) and PH3101.</p> <p><b>Level 4:</b> 60 credits comprising: PH4021, PH4022, PH4027, PH4028, PH4030, PH4034, and PH4105.</p> <p><b>Level 5:</b> 90 credits comprising: PH5005, PH5008 and PH5101.</p>
(M.Sci. Honours): <b>Physics and Chemistry (M.Sci. Honours) 5 year Degree</b>	<p><b>Physics element of Physics-Chemistry M.Sci. Degree:</b></p> <p><b>Level 1:</b> 60 credits comprising: PH1011, PH1012, MT1002</p> <p><b>Level 2:</b> At least 90 credits comprising: 15 or better in PH2011 and PH2012, and 11 or better in MT2001</p> <p><b>Level 3:</b> At least 90 credits comprising: PH3002, PH3007, PH3012, PH3061, PH3062, PH3066, PH3075 (except for students who have taken MT2003) and at least one of PH3101, PH4105</p> <p><b>Level 4:</b> 25 credits comprising: PH4021 and PH4022</p> <p><b>Level 5:</b> At least 30 credits comprising: either PH5101 or CH5441, and at least 2 PH5000 level modules excluding PH5101</p>
(M.Phys. Honours): <b>Theoretical Physics</b>	<p><b>Single Honours Theoretical Physics (M.Phys.) Degree:</b></p> <p><b>Level 1:</b> 60 credits comprising: PH1011, PH1012, and MT1002. For those who enter at second level, the PH modules are not required.</p> <p><b>Level 2:</b> At least 90 credits comprising: 15 or better in PH2011 and PH2012, and in MT2001</p> <p><b>Level 3:</b> 120 credits comprising: MT3501, PH3002, PH3007, PH3012, PH3014, PH3061, PH3062, PH3066, PH3073 and PH3075 (except for students who have taken MT2003).</p> <p><b>Level 4:</b> 60 credits comprising: PH4021, PH4022, PH4028, PH4030, PH4032.</p> <p><b>Level 5:</b> At least 90 credits comprising: PH5002, PH5004, PH5102 and at least one of PH5003, PH5011 and PH5012.</p>
(M.Phys. Honours): <b>Theoretical Physics and Mathematics</b>	<p><b>Theoretical Physics element of Joint M.Phys. Degree:</b></p> <p><b>Level 1:</b> 40 credits comprising: PH1011, PH1012. For those who enter at second level, these PH modules are not required.</p> <p><b>Level 2:</b> 60 credits comprising: 15 or better in PH2011 and PH2012.</p> <p><b>Level 3:</b> At least 65 credits comprising: PH3007, PH3012, PH3061, PH3062, PH3075 (except for students who have taken MT2003). and (PH3073 or MT4507)</p> <p><b>Level 4:</b> 35 credits comprising: PH4022, PH4028 and PH4032.</p> <p><b>Level 5:</b> At least 85 credits comprising: PH5002, PH5004, PH5102 or MT5999, and at least one of PH5003, PH5011 and PH5012.</p>

<b>Degree Programmes</b>	<b>Programme Requirements at:</b>
(B.Eng. Honours): <b>Microelectronics and Photonics</b>  <b>Not available to entrants from 2007/8</b>	<b>Single Honours Microelectronics and Photonics (B.Eng.) Degree:</b>  <b>Level 1:</b> 60 credits comprising: PH1011, PH1012 and MT1002.  <b>Level 2:</b> Modules taught by University of Dundee: 120 credits comprising: EG21001, EG21002, EG21005, EG22001, EG22002, EG22004.  <b>Level 3:</b> 120 credits comprising: PH3007, PH3014, PH3066, PH3075, PH3110, and modules taught by the University of Dundee: EE31001, EE32002.  <b>Level 4:</b> 115 credits comprising: PH4025, PH4027, PH4034, PH4035, and modules taught by the University of Dundee EG40001, EG40003, EG40005.
(M.Eng. Honours): <b>Microelectronics and Photonics</b>  <b>Not available to entrants from 2007/8</b>	<b>Single Honours Microelectronics and Photonics (M.Eng.) Degree:</b>  <b>Level 1:</b> 60 credits comprising: PH1011, PH1012 and MT1002.  <b>Level 2:</b> Modules taught by University of Dundee: 120 credits comprising: EG21001, EG21002, EG21005, EG22001, EG22002, EG22004.  <b>Level 3:</b> 120 credits comprising: PH3007, PH3014, PH3066, PH3075, PH3110 and modules taught by the University of Dundee: EE31001, EE32002.  <b>Level 4:</b> 105 credits comprising: PH4025, PH4027, PH4034, PH4035, and modules taught by the University of Dundee: EG40001, EG40003.  <b>Level 5:</b> 120 credits comprising: PH5018, PH5019 and modules taught by the University of Dundee: CE52001, EE50002 and EE50003.

## Modules

### InterDisciplinary (ID) Modules

This School contributes to an InterDisciplinary module **ID2004 Science Ethics (Section 23)**

### Astronomy (AS) Modules

#### AS1001 Astronomy and Astrophysics 1

Credits: 20.0

Semester: 1

Prerequisites: Higher Physics or AS-level Physics, and Higher or AS-Level Mathematics.

Anti-requisite: AS1002

Description: This module surveys our present state of knowledge of the orbits, surfaces and atmospheres of the planets in our solar system; the structure and evolution of the Sun and other stars, including extra-solar planetary systems; the bizarre menagerie of star-forming regions, violent stellar objects and supermassive black holes found within our own Milky Way Galaxy and in other galaxies; and the large-scale structure and ultimate fate of the expanding Universe. Throughout the module, fundamental observations are interpreted using simple but powerful geometric methods to show how distances and other properties of astronomical objects throughout the Universe have been measured, from the time of Copernicus to the era of the Hubble Telescope and beyond.

Class Hour: 11.00 am

Teaching: Four lectures, one tutorial and one laboratory.

Assessment: Laboratory work = 25%, Continuous Assessment = 15%, 2 Hour Examination = 60%

Re-Assessment: Laboratory work = 25%, 2 Hour Examination = 75%

## **Physics & Astronomy – Sub-honours 2007/08 – August 2007**

### **AS1002 The Physical Universe**

Credits: 20.0 Semester: 2

Anti-requisites: AS1001 or PH1011 or PH1012

Description: This module presents a descriptive, non-mathematical account of the physical universe. It is divided into two components: concepts in astronomy, dealing with our understandings of the properties and ages of planets, stars, galaxies, and their distributions in space, cosmology and the origin of the Universe; and concepts in physics, dealing with our understandings of the nature of light and matter, the structure of atoms, fundamental particles and their links to cosmology.

Class Hour: 5.00 pm

Teaching: Four lectures, one tutorial/seminar.

Assessment: Continuous Assessment = 50%, 2 Hour Examination = 50%

Re-Assessment: 2 Hour Examination = 100%

### **AS2001 Astronomy and Astrophysics 2**

Credits: 30.0 Semester: 1

Prerequisites: AS1001, PH1011, PH1012 and MT1002; alternatively (for the PH and MT modules) passes in Advanced Higher Physics and Mathematics or in A-level Physics and Mathematics, both normally at grade A.

Description: This module comprises four lecture courses which extend knowledge gained in the first level module AS1001, and discuss recent developments in the subject: (i) observational techniques - modern telescopes, instruments and detectors for gamma-, X-, uv, optical, IR and radio radiation; spherical astronomy and essential coordinate systems; (ii) the structure and evolution of stars - nucleosynthesis, stellar properties as a function of age, a complete understanding of the HR diagram; (iii) the chemical evolution of the Universe - abundances from the Big Bang to the present; (iv) galactic astronomy - the distribution and motion of stars, gas, dust, and dark matter in our Milky Way and other galaxies.

Class Hour: 11.00 am

Teaching: Four lectures, one tutorial and one laboratory.

Assessment: Laboratory work = 25%, Continuous Assessment = 15%, 3 Hour Examination = 60%

Re-Assessment: Laboratory work = 25%, 3 Hour Examination = 75%

## **Physics (PH) Modules**

### **PH1011 Physics 1A**

Credits: 20.0 Semester: 1

Prerequisite(s): Passes in Higher Mathematics and Physics, both at grade B or better, or passes in A-Level Mathematics and Physics, at grade combination BC or better.

Anti-requisite: AS1002

Description: This module covers the core subjects of mechanics, waves and optics, and also provides an introduction to lasers and optoelectronics. It is suitable for those who have studied physics to the level of Higher Physics or equivalent. It includes lectures on the dynamics of particles, gravitation, simple harmonic motion, the different types of wave motion, geometrical and wave optics, the principles of lasers, and some aspects of optical communication.

Class Hour: 12.00 noon

Teaching: Four lectures, one workshop, one tutorial and one laboratory.

Assessment: Continuous Assessment = 40%, 2 Hour Examination = 60%

Re-Assessment: Continuous Assessment = 40%, 2 Hour Examination = 60%

**PH1012 Physics 1B**

Credits: 20.0 Semester: 2

Prerequisite(s): Passes in Higher Mathematics and Physics, both at grade B or better, or passes in A-Level Mathematics and Physics, at grade combination BC or better.

Anti-requisite: AS1002

Description: This module covers the core subjects of quantum phenomena and the properties of matter, and provides an elementary introduction to the theory of relativity. It is suitable for those who have studied physics to the level of Higher Physics or equivalent. It includes lectures on the origins of quantum theory, its application to atoms and other small scale systems; the nature and composition of nuclei, atoms, molecules and solids; and a few lectures on Einstein's relativity theory.

Class Hour: 12.00 noon

Teaching: Four lectures, one workshop, one tutorial and one laboratory.

Assessment: Continuous Assessment = 40%, 2 Hour Examination = 60%

Re-Assessment: Continuous Assessment = 40%, 2 Hour Examination = 60%

**PH2011 Physics 2A**

Credits: 30.0 Semester: 1

Prerequisite(s): PH1011, PH1012 and MT1002; alternatively passes in Advanced Higher Physics and Mathematics or A-level Physics and Mathematics, both normally at grade A.

Description: This module covers the subjects of mechanics and relativity, oscillations and waves, and photonics. It is suitable for those who have taken the specified first year modules in physics and mathematics, or have good Advanced Higher or A-level passes or equivalent in physics and mathematics. It includes lectures on the dynamics of particles and rigid bodies, gravitation, Einstein's special theory of relativity, free, forced and damped harmonic motion, waves on strings, acoustics, polarisation of light, interference and diffraction.

Class Hour: 10.00 am

Teaching: Four or five lectures, one workshop, one tutorial and one laboratory.

Assessment: Continuous Assessment = 40%, 3 Hour Examination = 60%

Re-Assessment: Continuous Assessment = 40%, 3 Hour Examination = 60%

**PH2012 Physics 2B**

Credits: 30.0 Semester: 2

Prerequisite(s): PH1011, PH1012 and MT1002; alternatively passes in Advanced Higher Physics and Mathematics or A-level Physics and Mathematics, both normally at grade A.

Description: This module covers the subjects of quantum physics, electricity and magnetism and thermal physics. It is suitable for those who have taken the specified first year modules in physics and mathematics, or have good Advanced Higher or A-level passes or equivalent in physics and mathematics. It includes lectures on the origin of Schrodinger's equation in quantum mechanics and its solution for simple one-dimensional potentials; an elementary introduction to the electromagnetic field comprising electrostatics, magnetostatics, electromagnetic induction and circuit theory; and lectures on thermal physics including elementary thermodynamics and the notion of entropy.

Class Hour: 10.00 am

Teaching: Four or five lectures, one workshop, one tutorial and one laboratory.

Assessment: Continuous Assessment = 40%, 3 Hour Examination = 60%

Re-Assessment: Continuous Assessment = 40%, 3 Hour Examination = 60%

**The details of the Honours modules – that is 3000, 4000 and 5000 level modules – which relate to the programmes listed in this section, are available in the Honours Course Catalogue.**

