

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 (H) 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 (H) 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 (being phased out)

The general requirements of 540 credits over a period of normally 4 years; of which 300 credits are in an approved honours programme. See earlier regulations.

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.

The Honours syllabus is undergoing a major change commencing in 2002-03 and Programme requirements listed below are those for students entering the first year of the Honours Programme in 2002-03 or subsequently. Students entering the Second Year of the Honours programme in 2002-03 should refer to School Handbooks and consult Honours Advisers for the requirements of their honours programme.

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Degree Programmes	Programme Requirements at:
<p>(B.Sc. Honours): Astrophysics</p>	<p>Single Honours Astrophysics (B.Sc.) Degree: Level 1: 80 credits comprising: PH1001 or PH1011, PH1002 or PH1012, MT1002 and AS1001. For those who enter at second level, the PH modules are not required.</p> <p>Level 2: At least 120 credits comprising: 11 or better in AS2001, PH2011, PH2012, and in MT2101 or (MT2001 and MT2003).</p> <p>Level 3: 110 credits comprising: AS3011 – AS3013, PH3014, PH3061, PH3062, and PH3064 – PH3067.</p> <p>Level 4: At least 50 credits comprising: AS4103, and at least two of AS3014, AS3015, AS4021-AS4024, and PH4031.</p> <p>Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>
<p>(M.Sci. Honours): Astrophysics</p>	<p>Single Honours Astrophysics (M.Sci.) Degree: Level 1: 80 credits comprising: PH1001, PH1002, MT1002, and AS1001.</p> <p>Level 2: At least 120 credits comprising: 15 or better in AS2001, PH2011 and PH2012, and 11 or better in MT2101 or (MT2001 and MT2003).</p> <p>Level 3: 125 credits comprising: AS3011 – AS3013, AS3101, PH3014, PH3061, PH3062, and PH3064 – PH3067.</p> <p>Level 4: At least 55 credits comprising: AS4024 and at least 45 credits from AS3015, AS4021, AS4022, AS4023 and PH4031</p> <p>Level 5: 75 credits comprising: AS5101 and at least two of AS5001, AS5002, AS5003.</p> <p>Other Information: This programme applies only to students entering third level in September 2002.</p>
<p>(M.Phys. Honours): Astrophysics</p>	<p>Single Honours Astrophysics (M.Phys) Degree: Level 1: 80 credits comprising: PH1001 or PH1011, PH1002 or PH1012, MT1002 and AS1001. For those who enter at second level, the PH modules are not required.</p> <p>Level 2: At least 120 credits comprising: 15 or better in AS2001, PH2011 and PH2012, and 11 or better in MT2101 or (MT2001 and MT2003).</p> <p>Level 3: 140 credits comprising: AS3011 – AS3015, PH3014, PH3061, PH3062, and PH3064 – PH3067.</p> <p>Level 4: 60 credits comprising: AS4021-AS4024, PH4031.</p> <p>Level 5: 90 credits comprising AS5001-AS5003 and AS5101.</p> <p>Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>

Degree Programmes	Programme Requirements at:
<p>(B.Sc. Honours): Physics</p>	<p>Single Honours Physics (B.Sc.) Degree: Level 1: 60 credits comprising: PH1001 or PH1011, PH1002 or PH1012, and MT1002. For those who enter at second level, the PH modules are not required. Level 2: At least 90 credits comprising: 11 or better in PH2011, PH2012, and in MT2101 or (MT2001 and MT2003). Level 3: 125 credits comprising: PH3002, PH3014, PH3061, PH3062, PH3064 – PH3067, PH3101 and PH3102. Level 4: 45 credits comprising: PH4021 and PH4111. Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>
<p>(B.Sc. Honours): Physics and Chemistry, Computer Science, Internet Computing, Logic & Philosophy of Science, Mathematics.</p>	<p>Physics element of Joint Degree: Level 1: 60 credits comprising: PH1001 or PH1011, PH1002 or PH1012, and MT1002. For those who enter at second level, the PH modules are not required. Level 2: At least 90 credits comprising: 11 or better in PH2011, PH2012, and in MT2101 or (MT2001 and MT2003). Level 3: 65 credits comprising: PH3061, PH3062, PH3064 – PH3067. Level 4: No specific requirements – see B.Sc. Honours statement at beginning of chapter Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>
<p>(B.Sc. Honours): Physics with French[^]; Physics with Management</p> <p>[^] available also as 'with Integrated Year Abroad Degrees'</p>	<p>Physics element of Major Degree Programmes: Level 1: 60 credits comprising: PH1001 or PH1011, PH1002 or PH1012, and MT1002. For those who enter at second level, the PH modules are not required. Level 2: At least 90 credits comprising: 11 or better in PH2011, PH2012, and in MT2101 or (MT2001 and MT2003). Level 3: 95 credits comprising: PH3002, PH3061, PH3062, PH3064 – PH3067, and at least one of PH3101, PH3102. Level 4: 45 credits comprising: PH4021 and PH4111. Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>
<p>(M.Phys. Honours): Physics</p>	<p>Single Honours Physics (M.Phys.) Degree: Level 1: 60 credits comprising: PH1001 or PH1011, PH1002 or PH1012, and MT1002. For those who enter at second level, the PH modules are not required. Level 2: At least 90 credits comprising: 15 or better in PH2011 and PH2012, and 11 or better in MT2101 or (MT2001 and MT2003). Level 3: 140 credits comprising: PH3002, PH3004, PH3014, PH3061, PH3062, PH3064 – PH3067, PH3101 and PH3102. Level 4: 35 credits comprising: PH4021, PH4028 and PH4030. Level 5: 45 credits comprising: PH5101. Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>

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Degree Programmes	Programme Requirements at:
(M.Sci. Honours): Physics	<p>Single Honours Physics (M.Sci) Degree: Level 1: 60 credits comprising: PH1001, PH1002 and MT1002.</p> <p>Level 2: At least 90 credits comprising: 15 or better in PH2011 and PH2012, and 11 or better in MT2101 or (MT2001 and MT2003).</p> <p>Level 3: 110 credits comprising: PH3002, PH3014, PH3061, PH3062, PH3064 – PH3067, PH3101 and PH3102.</p> <p>Level 4: 35 credits comprising: PH4021, PH4028 and PH4030.</p> <p>Level 5: 45 credits comprising: PH5101.</p> <p>Other Information: This programme applies only to students entering third level in September 2002.</p>
(M.Phys. Honours): Physics with Photonics	<p>Physics with Photonics (M.Phys.) Degree: Level 1: 60 credits comprising: PH1001 or PH1011, PH1002 or PH1012, and MT1002. For those who enter at second level, the PH modules are not required.</p> <p>Level 2: At least 90 credits comprising: 15 or better in PH2011 and PH2012, and 11 or better in MT2101 or (MT2001 and MT2003).</p> <p>Level 3: 155 credits comprising: PH3002, PH3005, PH3010, PH3014, PH3061, PH3062, PH3064 – PH3067, PH3101 and PH3102.</p> <p>Level 4: 50 credits comprising: PH4021, PH4027, PH4028 and PH4030.</p> <p>Level 5: 75 credits comprising: PH5005, PH5008 and PH5101.</p> <p>Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>
(M.Sci. Honours): Physics with Photonics	<p>Physics with Photonics (M.Sci.) Degree: Level 1: 60 credits comprising: PH1001, PH1002 and MT1002.</p> <p>Level 2: At least 90 credits comprising: 15 or better in PH2011 and PH2012, and 11 or better in MT2101 or (MT2001 and MT2003).</p> <p>Level 3: 155 credits comprising: PH3002, PH3005, PH3010, PH3014, PH3061, PH3062, PH3064 – PH3067, PH3101 and PH3102.</p> <p>Level 4: 50 credits comprising: PH4021, PH4027, PH4028 and PH4030.</p> <p>Level 5: 75 credits comprising: PH5005, PH5008 and PH5101.</p> <p>Other Information: This programme applies only to students entering third level in September 2002.</p>
(M.Sci. Honours): Theoretical Physics and Mathematics	<p>Theoretical Physics element of Joint M.Sci. Degree: Level 1: 40 credits comprising: PH1001, PH1002.</p> <p>Level 2: 60 credits comprising: 15 or better in PH2011 and PH2012.</p> <p>Level 3: At least 65 credits comprising: PH3061, PH3062, PH3064, PH3065, PH3067, and PH3073 or MT4507.</p> <p>Level 4: 25 credits comprising: PH4029, PH4032.</p> <p>Level 5: At least 45 credits comprising: PH5002, PH5004, PH5102 or MT5998, and at least one of PH4022, PH5003, PH5011 and PH5012.</p> <p>Other Information: This programme applies only to students entering third level in September 2002.</p>

Degree Programmes	Programme Requirements at:
<p>(M.Phys. Honours): Theoretical Physics and Mathematics</p>	<p>Theoretical Physics element of Joint M.Phys. Degree: Level 1: 40 credits comprising: PH1001 or PH1011, PH1002 or PH1012. For those who enter at second level, the PH modules are not required.</p> <p>Level 2: 60 credits comprising: 15 or better in PH2011 and PH2012.</p> <p>Level 3: At least 65 credits comprising: PH3061, PH3062, PH3064, PH3065, PH3067, and PH3073 or MT4507.</p> <p>Level 4: 50 credits comprising: PH4022, PH4028, PH4029 and PH4032.</p> <p>Level 5: At least 45 credits comprising: PH5002, PH5004, PH5102 or MT5998, and at least one of PH5003, PH5011 and PH5012.</p> <p>Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>
<p>(M.Phys. Honours): Theoretical Physics</p>	<p>Single Honours Theoretical Physics (M.Phys.) Degree: Level 1: 60 credits comprising: PH1001 or PH1011, PH1002 or PH1012, and MT1002. For those who enter at second level, the PH modules are not required.</p> <p>Level 2: At least 90 credits comprising: 15 or better in PH2011 and PH2012, and in MT2101 or (MT2001 and MT2003).</p> <p>Level 3: 120 credits comprising: MT3501, PH3002, PH3014, PH3061, PH3062, PH3064-PH3067, PH3073.</p> <p>Level 4: 75 credits comprising: PH4021, PH4022, PH4028- PH4030, PH4032.</p> <p>Level 5: At least 75 credits comprising: PH5002, PH5004, PH5102 and at least one of PH5003, PH5011 and PH5012.</p> <p>Other Information: This programme applies to all students entering third level from September 2002 onwards.</p>
<p>(M.Sci. Honours): Theoretical Physics</p>	<p>Single Honours Theoretical Physics (M.Sci.) Degree: Level 1: 60 credits comprising: PH1001, PH1002 and MT1002.</p> <p>Level 2: At least 90 credits comprising: 15 or better in PH2011 and PH2012, and in MT2101 or (MT2001 and MT2003).</p> <p>Level 3: 120 credits comprising: MT3501, PH3002, PH3014, PH3061, PH3062, PH3064-PH3067, PH3073.</p> <p>Level 4: 65 credits comprising: PH4021, PH4022, PH4029, PH4030, PH4032.</p> <p>Level 5: At least 75 credits comprising: PH5002, PH5004, PH5102 and at least one of PH5003, PH5011 and PH5012.</p> <p>Other Information: This programme applies only to students entering third level in September 2002.</p>

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Degree Programmes	Programme Requirements at:
(B.Eng. Honours): Microelectronics and Photonics	<p>Single Honours Microelectronics and Photonics (B.Eng.) Degree: Level 1: 60 credits comprising: PH1011, PH1012 and MT1002.</p> <p>Level 2: Modules taught by University of Dundee: 120 credits comprising: EG2101, EG2102, EG2107, EG2201, EG2202, EG2204.</p> <p>Level 3: 120 credits comprising: PH3005, PH3010, PH3064, PH3065, PH3066, PH3101, PH3102 and modules taught by the University of Dundee: PE1, PE2.</p> <p>Level 4: 120 credits comprising: PH4025, PH4027 and modules taught by the University of Dundee: PE423, PE426, PE472.</p>
(M.Eng. Honours): Microelectronics and Photonics	<p>Single Honours Microelectronics and Photonics (M.Eng.) Degree: Level 1: 60 credits comprising: PH1011, PH1012 and MT1002.</p> <p>Level 2: Modules taught by University of Dundee: 120 credits comprising: EG2101, EG2102, EG2107, EG2201, EG2202, EG2204.</p> <p>Level 3: 120 credits comprising: PH3005, PH3010, PH3064, PH3065, PH3066, PH3101, PH3102 and modules taught by the University of Dundee: PE1, PE2.</p> <p>Level 4: 120 credits comprising: PH4025, PH4027 and modules taught by the University of Dundee: PE423, PE426, PE472.</p> <p>Level 5: 120 credits comprising: PH5005, PH5008 and modules taught by the University of Dundee: PE523, CE5201 and PE555.</p>
(M.Sci. Honours): Physics and Chemistry (M.Sci. Honours) 5 year Degree	<p>Physics element of Physics-Chemistry M.Sci. Degree: Level 1: 60 credits comprising: PH1011, PH1012, MT1002</p> <p>Level 2: At least 90 credits comprising: 15 or better in PH2011 and PH2012, and 11 or better in MT2101 or (MT2001 and MT2003)</p> <p>Level 3: At least 95 credits comprising: PH3002, PH3061, PH3062, PH3064, PH3065, PH3066, PH3067, and at least one of PH3101, PH3102</p> <p>Level 4: 30 credits comprising: PH4021, PH4023</p> <p>Level 5: At least 30 credits comprising: either PH5101 or CH5441, and at least 2 PH5000 level modules excluding PH5101</p>

Astronomy (AS) Modules

AS1001 Astronomy and Astrophysics 1

Credits: 20.0

Semester: 1

Prerequisites: Higher Physics or A-level Physics or Higher Mathematics or A-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%

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: Three 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 B or better.

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): Higher or A-level Physics and Higher or A-level Mathematics.

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%

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PH1012 Physics 1B

Credits: 20.0 Semester: 2

Prerequisite(s): Higher or A-level Physics and Higher or A-level Mathematics.

Anti-requisite: AS1002

Description: This module covers the core subjects of electricity and magnetism, quantum phenomena, and the properties of matter. It is suitable for those who have studied physics to the level of Higher Physics or equivalent. It includes lectures on electrostatics, the electric field and potential, capacitors, d.c. currents, and magnetostatics; the origins of quantum theory and its application to atoms and other small scale systems; the nature and composition of nuclei, atoms, molecules and solids; and some aspects of thermal physics and kinetic 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 in A-level Physics and Mathematics, both normally at grade B or better.

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, diffraction and holography.

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 in A-level Physics and Mathematics, both normally at grade B or better.

Description: This module covers the subjects of quantum physics, electronics, and atoms, molecules and solids. 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 Schrödinger's equation in quantum mechanics and its solution for simple one-dimensional potentials; the application of quantum mechanics to atomic and molecular systems and to condensed matter; and an introduction to circuit analysis, AC theory and analogue electronics.

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.