

School of Physics & Astronomy

Important Entry Information: Entry to first year is the standard entry route, and the route which can provide the broadest education, and which can give most flexibility in final choice of degree. Students who are aiming for a degree in Physics or Astrophysics and who enter with good Advanced Highers or A-levels or equivalent in Physics and Mathematics may apply for an accelerated entry route to the programme, which can reduce the length of the B.Sc. Honours programme to three years and the M.Phys. programme to four years. The special Physics and Astronomy (Gateway) first year allows subsequent progression to the second year of all the single-honours degree programmes in the School, and the joint degrees with the School of Mathematics.

B.Sc. / M.A. Honours

The general requirements are 480 credits over a period of normally four years (and not more than five years) or part-time equivalent, of which the final two years form 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.

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

The general requirements are 540 credits over a period of normally five years (and not more than six years) or part-time equivalent, of which the final three years are 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.

M.Phys. Honours

The general requirements are 600 credits over a period of normally five years (and not more than six years) or part-time equivalent, of which the final three years form an approved Honours programme of 360 credits, of which 120 credits are at 5000 level and at least 210 credits are at 3000 and/or 4000 levels.

M.Sci. Honours

The general requirements are 600 credits over a period of normally five years (and not more than six years) or part-time equivalent, of which the final three years form an approved Honours programme of 360 credits, of which 120 credits are at 5000 level and at least 210 credits are at 3000 and/or 4000 levels.

Study Abroad: In the case of students who spend part of the Honours programme on a recognised Study Abroad scheme, the Programme Requirements will be amended to take into account overseas courses which are approved by the relevant St Andrews School in the Learning Agreement.

(see <http://www.st-andrews.ac.uk/studyabroad/outgoingstudents/AcademicInformation/>).

Accreditation: All the B.Sc. and M.Phys. Honours degrees described in this section of the catalogue are accredited by the UK Institute of Physics.

** IMPORTANT NOTE **

Students entering Fifth Year of any programme in 2013-14 should see the appropriate 2011-12 Course Catalogue entry for the requirements to complete their Honours programme.

Astrophysics - Single Honours B.Sc.

First Year:	80 credits: AS1001 and MT1002 and PH1011 and PH1012. <i>(Students without prerequisite for MT1002 will take MT1001 in Semester 1.)</i>
Second Year:	120 credits: AS2001 and MT2001 and PH2011 and PH2012.
Third Year:	120 credits: AS3013 and AS4010 and PH3007 and PH3012 and PH3014 and PH3061 - PH3062 and PH3080 and PH3081, except that AS4010 may be delayed until Fourth Year and equivalent credits substituted with approval of the Adviser of Studies.
Fourth Year:	50 credits: AS4103 and PH4022 and PH4037; 30 credits: AS4010 - AS4012, AS4015, AS4025, PH4031 40 further credits: AS3000 - AS4999, PH3000 - PH4109, ID4001 or modules in other subjects or levels with the approval of the Adviser of Studies.
In total,	at least 210 credits must be achieved at 3000 and 4000 level with at least 90 of these at 4000 level.

Physics & Astronomy - Programme Requirements 2013/14 – August 2013

Astrophysics - Single Honours B.Sc.

Direct entry to second year for approved candidates with 120 advanced standing credits

Second Year:	20 credits: MT1002; 105 credits: AS1001 and MT2001 and PH2011 and PH2012 - with passes at grade 11 or better in all.
Third Year:	105 credits: AS3013 and PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081; 15 credits: AS2101, or if already taken in Second Year, AS4010, except that AS4010 may be delayed until Fourth Year and equivalent credits substituted with approval of the Adviser of Studies.
Fourth Year:	50 credits: AS4103 and PH4022 and PH4037; 30 credits: AS4010 - AS4012, AS4015, AS4025, PH4031 40 further credits: AS3000 - AS4999, PH3000 - PH4109, ID4001 or modules in other subjects or levels with the approval of the Adviser of Studies.

In total at least 210 credits must be achieved at 3000 and 4000 level with at least 90 of these at 4000 level.

Astrophysics – Single Honours M.Phys.

First Year:	80 credits: AS1001 and MT1002 and PH1011 and PH1012. <i>(Students without prerequisite for MT1002 will take MT1001 in Semester 1.)</i>
Second Year:	120 credits: AS2001 and MT2001 and PH2011 and PH2012 - with passes at grade 15 or better in all.
Third Year:	120 credits: AS3013 and AS4010 and PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081, except that AS4010 may be delayed until Fourth Year and equivalent credits substituted with approval of the Adviser of Studies.
Fourth Year:	65 credits: AS4011 and AS4012 and PH4022 and PH4037 and PH4038; 30 credits in two of: AS4015, AS4025, PH4031; At least 25 further credits, which may include ID4001.
Fifth Year:	60 credits: AS5101; At least 30 credits: AS5001 - AS5003; Further credits: AS3000 - AS4099, PH3000 - PH4109, PH5000 - PH5099 or modules in other subjects with the approval of the Adviser of Studies, to a total of 360 across Third, Fourth and Fifth Years, of which at least 330 credits must be achieved at 3000, 4000 and 5000 level with at least 120 of these at 5000 level.

Astrophysics – Single Honours M.Phys.

Direct entry to second year for approved candidates with 120 advanced standing credits

Second Year:	20 credits: MT1002; 105 credits: AS1001 and MT2001 and PH2011 and PH2012 - with passes at grade 15 or better in all.
Third Year:	105 credits: AS3013 and PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081; 15 credits: AS2101, or if already taken in Second Year, AS4010, except that AS4010 may be delayed until Fourth Year and equivalent credits substituted with approval of the Adviser of Studies.
Fourth Year:	65 credits: AS4011 and AS4012 and PH4022 and PH4037 and PH4038; 30 credits in two of: AS4015, AS4025, PH4031; At least 25 further credits: AS3000 - AS4999, PH3000 - PH4999, ID4001.
Fifth Year:	60 credits: AS5101; At least 30 credits: AS5001 - AS5003; Further credits: AS3000 - AS4099, PH3000 - PH4109, PH5000 - PH5099 or modules in other subjects with the approval of the Adviser of Studies, to a total of 360 across Third, Fourth and Fifth Years, of which at least 330 credits must be achieved at 3000, 4000 and 5000 level with at least 120 of these at 5000 level.

Physics & Astronomy - Programme Requirements 2013/14 – August 2013

Physics - Single Honours B.Sc.

First Year:	60 credits: PH1011 and PH1012 and MT1002. <i>(Students without prerequisite for MT1002 will take MT1001 in Semester 1.)</i>
Second Year:	90 credits: PH2011 and PH2012 and MT2001 - with passes at grade 11 or better in all.
Third Year:	105 credits: PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081 and PH3101; 15 credits: AS3000 - AS4999, PH3000 - PH4109, MT3501, or modules in other subjects or levels with the approval of the Adviser of Studies.
Fourth Year:	80 credits: PH4022 and PH4037 and PH4039 and PH4105 and PH4111; 40 further credits: AS3000 - AS4999, PH3000 - PH4109, ID4001 or modules in other subjects or levels with the approval of the Adviser of Studies.
In total, at least 210 credits must be achieved at 3000 and 4000 level with at least 90 of these at 4000 level.	

Physics - Single Honours B.Sc.

Direct entry to second year for approved candidates with 120 advanced standing credits

Second Year:	20 credits: MT1002; 90 credits: PH2011 and PH2012 and MT2001 - with passes at grade 11 or better in all.
Third Year:	105 credits: PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081 and PH3101; 15 credits: AS3000 - AS4999, PH3000 - PH4109, MT3501, or modules in other subjects or levels with the approval of the Adviser of Studies.
Fourth Year:	80 credits: PH4022 and PH4037 and PH4039 and PH4105 and PH4111; 40 further credits: AS3000 - AS4999, PH3000 - PH4109, ID4001 or modules in other subjects or levels with the approval of the Adviser of Studies.
In total, at least 210 credits must be achieved at 3000 and 4000 level with at least 90 of these at 4000 level.	

Physics & Astronomy - Programme Requirements 2013/14 – August 2013

Physics - Joint Honours B.Sc.

Physics and one of: Computer Science, Logic & Philosophy of Science, Mathematics.

Physics element of Physics - Joint Honours B.Sc. (except those defined below):

First Year: 60 credits: PH1011 **and** PH1012 **and** MT1002.
(Students without prerequisite for MT1002 will take MT1001 in Semester 1.)

Second Year: 90 credits: PH2011 **and** PH2012 **and** MT2001 - with passes at grade 11 or better in all.

Third Year: 60 credits: PH3012 **and** PH3061 **and** PH3062 **and** PH3080 **and** PH3081.

Fourth Year: 15 credits: PH3007;
 15 credits: PH4040;
 30 credits: PH4111 (unless one of CS4098, PY4698, PY4699 taken);
 Further credits may be taken from AS3000 - AS4999, PH3000 - PH4109, ID4001 or modules in other subjects with the approval of the Adviser of Studies.

In total, 240 credits must be achieved at 3000 and 4000 level with at least 90 of these at 4000 level.

Physics and Mathematics - Joint Honours B.Sc.:

First Year: 60 credits: PH1011 **and** PH1012 **and** MT1002.
(Students without prerequisite for MT1002 will take MT1001 in Semester 1.)

Second Year: 90 credits: PH2011 **and** PH2012 **and** MT2001 - with passes at grade 11 or better in all;
 30 credits: MT2002 **or** MT2003 - with a pass at grade 11 or better.

Third and Fourth Years (Maths):
 30 credits in two of: MT3501, MT3503, MT3504;
 15 credits: MT3600 **or** MT3601;
 15 credits: MT4111 **or** MT 4112 (unless PH3080 taken);
 15 credits: MT4599 (in Fourth Year only);
 45 further credits: MT3000 - MT4999.

Third Year (Physics): **EITHER (if MT2003 taken in Second Year):**
 50 credits: PH3007 **and** PH3012 **and** PH3061 **and** PH3062;
 10 credits: PH3080 (unless MT4111 **or** MT4112 taken).
OR (if MT2003 not taken in Second Year):
 50 credits: PH3012 **and** PH3061 **and** PH3062 **and** PH3081;
 10 credits: PH3080 (unless MT4111 **or** MT4112 taken).

Fourth Year (Physics): **EITHER (if MT2003 taken in Second Year):**
 25 credits: PH4022 **and** PH4039;
 At least 30 further credits: AS3000-AS5999, PH3000 - PH4110, PH5000 - PH5099.
OR (if MT2003 not taken in Second Year):
 40 credits: PH3007 **and** PH4022 **and** PH4039;
 At least 15 further credits: AS3000 - AS5999, PH3000 - PH4110, PH5000 - PH5099.

In total, 240 credits must be achieved at 3000 and 4000 level with at least 90 of these at 4000 level.

Physics & Astronomy - Programme Requirements 2013/14 – August 2013

Physics – Single Honours M.Phys.

First Year:	60 credits: PH1011 and PH1012 and MT1002. <i>(Students without prerequisite for MT1002 will take MT1001 in Semester 1.)</i>
Second Year:	90 credits: PH2011 and PH2012 and MT2001 - with passes at grade 15 or better in all.
Third Year:	105 credits: PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081 and PH3101; 15 credits: AS3000 - AS4999, PH3000 - PH4109, MT3501, or modules in other subjects or levels with the approval of the Adviser of Studies.
Fourth Year:	65 credits: PH4022 and PH4037 and PH4038 and PH4039 and PH4105; 15 credits: PH3074, unless taken in Third Year; Further credits: AS3000 – AS4999, PH3000 - PH4109, ID4001 or modules in other subjects or levels with the approval of the Adviser of Studies, to a total of 120 credits for the Year.
Fifth Year:	60 credits: PH5101; 60 credits: AS5000 - AS5999, PH5000 - PH5099.
In total, at least 330 credits must be achieved at 3000, 4000 and 5000 level with at least 120 of these at 5000 level.	

Physics – Single Honours M.Phys.

Direct entry to second year for approved candidates with 120 advanced standing credits

Second Year:	20 credits: MT1002; 90 credits: PH2011 and PH2012 and MT2001 - with passes at grade 15 or better in all.
Third Year:	105 credits: PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081 and PH3101; 15 credits: AS3000 - AS4999, PH3000 - PH4109, MT3501, or modules in other subjects or levels with the approval of the Adviser of Studies.
Fourth Year:	65 credits: PH4022 and PH4037 and PH4038 and PH4039 and PH4105; 15 credits: PH3074, unless taken in Third Year; Further credits: AS3000 – AS4999, PH3000 - PH4109, ID4001 or modules in other subjects or levels with the approval of the Adviser of Studies, to a total of 120 credits for the Year.
Fifth Year:	60 credits: PH5101; 60 credits: AS5000 - AS5999, PH5000 - PH5099.
In total, at least 330 credits must be achieved at 3000, 4000 and 5000 level with at least 120 of these at 5000 level.	

Physics and Astronomy (Gateway) B.Sc. or M.Phys.

First Year:	120 credits to include: PH1011, PH1012, PH1501 (unless bypassed due to maths qualifications), PH1502, PH1503, MT1002.
In subsequent years, students follow the programme requirements for the relevant degree programme onto which they progress as the start of second year.	

Physics & Astronomy - Programme Requirements 2013/14 – August 2013

Physics and Chemistry - Joint Honours M.Sci.:

First Year:	100 credits: CH1401 and CH1402 and MT1002 and PH1011 and PH1012. <i>(Permission may be granted for suitably-qualified students to be exempted from PH1011 and/or PH1012 and to take some 2000-level PH credits in First Year.)</i>
Second Year:	150 credits: CH2501 and CH2701 and MT2001 and PH2011 and PH2012 - with passes at grade 15 or better in all.
Third or Fourth Year* (Chemistry):	120 credits: CH3431 and CH3441 and CH3512 and CH3514 and CH3615 and CH3712 and CH3717 and CH3721 and CH4712 and CH4713 and CH4714.
Third or Fourth Year* (Physics):	120 credits: PH3007 and PH3012 and PH3061 and PH3062 and PH3082 and PH3101 and PH4022 and PH4037 and PH4039.
Fifth Year:	EITHER 60 credits: PH5101; 15 further credits in one of: PH5000 - PH5999; 30 credits in three of: CH5518, CH5711 - CH5714, CH5717 - CH5718; 15 further credits: CH5000 - CH5999, PH5000 - PH5999. OR 40 credits from CH5441; 30 credits: PH5000 - PH5999; 30 credits: CH5518, CH5711 - CH5714, CH5717 - CH5718; 20 further credits: CH5000 - CH5999, PH5000 - PH5999.

* This will be decided between the two Schools and notified to students.

This programme is accredited by the Royal Society of Chemistry (RSC) for professional membership.

Theoretical Physics – Single Honours M.Phys.

First Year:	60 credits: PH1011 and PH1012 and MT1002.
Second Year:	90 credits: PH2011 and PH2012 and MT2001 - with passes at grade 15 or better in all.
Third Year:	105 credits: PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081 and PH4038; 15 credits: AS3000 - AS4999, PH3000 - PH4109, MT3501, or modules in other subjects or levels with the approval of the Adviser of Studies.
Fourth Year:	60 credits: PH4022 and PH4037 and PH4028 and PH4039 and PH4032; 15 credits: MT3501, unless taken in Third Year; Further credits: AS3000 – AS4999, PH3000 - PH4109, ID4001 or modules in other subjects or levels with the approval of the Adviser of Studies, to a total of 120 credits for the Year.
Fifth Year:	90credits: PH5003 and PH5004 and PH5103; At least 15 credits: PH5002, PH5011, PH5012. Further credits: AS5000 - AS5999, PH5000 - PH5099, to a total of 120 credits for the Year.
In total, at least 330 credits must be achieved at 3000, 4000 and 5000 level with at least 120 of these at 5000 level.	

Physics & Astronomy - Programme Requirements 2013/14 – August 2013

Theoretical Physics – Single Honours M.Phys.

Direct entry to second year for approved candidates with 120 advanced standing credits

Second Year:	20 credits: MT1002; 90 credits: PH2011 and PH2012 and MT2001 - with passes at grade 15 or better in all.
Third Year:	105 credits: PH3007 and PH3012 and PH3014 and PH3061 and PH3062 and PH3080 and PH3081 and PH4038; 15 credits: AS3000 - AS4999, PH3000 - PH4109, MT3501, or modules in other subjects or levels with the approval of the Adviser of Studies.
Fourth Year:	60 credits: PH4022 and PH4037 and PH4028 and PH4039 and PH4032; 15 credits: MT3501, unless taken in Third Year; Further credits: AS3000 – AS4999, PH3000 - PH4109, ID4001 or modules in other subjects or levels with the approval of the Adviser of Studies, to a total of 120 credits for the Year.
Fifth Year:	90 credits: PH5003 and PH5004 and PH5103; At least 15 credits: PH5002, PH5011, PH5012. Further credits: AS5000 - AS5999, PH5000 - PH5099, to a total of 120 credits for the Year.
In total, at least 330 credits must be achieved at 3000, 4000 and 5000 level with at least 120 of these at 5000 level.	

Theoretical Physics and Mathematics - Joint Honours M.Phys.

First Year:	60 credits: PH1011 and PH1012 and MT1002.
Second Year:	90 credits: PH2011 and PH2012 and MT2001 - with passes at grade 15 or better in all. 30 credits: MT2002 or MT2003 - with a pass at grade 15 or better.
Third Year:	EITHER (if MT2003 taken in Second Year): 50 credits: PH3007 and PH3012 and PH3061 - PH3062; 45 credits: MT3501 and MT3504; At least 10 credits: MT4111 or MT4112 or PH3080; 15 credits: MT4507 or PH4038. OR (if MT2003 not taken in Second Year): 50 credits: PH3012 and PH3061 - PH3062 and PH3081; 30 credits: MT3501 and MT3504; At least 10 credits: MT4111 or MT4112 or PH3080; 15 credits: MT4507 or PH4038. 15 further credits: MT3000 - MT4598 or MT4600 - MT4699.
Fourth Year:	EITHER (if MT2003 taken in Second Year): 40 credits: PH4022 and PH4032 and PH4039; At least 20 further credits: AS3000 – AS4999, PH3000 - PH4109, ID4001; At least 60 further credits: MT3000 - MT4598, MT4600 - MT4699, MT5000 - MT5899. OR (if MT2003 not taken in Second Year): 70 credits: PH3007 and PH4022 and PH4032 and PH4039; At least 45 further credits: MT3000 - MT4598, MT4600 - MT4699, MT5000 - MT5899.
Fifth Year:	At least 40 credits: MT5999 or PH5103; At least 15 credits from : PH5002, PH5003, PH5011, PH5012 (unless already taken); At least 40 credits: MT5000 - MT5899 (unless already taken in Fourth Year); Further credits if necessary to a total of 145 across Third, Fourth and Fifth Years from 3000 - , 4000 - and 5000 - level MT modules (except that 30 further credits from MT2000 - MT2999 may be substituted). Further credits if necessary to a total of 145 across Third, Fourth and Fifth Years from 3000 - , 4000 - and 5000 - level MT -PH and AS modules (except that 15 further credits from a physics-based ID4001 may be substituted).
In total, at least 330 credits must be achieved at 3000, 4000 and 5000 level with at least 120 of these at 5000 level.	

Physics & Astronomy - Programme Requirements 2013/14 – August 2013

Theoretical Physics and Mathematics - Joint Honours M.Phys.

Direct entry to second year for approved candidates with 120 advanced standing credits

Second Year:	20 credits: MT1002; 90 credits: PH2011 and PH2012 and MT2001 - with passes at grade 15 or better in all. 30 credits: MT2002 or MT2003 - with a pass at grade 15 or better.
Third Year:	EITHER (if MT2003 taken in Second Year): 50 credits: PH3007 and PH3012 and PH3061 - PH3062; 45 credits: MT3501 and MT3504; At least 10 credits: MT4111 or MT4112 or PH3080; 15 credits: MT4507 or PH4038. OR (if MT2003 not taken in Second Year): 50 credits: PH3012 and PH3061 - PH3062 and PH3081; 30 credits: MT3501 and MT3504; At least 10 credits: MT4111 or MT4112 or PH3080; 15 credits: MT4507 or PH4038. 15 further credits: MT3000 - MT4598 or MT4600 - MT4699.
Fourth Year:	EITHER (if MT2003 taken in Second Year): 40 credits: PH4022 and PH4032 and PH4039; At least 20 further credits: AS3000 – AS4999, PH3000 - PH4109, ID4001; At least 60 further credits: MT3000 - MT4598, MT4600 - MT4699, MT5000 - MT5899. OR (if MT2003 not taken in Second Year): 70 credits: PH3007 and PH4022 and PH4032 and PH4039; At least 45 further credits: MT3000 - MT4598, MT4600 - MT4699, MT5000 - MT5899.
Fifth Year:	At least 40 credits: MT5999 or PH5103; At least 15 credits from : PH5002, PH5003, PH5011, PH5012 (unless already taken); At least 40 credits: MT5000 - MT5899 (unless already taken in Fourth Year); Further credits if necessary to a total of 145 across Third, Fourth and Fifth Years from 3000 - , 4000 - and 5000 - level MT modules (except that 30 further credits from MT2000 - MT2999 may be substituted). Further credits if necessary to a total of 145 across Third, Fourth and Fifth Years from 3000 - , 4000 - and 5000 - level MT PH and AS modules (except that 15 further credits from a physics-based ID4001 may be substituted).
In total, at least 330 credits must be achieved at 3000, 4000 and 5000 level with at least 120 of these at 5000 level.	

Students still completing degree programmes as defined in previous Course Catalogues should discuss their module selections with their Honours Adviser(s).