

SCHOOL OF PHYSICS AND ASTRONOMY

HONOURS HANDBOOK – 2011-12

| CONTENTS | Page |
|--|-------------|
| Introduction | 3 |
| Aims of our Teaching Programmes | 4 |
| Honours Entry Requirements | 5 |
| Bachelor's and Master's degrees | 6 |
| QAA and SCQF Requirements | 6 |
| Coordinators/Advisers | 7 |
| Selection of Modules | 7 |
| Preparation | 8 |
| Tutorials | 8 |
| Transferable skills | 8 |
| Practical Work | 9 |
| Projects | 10 |
| Monitoring and Assessment | 12 |
| Academic Alerts | 13 |
| Penalties for late submission | 15 |
| Absence from Classes or Examinations | 15 |
| Special Circumstances Affecting Assessment | 15 |
| Academic Misconduct | 16 |
| Use of Calculators in Examinations | 17 |
| The 0-20 Grading Scale | 18 |
| Progression | 20 |
| Honours Degree Classification | 20 |
| Deans' List | 21 |
| Medals and Prizes | 21 |

| | |
|--|----|
| Feedback on Assessed Work, & Access to Examination Scripts | 22 |
| Appeals and Complaints | 22 |
| Ethics (UTREC) | 23 |
| Information for students | 23 |
| English Language Support to non-native speakers of English | 24 |
| Disabilities Coordinator | 24 |
| Work Spaces | 25 |
| Physics/Mathematics Library | 25 |
| Computing Facilities | 26 |
| Student-Staff Council and School President | 26 |
| Research Colloquia | 26 |
| Program-specific fees | 27 |
| Careers and Research | 27 |
| Finding Referees | 29 |
| Health and Safety | 29 |
| Advice and Support | 29 |
| Academic Dates 2011-12 | 30 |
| Appendix 1 - Key Contacts/Coordinators | 31 |
| Appendix 2 – Selected Staff Members | 32 |
| Appendix 3 - Modules to be taught in 2011-12 | 33 |
| Appendix 4 - Degree programmes | 37 |
| Appendix 5. AS2101 Level Two Astrophysics – condensed | 44 |

Head of School - Professor Thomas Krauss

School of Physics and Astronomy
 J F Allen Building, University of St Andrews
 North Haugh, St Andrews, Fife KY16 9SS

Tel: (01334) 463103 Fax: (01334) 463104 email: physics@st-andrews.ac.uk
www.st-andrews.ac.uk/physics

School Office Opening Hours 08.45-11.00, 11.20--17.00

Introduction

This booklet provides information about honours degree programmes offered by the School of Physics and Astronomy. These programmes are for students in years 3 (Junior Honours), 4 (Senior Honours) and 5 of an honours degree and comprise the following:

- (a) the honours BSc degrees in
Astrophysics
Physics
- (b) the joint honours BSc degrees in Physics and one of
Computer Science
Logic & Philosophy of Science
Mathematics
- (c) the major/minor honours BSc degrees in which Physics is the major component (taking up roughly 3/4 of a student's time) and the minor component is one of
French , Spanish
- (d) the honours MPhys degrees in
Astrophysics
Physics
Physics with Photonics
Theoretical Physics
- (e) the joint honours MPhys degree in Theoretical Physics and Mathematics
- (f) the joint honours MSci degree in Physics and Chemistry

A separate booklet entitled "First and Second Level Modules" provides full information about the modules in Physics and Astronomy for students in first or second level.

The University moves to a new calendar for the academic year 2012-13, and this is likely to result in a number of changes to our programme structure for the start of that year, albeit that our new programme will be aiming to provide similar or enhanced opportunities to the current one.

Aims of our Teaching Programmes

- To provide a systematic functional knowledge and understanding of core physical concepts, principles and theories, and some of their applications.
- To provide specialist functional knowledge and understanding relevant to the particular degree programme, for example in astrophysics, theoretical physics, or photonics.
- To provide access to physics at the frontiers, capitalising on the strengths of the research undertaken in the School.
- To develop proficiency in the analysis of complex physical problems and the use of mathematical and other appropriate techniques to solve them.
- To develop the ability of students to organise their knowledge in a way that they can articulate the big ideas from the various modules, and can see the inter-relationship of material from different modules. Students should develop the ability to filter their knowledge in such a way that they can access the information that they need to apply to a particular problem or learning situation.
- To provide the ability to plan, execute under supervision, analyse and report upon the results of an experiment or investigation.
- To provide experience and expertise in experimental investigations for all students at the earlier stages of the programme. At least for students on the *Physics* and *Physics with Photonics* degree programmes to develop these skills further in the honours years. At least for students on the *Astrophysics* degree programmes to develop competence in observational and computational techniques in astronomy. At least for *Physics* and *Physics with Photonics* students to develop skills in the use of computers for control, data acquisition, and data analysis in experimental investigations.
- To develop the professional skills of teamwork, independent learning, information retrieval, critical analysis, and the communication of scientific concepts in writing and orally.
- To develop the ability to be a self-directed learner, including fostering a healthy intellectual curiosity in this and other disciplines, and the ability to determine one's own learning needs and to organise one's own learning.
- To enthuse students about the discipline and its applications, and to develop their confidence in their work using the discipline.
- To provide students in the School with an educational and social environment which encourages them to become informed, responsible, and respected members of society.
- To provide opportunities and support for all students to reach their full potential during their studies.

Honours Entry Requirements

BSc Programmes

Grade 11 or better in each of PH2011, PH2012 and MT2001.

For the BSc in Astrophysics, grade 11 or better in AS2001 is an additional requirement. For those aiming for an astrophysics degree who have taken entry directly into level two physics, AS2101 is taken in JH instead of AS2001 in the year of entry. These students have as an additional requirement for honours entry a grade of 11 in AS1001 rather than in AS2001.

MPhys and MSci Programmes

Grade 15 or better in each of PH2011, PH2012, and MT2001.

For the MPhys in Astrophysics, grade 15 or better in AS2001 is an additional requirement. For those aiming for an astrophysics degree who have taken entry directly into level two physics, AS2101 is taken in JH instead of AS2001 in the year of entry. These students have as an additional requirement for honours entry a grade of 15 in AS1001 rather than the specified grade in AS2001.

For degree programmes involving other Schools there may be additional requirements from those Schools.

Resit grades are no longer normally used to satisfy the above requirements. Students entering the honours class will also normally have the appropriate number of credits at sub-honours levels. Those who fall short of the required grades shown above *may* be admitted at the discretion of the Head of the School of Physics and Astronomy.

Students who *narrowly* miss the requirements for entry to the Bachelors programmes, or who need to use resit results (with minimum resit grade being 13), may be permitted to “shadow” the Junior Honours programme while being registered on the General BSc Degree programme. In this case a good performance in Junior Honours would normally result in the School permitting the students to transfer to the relevant Honours programme. “Good” in this context would be gaining credit for all modules, and obtaining a mean grade over the year of at least 12.0. To keep in the shadowing cohort a mean grade of at least 11 is needed at the end of first semester

It is unlikely that a student with a mean grade of less than 10.0 at level two, or a grade of less than 8.0 in any of the required level-two modules would be permitted to “shadow” the Honours programme.

Bachelor's and Master's degrees

The range of honours degrees available here is:

| | |
|------------------------|--|
| BSc degrees | 4 years duration [†] , modules worth 120 credits per year, total 480 credits. |
| MPhys and MSci degrees | 5 years duration [†] , 120 credits per year, total 600 credits. |

In all cases, our Master's degrees are distinguished from Bachelor's degrees by the following:

- Master's degree programmes involve a greater number of credits, amounting in the MPhys and MSci to one year's extra study for the same entry points.
- The final year project for a Master's degree is more ambitious and/or research orientated than that for a Bachelor's degree.
- Master's degree programmes involve modules at 5000 level which are more specialised and advanced.

Since Master's degree programmes are more demanding than those leading to a Bachelor's degree, a particularly good performance at second level is an essential prerequisite.

QAA and SCQF Requirements

The University of St Andrews is committed to implementing the policy of the Quality Assurance Agency for Higher Education (QAA) regarding criteria for honours degree standards. As part of this policy, universities in Scotland are required to identify five levels to which all university teaching is to correspond, each level having distinct characteristics in terms of students' depth of understanding of the subject. This means that honours modules are all classified as 3000, 4000 or 5000 level. These correspond with SCQF levels of 9, 10, and 11 respectively. Modules are allocated credits, where each credit point should correspond to 10 hours of work for the average student at that level. Level five modules are regarded as being appropriate for both postgraduate MSc students and students in the final year of an integrated masters programme.

www.scqf.org.uk/content/files/SCQF_handbook_FULL_-_amended_Dec_09.pdf.

[†] One year less for students who choose Direct Entry to second level physics.

Coordinators/Advisers

The members of staff (listed in Appendix 1) who have responsibilities for co-ordinating the organisation of the Honours Programme for JH, SH and year 5 students are also the Advisers of Study for those year groups.

They are available to be consulted on any academic queries which may arise during the year, and they provide advice at the start of each session on selection of modules etc. Students who wish to modify their choice of modules after the start of semester, particularly within the first two weeks, may do so only in consultation with their adviser. Any request for a change of modules after two weeks have elapsed will require in addition the approval of the Pro-Dean of the Faculty of Science. Should you wish to see your adviser and they are not available, the School's Director of Teaching may be able to assist with some queries.

Selection of Modules

All honours teaching is expressed in terms of modules, and the differences between degree programmes are expressed in terms of the different combinations of modules which are to be taken, or from which a certain selection must be made.

Appendix 3 lists the modules which will be available, and Appendix 4 shows the selection of those that provides the recognised programme for each of the degrees available. In addition to the compulsory modules listed, students normally have a free choice from the remaining modules, subject to satisfying the prerequisites which are given for each module and also to timetable restrictions. Some modules from the School of Mathematics may also be of interest. It should be noted that 5000 level modules are normally available only to MPhys and MSci students.

Detailed synopses of the honours modules to be given, together with teaching aims and prerequisites for each module, are available on the School's website. The prerequisites listed are intended to be a helpful guide to the previous knowledge which is normally required by a student starting a module. They are not meant to be interpreted in a completely rigid manner however and there may well be students who are able to tackle a module successfully without actually possessing the qualifications listed. The co-ordinators will be able to advise on such matters.

The University permits students on an honours programme to take a small number of credits from sub-honours modules during their honours years. This is known as "dipping down". This is the means by which level-two-entry students can take AS2101 in the first semester of the honours years. The School recommends that our

honours students “dip down” only where necessary for interest or need. The School does not permit honours students to “dip down” in their final semester of study.

The University’s Course Catalogue, Student Handbook, and other publications state the rules associated with an academic programme. However, we anticipate that this booklet and the associated module synopses on the School’s staff and students webpage will be the most useful information source for our students.

Preparation

Students are encouraged to use part of the summer to revise and practice their work from the previous year. The University now regards Orientation week as a time for returning students to prepare for their new studies. The School has a number of resources to help students in this work. All students entering JH are asked to work on mathematics revision sheets, and all those planning to take special relativity or general relativity modules are asked to study some recently produced teaching videos (vodcasts) on tensor notation.

Tutorials

Students in the JH year benefit from small group tutorials, which are compulsory. In semester one there is a weekly tutorial in a group of around eight students covering Maths for Physicists and Quantum Mechanics 1, as well as a small group tutorial every two weeks covering Thermal and Statistical Physics. A similar scheme will run in semester two with the larger group tutorial covering Quantum Mechanics 2 and Solid-State Physics, and smaller group tutorials covering Electromagnetism. A list showing the groups and tutors will be published shortly after the start of term.

For other honours lecture modules, the tutorial arrangements are different. The lecture timetable for each module will include slots intended to be used for whole-class tutorial purposes, at the rate of one every two or three weeks. These tutorials will be taken by the lecturers concerned.

Transferable skills

It is increasingly acknowledged that the acquisition of transferable or "professional" skills should be an important goal for students in higher education. By transferable skills we mean the ability to apply existing knowledge to solve new problems; expertise in finding information and evaluating it; the ability to communicate effectively orally and in writing; the ability to work in a team and demonstrate

leadership; and the assumption of responsibility for one's own learning. Many of these skills are developed in the normal course of honours study.

The module PH3014 Transferable Skills for Physicists, which is spread over the JH year, is designed to expose students to a wide range of activities which will help develop their transferable skills to an advanced level, while at the same time exploring aspects of physics and astronomy of interest to them. These activities include the writing of a review article, and practice in giving a talk on a chosen topic in physics or astronomy. The latter is done in the context of a student conference, usually held at the Burn, Edzell. More details are given in the description of the module on the School's website. The module is a compulsory part of the teaching programme for all single honours students in their JH year, and is optional for joint honours students.

Practical Work

Physics, including Photonics

The aims of laboratory work at honours level are:

- to familiarise students with a wide range of experimental techniques and equipment.
- to strengthen understanding of important physical concepts
- to develop sound practice in planning of experiments, risk assessment, record keeping, data handling and evaluation, error analysis, drawing evidence-based conclusions, and identifying future work.

Each module is divided into five sub-modules; these consist of experiments and demonstrations illustrating a particular aspect of experimental physics. The laboratory afternoons are on Monday and Thursday. The assessment mechanism can vary between sub-modules, but will be drawn from material in the lab notebook, written reports on the demonstrations and on the experiments, presentations, and short tests. One of the lab modules will also include an assessed formal report.

Astrophysics

The aims of the astrophysics “laboratory” modules are to equip students with skills in the field of observation, measurement, data analysis, computer programming and modelling, and report writing. All students attend AS3013 Computational Astrophysics in the second semester of JH, and may attend AS4025 Observational Astrophysics in the first semester of SH. Essential supervision and assistance are provided, but students are encouraged to work independently. Monday and Thursday

afternoons are reserved for practical work, and students undertake additional evening or night work when required for observation.

Theoretical Physics

Students on the theoretical physics programmes are not required to take laboratory modules, but, subject to the permission of their adviser may do so if they wish.

Projects

All honours students in the School undertake a project in their final year, though the arrangements vary according to the degree programme taken. The information below is associated primarily with AS and PH projects; in some cases joint-degree students will take a project or similar module in their other School.

A list of possible projects available in this School, giving full details of references and suggested programmes, is provided near the start of the session. Each project, which may combine the elements of a review or of research in varying proportions, is carried out under the supervision of a member of academic staff and leads to the presentation of a written report. As part of the assessment of the project, each student is asked to give a brief oral summary of the results of the project and to answer questions put by members of staff.

Although all projects are two-semester long, any experimental work is normally carried out only in semester two, and the School suggests that most of the work of the project could be carried out in the inter-semester break and semester two. The review essay required from all but MPhys theoretical physics projects is due in week one of semester two. The final project reports are due in towards the end of semester two, as detailed in the separate project documentation. MPhys astrophysics and experimental physics students have the project as their only academic commitment in semester two, allowing a complete immersion in the research experience.

On a number of occasions a project has led to the publication of a paper in a research journal, providing an especially valuable point for inclusion in references for scholarships and employment. In 2011 Janos Perczel's theoretical physics project work hit the international popular press, as reported on the School web news pages.

It is a University requirement that any Honours or Masters dissertation that required ethical approval from the University's UTREC committee, should have the letter or email of ethical approval bound into an appendix before submission. There is more on this later in this handbook and at <http://www.st-andrews.ac.uk/utrec/>

Projects in Physics, including Photonics

Usually the project entails an original investigation of some phenomenon, often undertaken in one of the research laboratories and sometimes involving collaboration with industrial firms. The project is preceded by a review essay of 6,000 words. This work is intended to include a literature search and a review of important papers within the general field of the topic, as well as linking this to the planned project work. Project PH4111 is for BSc students and is worth 30 credits, while Project PH5101 is for MPhys and MSci students and is worth 60 credits.

Projects in Astrophysics

All final year students undertake a project, selected from a list of topics suggested by supervising staff, but suggestions from students themselves are welcomed. A review essay precedes the project, as described above for Physics. Project AS4103 is for BSc students in Astrophysics and is worth 30 credits, while Project AS5101 is for MPhys students in Astrophysics and is worth 60 credits.

Projects in Theoretical Physics

A project in theoretical physics (PH5102, worth 45 credits) is compulsory for single-honours Theoretical Physics (MPhys) students. For those taking Mathematics and Theoretical Physics a project is compulsory, but the topic may be in either of the two subjects of the degree course. (It is not permitted to do a project in both subjects).

Projects in the Physics and Chemistry MSci degree

Students may choose to do their project primarily in Chemistry or primarily in Physics. For this degree it may be necessary to spread the project work more evenly through the year.

The School does not require students to bind their project reports with anything more than a staple or clip. However, we are asked to tell you that:-

“The University’s Print & Design Unit is ideally set up to print and/or bind your dissertation and thesis. You can send your material in PDF format (with a note of pages to be printed in colour) to: printanddesign@st-andrews.ac.uk and then they will be in touch when your job is ready. Price lists and further information: www.st-andrews.ac.uk/printanddesign/”

Student Work

In addition to their attendance at lectures, tutorials and (where applicable) laboratories during normal class hours, students are expected, through independent study, to work at augmenting their knowledge and understanding of the topics being taught in their modules. Each unit of credit should correspond to 10 hours of study time in total, for the average student at that level. For a conventional 120-credit a year programme this corresponds to a study-time commitment of around 40 hours per week.

If you encounter difficulties in understanding the lecture material which cannot easily be resolved, eg by reference to text books or discussion with classmates, you are encouraged to approach the lecturer concerned who will be pleased to deal with queries of this type.

As one of the aims of our teaching programme is

- To develop the ability to be a self-directed learner, including fostering a healthy intellectual curiosity in this and other disciplines, and the ability to determine one's own learning needs and to organise one's own learning.

students are expected and encouraged to use information in the library and online to help their studies, as well as discussing physics with other students and with staff.

The School encourages students to form groups that can meet on a regular basis to discuss the work being covered in the teaching programme. The Group Study Area in the School is one place that may be used for such meetings.

Monitoring and Assessment

For each lecture module students will normally be issued with sample examination-style questions, and asked to hand in written answers by certain specified dates. These answers will be marked by the lecturer and returned to students with feedback comments.

For some modules students will be required to carry out problem solving exercises, and these will be marked and returned to the students with feedback. Students will be told in advance whether or not the marks contribute to the overall grade for the module.

Most lecture modules involve an examination, consisting of one paper of two hours, held at the end of the semester. Most examination papers are divided into two sections. Section A consists of several short questions designed to test factual knowledge and basic understanding of the subject, and section B consists of three

longer questions from which each candidate must select two. These questions aim to test the understanding of the student of the subject, and their ability to apply the ideas and techniques covered in the module. At honours level it is expected that some of the material in the long questions will cover concepts or reasoning that requires a student to think and reason beyond the material covered already in the module. The School's Staff and Students web page links to some past examination papers and sample solutions, along with guidance on the way that examination questions are structured and what they are aiming to assess. The University's iSaint portal gives access to the last few years of exam papers.

Students whose first language is not English may request access to an English-foreign language dictionary, provided by themselves, during examinations. Such students should contact the School's Examinations Officer who will provide a certificate to show to the examination invigilator.

Please note that, unlike sub-honours modules, there are no conventional resit examinations in honours modules. The grade obtained in an honours module (possibly including at oral re-assessment, see below) will appear on a student's transcript and will form part of their degree classification calculation.

Honours students who fail a module (grade less than 7.0) which involves an examination, and who have achieved at least grade 4.0 in the examination, will be eligible for an oral re-assessment in the examination component. As soon as possible after the original assessment, they will be invited to attend an oral examination conducted by the lecturer(s) who taught the module together with a member of staff nominated by the Year Coordinator. This oral reassessment will normally take place within days of the original examination. The reported grade for the re-assessed module cannot be any higher than 7.0. Students who do not achieve grade 4.0 in an examination, or who achieve less than grade 7.0 in a module which is entirely continuously assessed, are not eligible for re-assessment or academic credit for that level 3, 4, or 5 module at that sitting.

Academic Alerts

Academic Alerts are a way of helping students who are having trouble coping with their studies; such as missing deadlines for handing in work, or missing compulsory tutorials. The aim of the Alert system is to help students by flagging up problems before they seriously affect students' grades. Academic Alerts will be issued by email from one of the Director of Teaching, Module Co-ordinator or School administrator and will tell students what is wrong and what they are required to do (eg attend classes in future). The Alerts will also tell students what support the

University can offer. If students do not take the action required they will get another Alert, and eventually will automatically get a grade of zero and will fail that module.

The system is designed to help and support students in order to remedy any problems or issues before these lead to failing a module. Alerts will never appear on a student's permanent transcript. For more information on Academic Alerts and details on how the categories work, see www.st-andrews.ac.uk/staff/policy/tlac/attendance/academicalerts/.

A category ten academic alert is an indication that a student has not met the minimum requirements, and, subject to any appeals, will be given a zero for the module with no opportunity to resit at that diet. That zero will also form part of the calculation for the classification of the honours degree.

In honours modules in physics and astronomy, attendance at all classes (lectures, tutorials, and any specified practical work) is strongly recommended and in some cases is a requirement. In order to avoid receiving a grade ten academic alert, the requirements for honours modules in the School are :-

- For all modules which are assessed wholly or partly by continuous assessment, a requirement of the module is to achieve a grade of at least 4.0 in the continuously assessed component. This applies, amongst other places, to continuously assessed work associated with the JH core tutorials.
- For the Physics laboratory modules students must attend at least 75% of the laboratory sessions.
- For PH3014 Transferable Skills for Physicists, students must gain at least grade 4 in one of the Review Article and the Burn Conference
- For the physics project modules PH4111 and PH5101 and the astronomy project modules AS4103 and AS5101 the review essay must be handed in before one week after the deadline, and it must be of a high enough standard to obtain at least 25% in the assessment (after any lateness penalty has been applied). Additionally, the final project report must be handed in before one week after the deadline, and it must get in the assessment at least 25% (after any lateness penalty has been applied).

Although it may not formally be part of the Academic Alert system, this may be a good place to remind students that failure to turn up to an exam without good cause, or attaining less than grade 4.0 in an examination, will result in the failure to gain academic credit for that module in that year; this fail grade will still be used in the final degree classification even if the module is retaken in a subsequent year.

Penalties for late submission

In those cases where written work requires to be handed in for marking, a deadline will be defined well in advance and one of a range of penalties will be applied for late submission. Often this will be expressed as a percentage reduction in the mark to be awarded for each day late. It is particularly vital that project reports should be handed in on time, in view of the large number of credits attached to these modules. If you are unclear about the penalties associated with the late submission of any piece of assessed work, please contact the member of staff concerned.

The University states that “In the context of electronic submission of assessed work, every day of the week will be considered as counting towards a late penalty. This rule will apply to all holidays (public and University) and includes weekends, with Saturday and Sunday each counting as one day.

Absence from Classes or Examinations

If, for any reason, you are absent from a module, you should complete as soon as possible a Self Certificate for Absence. These are available on the University web site. There is no need to self-certify for missing a lecture, but any illness that affects assessed work or compulsory activity (eg tutorial, lab work) must be noted. If you are absent from a small-group teaching session it is polite also to inform the tutor or demonstrator directly.

Absence from an examination should be reported *immediately* to the Examination Office [examoff@st-andrews.ac.uk, tel (01334 46)2528] and backed up by a completed Self Certificate for Absence report. It would also be helpful if the School was also directly notified, please.

Special Circumstances Affecting Assessment

Unfortunately, some students will suffer unavoidable circumstances that impede their academic performance. These may include illness or bereavement of a close family member. If you find yourself in this position, you should alert the School’s Director of Teaching as soon as possible. You can do this directly, or through Student Services. Depending on the circumstances it may be possible for the School to agree to defer the piece of assessment (including exams) to a later date.

It may also be possible for the School to “S-code” a module result, which indicates that the assessment of that module has been affected by special circumstances. S-

coding can only be done at the request of a student and cases normally have to be notified very close to the time at which the problem occurs, and normally before any examination is taken. Grades which are S-coded may be temporarily disregarded for the purpose of degree classification, if this is to the advantage of the student. The “S” coding remains on the student’s record and transcript. The current University policy is that deferral of assessment is usually preferred to S-coding.

Academic Misconduct

Academic integrity is fundamental to the values promoted by the University. It is important that all students are judged on their ability and performance, and no student will be allowed unfairly to take an advantage over others, to affect the security and integrity of the assessment process, or to diminish the reliability and quality of a University of St Andrews degree.

Academic misconduct includes the presentation of material as one’s own when it is not one’s own; the presentation of material whose provenance is academically inappropriate; and academically inappropriate behaviour in an examination or class test. Any work that is submitted for feedback and evaluation is liable for consideration under the University’s Academic Misconduct policy irrespective of whether it carries credit towards your degree. All work submitted by students is expected to represent good academic practice. “Not knowing” the regulations is not regarded as an acceptable excuse for academic misconduct.

You should be aware that the University takes academic misconduct offences extremely seriously, and penalties for first offences can be severe. Any student found guilty of a repeat offence may be expelled from the University either temporarily or on a permanent basis.

All students should familiarise themselves with the University’s Guide to students called “Avoiding Academic Misconduct” which may be accessed from:

<http://www.st-andrews.ac.uk/students/policy/academicmisconduct>

The full University policy and procedure is also available from:

<http://www.st-andrews.ac.uk/students/policy/academicmisconduct/>.

Students who are unsure about the correct presentation of academic material should approach their tutors or lecturers, and may also contact SALTIRE/CAPOD

(June.Knowles@st-andrews.ac.uk) for advice and training.

Examples of plagiarism at honours level would be (a) the copying of part of another student's laboratory report which is then passed off as one's own work, and (b) in the course of writing an essay or project report, "lifting" excerpts from published books, papers or articles on the Internet and incorporating them, without proper acknowledgement, in one's own essay or report.

If you ever need to use material verbatim from another source, its appearance in your work **MUST** be within inverted commas, and the source attributed beside that appearance.

Some student work may be submitted to the “Turnitin” electronic tool to check for such problems. The University’s procedure will be applied whenever instances of plagiarism or similar practices are detected. However students should carefully distinguish plagiarism from the assistance which they derive by discussing their work with others and, in some approved cases, carrying out their work in collaboration with others. The latter has genuine and legitimate value to the student and is encouraged, whereas plagiarism is at best “poor practice” and at worst “cheating”.

Use of Calculators in Examinations

Students should note that the Senate has prohibited the use of certain calculators in examinations, viz. those with programming, text, symbolic or graphical capabilities.

The 0-20 Grading Scale

The University has adopted a grading scale, common to all its Schools, for the purpose of reporting assessment results for modules. Further information is supplied by the University on its website. Grades are quoted to one decimal place, and the maximum grade which can be awarded is 20.0. The minimum grade for which credits for the modules are awarded (i.e. a bare pass) is 7.0. When the University runs the degree classification system, a credit-weighted mean grade of 16.5 over the appropriate and passed honours modules currently will result in a first classification, independent of the median grade. Full details are given at

www.st-andrews.ac.uk/staff/policy/tlac/examinations/classification/#d.en.52414

Similarly, a credit-weighted mean grade of 13.5 would result in an upper second, and 10.5 a lower second. Module grades are described by the University at

www.st-andrews.ac.uk/staff/policy/tlac/examinations/commonreportingscale/

Thus it can be seen that while 7.0 is a “pass” in a module, achievement at just this level in all modules will not result in obtaining an honours degree, and indeed the School has requirements on the mean grade obtained in Junior Honours to permit continuation in the Honours programmes.

In our School, normal practice is to assess submitted work such as examinations initially in terms of percentage marks, combine various components where needed, and then convert the final module percentage mark to a grade by a mapping procedure. In honours modules that include marks from both a module exam and continuous assessment, the overall mark is normally determined by the weightings given to these two components as published in the University’s Course Catalogue. The exception to this is that any student who obtains a mark in a module examination corresponding to grade 3.9 or less will have the module grade determined as above, but subject to a maximum module grade of 3.9.

The current mapping scheme normally adopted by the School for converting percentage marks to grades at honours level is as follows, *and is different to the mapping used for our level one and two modules*. Grade 5.0 corresponds to 25%, grade 7.5 to 38%, grade 16.5 to 74% and grade 20.0 to 100%. Between these fixed points, linear conversions apply. Thus 36% is mapped onto grade 7.1, 50% is mapped into grade 10.5, and 80% corresponds to grade 17.3

Any grade followed by the letter S indicates that the performance of the student in that module was affected by special circumstances, e.g. illness. A “D” on a transcript shows that the assessment has been deferred to a later time.

The mapping between the School's percentage mark at honours and the University's 20-point scale is normally as follows, though in principle may be changed by the Module Board. The classification boundaries are shown for the credit-weighted mean grades over a complete honours programme. The credit gained, fail, and re-assessment boundaries are for a single module.

| % | grade | % | grade | % | grade |
|----------|--------------|----------|--------------|----------|--------------|
| 15 | 3.0 | 50 | 10.5 | 85 | 18.0 |
| 16 | 3.2 | 51 | 10.8 | 86 | 18.1 |
| 17 | 3.4 | 52 | 11.0 | 87 | 18.3 |
| 18 | 3.6 | 53 | 11.3 | 88 | 18.4 |
| 19 | 3.8 | 54 | 11.5 | 89 | 18.5 |
| 20 | 4.0 | 55 | 11.8 | 90 | 18.7 |
| 21 | 4.2 | 56 | 12.0 | 91 | 18.8 |
| 22 | 4.4 | 57 | 12.3 | 92 | 18.9 |
| 23 | 4.6 | 58 | 12.5 | 93 | 19.1 |
| 24 | 4.8 | 59 | 12.8 | 94 | 19.2 |
| 25 | 5.0 | 60 | 13.0 | 95 | 19.3 |
| 26 | 5.2 | 61 | 13.3 | 96 | 19.5 |
| 27 | 5.4 | 62 | 13.5 | 97 | 19.6 |
| 28 | 5.6 | 63 | 13.8 | 98 | 19.7 |
| 29 | 5.8 | 64 | 14.0 | 99 | 19.9 |
| 30 | 6.0 | 65 | 14.3 | 100 | 20.0 |
| 31 | 6.2 | 66 | 14.5 | | |
| 32 | 6.3 | 67 | 14.8 | | |
| 33 | 6.5 | 68 | 15.0 | | |
| 34 | 6.7 | 69 | 15.3 | | |
| 35 | 6.9 | 70 | 15.5 | | |
| 36 | 7.1 | 71 | 15.8 | | |
| 37 | 7.3 | 72 | 16.0 | | |
| 38 | 7.5 | 73 | 16.3 | | |
| 39 | 7.8 | 74 | 16.5 | | |
| 40 | 8.0 | 75 | 16.6 | | |
| 41 | 8.3 | 76 | 16.8 | | |
| 42 | 8.5 | 77 | 16.9 | | |
| 43 | 8.8 | 78 | 17.0 | | |
| 44 | 9.0 | 79 | 17.2 | | |
| 45 | 9.3 | 80 | 17.3 | | |
| 46 | 9.5 | 81 | 17.4 | | |
| 47 | 9.8 | 82 | 17.6 | | |
| 48 | 10.0 | 83 | 17.7 | | |
| 49 | 10.3 | 84 | 17.8 | | |

Progression

Continuation into the next year of the programme is conditional on satisfying the examiners at the end of the current year. For progression into the SH year, it will normally be necessary for honours students to achieve in JH modules a credit-weighted mean of at least 10.5 for those on the honours BSc programme or 13.5 for those on the MPhys and MSci programme. A candidate who fails to satisfy the examiners may be recommended for the award of a General Degree, or may be required to switch from a Master's degree to a Bachelor's degree.

Students shadowing honours in JH need for transfer to the main honours programme a mean grade of at least 12.0 over the whole year. To keep in the shadowing cohort a mean grade of at least 11 is normally needed at the end of first semester.

A BSc student who obtains a credit weighted mean of grade 15 or above in JH would normally be permitted to change from the BSc to the MPhys cohort should they wish.

Honours Degree Classification

The current scheme for determining class of honours degrees involves an algorithm which utilises the credit-weighted mean of the grades obtained in all modules at 3000 level or above taken during the honours years, together with the credit-weighted median of these grades. Details of the algorithm may be found on the University website.

The University Honours Classification Algorithm usually produces a clear outcome. However, for students who entered the honours programme in 2009 and before, there are certain "border zones" where the classification outcome is not so clear (i.e. (roughly) the mean and median honours mark falls less than 0.5 below a classification boundary). In these cases the default classification will be the lower degree class. However the School Classification Board is currently permitted to make a case for the award of a higher degree class to the University Special Classifications Board. Such cases will be based on the School criteria as follows:

The School will normally take a set of module grades that generally improve with time through the honours degree programme as being an indication that it should recommend to the relevant University committee that the higher degree classification should be awarded.

If it appears to the School's Examination Board that a student deserves a higher degree class than determined by the algorithm, it has in principle the powers to

recommend to the University's Special Classification Board (SCB) that the higher degree class be awarded, though this is very unlikely to happen.

You should be aware that the SCB has the authority to turn down any recommendation from the School. In the case of Joint Honours students different criteria may be applied to each subject element and the classification will be agreed by both the Schools. The Special Classification board will adjudicate in the event that the two Schools fail to reach an agreement.

Deans' List

The University has an annual award for academic excellence, promoted by the four Deans. Undergraduate students who achieve an outstanding overall result in the course of an academic year have their names inscribed on the Deans' List, an honour which will also appear on their University transcript.

Any student who meets all the criteria and who obtains a credit-weighted mean grade of 16.5 or above for the year will be recorded on the Deans' List. Full details of all the criteria and conditions for the Deans List are available at:
<http://www.st-andrews.ac.uk/administration/deans/deanslist/>

Medals and Prizes

At each level (Junior Honours, Senior Honours and year 5) a class medal is awarded annually to each of the highest graded students of Physics (including "with Photonics"), Theoretical Physics, and Astrophysics, provided that at least one student in each category is deemed worthy of the award (ie credit weighted mean is at first class level).

In addition, the following prizes are awarded:

William David Brodie Prize (normally three awards). Awarded to the three students in the Junior Honours class with the most outstanding results, without restriction.

Neil Arnott Prize (normally three awards). Awarded to the three students with the most outstanding results in the Senior Honours class in Physics, which for this purpose includes Theoretical Physics and Physics with Photonics.

Scott Lang Prize. Awarded to the most Senior Honours student in Astrophysics with the most outstanding results.

Brewster Prize. Awarded to the student with the most outstanding results in the final year of any one of the undergraduate Master's degrees (MPhys or MSci), in the School of Physics and Astronomy.

In all cases awards are based on the highest credit-weighted mean grade from the School's modules achieved during the year. If there is more than one "best student" in a category, then the medal or prize is shared.

Since joint honours students are presumed to be eligible also for prizes offered in the other subject, the policy of the School is that the monetary amount of a prize awarded to any student in this category is halved.

Feedback on Assessed Work, & Access to Examination Scripts

Students should be able to receive routine feedback on any work that they have submitted. Feedback will give you advice that should guide you in improving your learning and future performance. Feedback can include discussions in tutorials, individual face-to-face discussion, written commentaries on work, or electronic feedback for example through Moodle. If you are not clear about what the feedback is saying, or wish advice on your best course of action, please contact the relevant staff member to discuss with them.

Feedback on examination performance can be given to a class as a whole. If you wish detailed feedback from a member of academic staff on an examination script, you should contact your year coordinator in the first instance to arrange a suitable meeting. No fee is charged for viewing the script. Students are however also entitled to request a hard copy of any of their own completed examination scripts. If a photocopy of the script is required for personal reference, please contact the School Office and, on payment of a fee of £10 per examination script to the University, a photocopy will be provided for you within five working days. Such requests should be made by the end of Week 3 of the semester that follows the examination diet.

Appeals and Complaints

The University web site gives full information on how students should pursue a complaint or appeal, whether this concerns an academic or non-academic issue. One guiding principle is that students should attempt first to resolve the issue by an informal approach to the member of staff most directly concerned. If that fails, there are available further stages by which the matter may be pursued.

Within the School of Physics and Astronomy, any complaint or appeal should be addressed (after the informal approach has been tried) to the Director of Teaching or, if the Director of Teaching has already been involved, to the Head of School. Academic issues which could be the subject of an appeal or complaint include the marks awarded to assessed work, module grades, degree classification, or any allegation of harassment or bullying. It should be noted that the final outcome of any appeal concerning grades includes the possibility that the marks or grades awarded could go down as well as up.

Ethics (UTREC)

All research in all Schools of the University that involves data collection (from questionnaires etc), interviews of, interactive investigation of, experimentation upon or demonstrations involving living human subjects, tissues and / or other samples requires formal approval from the University Teaching and Research Ethics Committee (UTREC).

It is University policy that any research involving children under 18 should be reviewed by the UTREC Child Panel and that the researcher should hold an ‘Enhanced Disclosure Scotland’ (EDS) certificate. The principal supervisor is responsible for ensuring that the student has received the appropriate ethical clearance from UTREC and the Child Panel prior to research commencing.

It is a requirement that any undergraduate honours or Masters dissertation or PhD thesis that requires ethical approval from UTREC has the letter or email of ethical approval bound into the appendix before submission.

<http://www.st-andrews.ac.uk/utrec/>

Information for students

The “Current Students” page linked to the Home page of the University’s web site contains in a single convenient package information on a wide variety of issues of interest to students. It includes for example details on academic regulations, codes of practice, employment, financial information, health, Library and Information Services, student organisations, student services, student support and guidance, and access to the pre-advising system, previous examination papers and examination timetables. The University publishes its teaching, learning, and assessment policies at www.st-andrews.ac.uk/staff/policy/tlac/

The University also publishes on its website a “Student Handbook”, which contains a digest of some of the most relevant material.

Our School's "Staff and Students" web page contains a range of useful information, including our module handbooks, honours module synopses, timetables, links to the student physics and astronomy societies, and other resources. Moodle and MMS will be used as managed learning environments and for mark reporting.

English Language Support to non-native speakers of English

The In-sessional English Language Support Service offers free language support to matriculated students who are non-native speakers of English. Support is offered in a number of forms, ranging from one-to-one tutorials to weekly workshops on writing, conversational speaking and grammar, and independent study resources. Further information is available on the Support Service website:

<http://www.st-andrews.ac.uk/elt/support>

If you would like further information, please contact Janie Brooks, In-sessional English Language Support Co-ordinator, ajb31@st-andrews.ac.uk

Disabilities Coordinator

If for disability reasons you require support, for example particular teaching and exam arrangements, please contact the Disability Team via the link below. Student Services provides support for a wide range of disabilities such as learning difficulties, visual and hearing impairments, mobility difficulties, Aspergers, mental health, long standing medical conditions, and much more.

www.st-andrews.ac.uk/studenthandbook/diversity/disabilities/

The disabilities coordinator (Dr Bruce Sinclair) will liaise with any user of the building who has a disability. Student Services can recommend appropriate modifications to teaching methods/materials for students with disabilities. Our aim is to try to make the same or equivalent facilities and experiences available to all. The School should be notified by Student Services of any recommended actions. However, this cannot always be immediate, and students are welcome to contact Dr Sinclair directly to advise him of their situation.

Most of the School is accessible to wheelchair users via the main entrance and the lift. If a person who is unable to use the stairs is on level three when there is a fire or other emergency, they should know that there is an evacuation chair in the stairwell outside room 301.

Work Spaces

The library is one obvious space in the building in which students may study, though it is intended to be a quiet area. The main concourse now has group-study tables behind the cafeteria. These are equipped with large screen computer monitors, and it is hoped that groups of students may find this space useful for collaborative working and/or as a noisy self-study space. The main part of the concourse may be used as a study and/or social area. If seminar/tutorial rooms in the building are not booked out for teaching or meetings, it is normally possible to use these for work. The School office staff can provide information on availability.

Physics/Mathematics Library

The JF Allen Library is a new and modern Library situated in the Physics and Astronomy building. It has a large number of comfortable, bright and quiet spaces for individual study, six PCs and two bookable rooms for group work.

There is a wide variety of up-to-date books available in both print and electronic format. Most books can either be borrowed for 7 or 28 days. It should be noted that the 28-day loan books are subject to a 7-day recall in the case of someone else wanting to borrow them. There is a self-issue and return machine which allows users to take out books themselves. If you have suggestions for additional physics and astronomy books that you think should be in the Library, please contact Dr Antje Kohnle (ak81@st-andrews.ac.uk) or email morebooks@st-andrews.ac.uk.

The Library also subscribes to a large number of journals, most of which are available electronically. There is a photocopier in the Library which is operated by prepaid cards which can be purchased from the Library helpdesk.

Online resources and information about books available can be searched for through the Library's Physics & Astronomy page: <http://libguides.st-andrews.ac.uk/panda>. Past examination questions for the last few years are available via iSaint, and tutorial sheets and solutions for some modules are available on Moodle or MMS.

Library staff are present to deal with enquiries, Monday to Friday, between the hours of 10am and 3pm, though the library space is open during normal working hours, and potentially beyond. There is also an online enquiry service available from the web pages as well as an evening phone service. Vicki Cormie (vhc1@st-andrews.ac.uk) is the Academic Liaison Librarian for Physics & Astronomy and is happy to be contacted for any help in using Library resources.

Computing Facilities

The PC classroom next to the main entrance contains 34 PCs, data projection facilities, scanners and printers. IT services operate many other clusters of computers and provide training in the use of hardware and software as well as the username and password required to log on the computers and for email. Many computers in the honours laboratory will be used by students during their lab/computational sessions, and may often be used outside laboratory time by students in the School for more general work-related activity.

Student-Staff Council and School President

The Student-Staff Council has representatives for students in each level of study, postgraduate representatives, and members of staff. Its primary purpose is to serve as a forum for the discussion of academic issues, but it also oversees some of the social facilities available in the building and some student activities. The Council normally meets twice per semester. It has its own web pages that may be accessed from the School's Staff and Students web page. It is chaired by the School Student President, who is elected by students at the end of the previous session. For 2011-12 the School President is Chris Carroll. He may be contacted by email at physicspresident.

Student representatives are elected from honours year and subject groups, and normally hold office for the whole academic year. Representatives discuss teaching matters with the Co-ordinator, and report to meetings of the Council on the issues raised and the action taken.

There are five sub-committees. The Fund Raising Committee is concerned with raising funds for vacation projects and social events. The Vacation Awards Committee disburses grants to students studying in the School who wish to pursue worthwhile scientific or recreational projects during the Easter or Summer vacations. The Art Committee promotes art and photographic exhibitions. The Website Committee looks after the Council's website. The Social Committee is responsible for the organisation of the Student/Staff Christmas dinner and for other social events which take place during the year.

Research Colloquia

These are held approximately weekly in Theatre C of the J F Allen building, usually at 10 am on Fridays. The topics of these talks are wide ranging, reflecting often the research interests of the School and covering exciting new developments in the

general area of physics and astronomy. Honours students are welcome to attend, but should not necessarily expect to follow every aspect of a talk.

Program-specific fees

There are no additional fees for labs and the like in the School. Students in the Transferable Skills for Physicists module are strongly encouraged to attend the Burn Conference, and are asked to make a contribution towards the costs of the weekend away. In line with University policy, the School expects its students to purchase a number of textbooks as part of their study.

Graduating in person or *in absentia* marks the end of your degree or diploma course of studies at the University of St Andrews. If you have been accepted onto a new degree or diploma programme at the University, the new programme is separate and distinct from the course of studies from which you are about to graduate, and you will be liable for all fees associated with that new programme.

Careers and Research

The University Careers Centre, situated opposite the Students Association building, is available for consultation by individuals. It has an online and physical library detailing various career opportunities as well as job vacancies. Careers fairs and seminars take place regularly. A huge amount of careers-related information can be found at the web site www.st-andrews.ac.uk/careers, including a wiki section aimed at physicists and astronomers.

All students are encouraged to talk with a Careers Adviser during their JH year. The module PH3014 Transferable Skills for Physicists includes activities that are directly associated with employability considerations. The School's liaison officer with the Careers Centre for 2011-12 is Dr Bruce Sinclair.

It is important to make plans regarding your career fairly early during the final years of your degree programme, preferably in your penultimate year. Some positions may need summer vacation work experience, and some research applications have early deadlines. Representatives from industrial firms and Government laboratories visit the University through the session under the auspices of the Careers Centre. Members of staff in the School will be available to give specialised advice on request, and may agree to write references on your behalf. Students are assumed to have authorised any member of staff whom they have asked for a reference to release personal information about them on a confidential basis.

When thinking about job opportunities it may be helpful to you to consider the following areas where you could pursue a career with a background in physics or astronomy: (a) in industry or an industrial research association, (b) in government agencies, (c) in university laboratories, (d) in teaching in technical colleges or schools, (e) in hospitals, (f) in the armed services, (g) in the commercial and financial sectors, (h) in environmental studies. A good honours degree should qualify you for a job in any of these groups.

We plan to have a physics and astronomy mini careers fair in the School on Wednesday afternoon of week six of first semester, ie 2 November 2011.

If you wish to continue advanced studies with an eye to working in a high technology industry, then you might consider a vocational MSc course. For example, St Andrews in collaboration with Heriot-Watt University offers an MSc course in Photonics and Optoelectronic Devices which provides a postgraduate training for those wishing to enter the laser and optoelectronics industries. A wide range of MSc courses is available in other universities. Success in such courses can often lead to your being accepted to continue your studies for a PhD, if you so wish.

Students who graduate with a First Class or upper Second Class honours degree are eligible to apply for funding as research students for an MPhil or PhD degree, either here or elsewhere. Should you choose to remain in St Andrews, you will find a well-endowed School, very successful in securing external funding for a wide range of research activities in areas such as condensed matter physics, optoelectronic and laser devices, theoretical physics, observational and theoretical astronomy, biophysics, and ultra-low temperature magnetism, and having direct contact with a large number of industrial concerns. Full information on the research activities of the School, and information about sources of grants and scholarships, is available on the web site of the School.

If you hope to do research in another university or institute of higher education you should contact the department in which you wish to work. Advice on which universities are active in your chosen field may be obtained from an appropriate staff member in the department.

It is important that, after graduation, you should respond to any enquiry from the Careers Centre regarding your current occupation, please. Responses to such enquiries form the basis of statistical information supplied to the central body which assembles data for the UK Higher Education System, thereafter used by news media for the construction of university league tables. Failure to respond therefore undermines, however unintentionally, the likely success your University in maintaining a favourable position in future league tables.

Finding Referees

Students are likely to wish to use members of academic staff as referees in job applications. To this end, they are advised to cultivate a professional relationship with appropriate staff members. The more a member of staff knows about a student, the more useful a reference they can write. It is thus most likely that a student's project supervisor or a tutor would be in a good position to write a reference. Students should seek the permission of staff members to use them as referees before naming them. As staff members are not permitted to disclose information about students without explicit permission, potential referees may ask for written statements from students authorizing disclosure. It may be worth noting that student attitude and attainment throughout their time at St Andrews can be relevant, which may be another reason for working hard throughout the degree programme.

Health and Safety

The Head of the School of Physics and Astronomy, as part of his responsibilities for safety within the School and its buildings, requires all persons who enter the buildings for any purpose to take reasonable care of the health and safety of themselves and of others. The School's safety policy is available via the "Staff and Students" page of the School website. The School Safety Officer is Mr Reg Gavine, ext 3180, rcg2.

Anyone requiring First Aid during normal hours should contact Mr Les Kirk (Room 324, Level 3, Tel 3148), Dr Graham Turnbull, Mr Steve King, or Mr Steve Balfour, or ask any member of staff to do this for them.

First aid boxes are located at the main entrance, outside room 301, and at the lift entrances. An emergency evacuation chair for those with mobility difficulties is located in the corridor outside room 301.

Advice and Support

If you need advice, then you should feel free to contact any member of academic or secretarial staff in the School; they may be able to help you directly or should be able to tell you who to contact for particular advice. Please feel free to ask questions of your lecturers, tutors, lab demonstrators, or advisers of studies. In a number of cases the paragraphs above suggest who might be the most appropriate person to speak with.

For general queries on academic and other issues, your Adviser of Studies or the School's Director of Teaching may both be good people to start with. If you wish to speak with your Adviser of Studies and they are not available, the School's Director of Teaching would be an appropriate alternative.

If you wish to speak with someone with no direct connection to the School, then Student Services accessed by email at theasc@st-andrews.ac.uk or via the Advice and Support Centre at 79 North St can provide professional support. They are also particularly well placed to help with problems affecting your studies or personal life, including problems with your course work, money, accommodation, health and disability, relationships, stress or anxiety. They also offer special help for international students. The majority of students seek advice from Student Services (formerly Student Support Services) during their time in St Andrews.
www.st-andrews.ac.uk/student-services/Adviceandsupport/

The School also provides advice on "Who can advise or help me?" on particular issues. This is on the main academic notice board and online via the student section of the School's Staff and Students web page.

Academic Dates 2011-12

| | |
|------------------------------|----------------------------|
| Martinmas (first) Semester: | 26 September to 20 January |
| Christmas Vacation: | 17 December to 3 January |
| Candlemas (second) Semester: | 6 February to 25 May |
| Spring Vacation: | 24 March to 8 April |

Orientation Week and Reading Week are integral parts of the University semester, and students are expected to devote these periods to their studies. Students are also expected to be available for the entire examination period

Appendix 1 - Key Contacts/Coordinators

| School Level | | Room | Email |
|------------------------------|---------------------|-------------|--------------|
| Head of School | Prof Thomas Krauss | 211 | hospanda |
| Deputy Head of School | Prof Andy Mackenzie | 207b | apm9 |
| Director of Teaching | Dr Bruce Sinclair | 221 | b.d.sinclair |
| Director of Research | Prof Andy Mackenzie | 207b | apm9 |
| Director of PostGrad Studies | Dr Graham Turnbull | 205 | gat |
| School Senior Secretary | Mrs Lesley Aitken | 211 | physics |
| 01334 463100 | | | |

Coordinators/advisers

| | | | |
|-------------------------|--|-----|------|
| General Degree Students | Drs Cassettari, Koenig, and Smith, as in pre-honours | | |
| Junior Honours | Dr Natalia Korolkova (sem 1) | 311 | nvk |
| | Prof Moira Jardine (sem 2) | 318 | mmj |
| Senior Honours | Dr Felix Baumberger | 208 | fb40 |
| Level Five | Dr Paul Cruickshank | 244 | pasc |

Module and programme coordinators

| | | | |
|------------------------------|-------------------------|------|-------|
| Physics labs | Dr Cameron Rae | 132c | cfr |
| Computational Astrophysics | Dr Christiane Helling | 318 | ch80 |
| Observational Astrophysics | Prof Andrew Cameron | 315 | acc4 |
| Transferable Skills | Dr Bruce Sinclair | 221 | bds2 |
| Overall Project Coordinator | Prof Andrew Cameron | 315 | acc4 |
| Physics projects | Dr Donatella Cassettari | 218 | dc43 |
| Theoretical Physics projects | Dr Chris Hooley | 305 | cjp10 |
| Astrophysics projects | Prof Andrew Cameron | 315 | acc4 |
| Other Modules | Please see appendix 3 | | |

Other

| | | | |
|---------------------------|-----------------------------|------|------------------|
| Examination Officer | Prof Steve Lee | 318a | sl10 |
| Disabilities Coordinator | Dr Bruce Sinclair | 221 | b.d.sinclair |
| Study Abroad Officer | Dr Natalia Korolkova (sem1) | 311 | nvk |
| | Dr Bruce Sinclair (sem2) | 221 | b.d.sinclair |
| Health and Safety Officer | Mr Reg Gavine | 172 | rcg2 |
| First Aid | Mr Les Kirk | 235 | ljk2 |
| S-coding etc requests | Dr Bruce Sinclair | 221 | b.d.sinclair |
| School Student President | Mr Chris Carroll | | physicspresident |

Telephone numbers are available on the next page

Appendix 2 – Selected Staff Members

| Lecturing Staff | <i>Room</i> | <i>ext</i> | <i>email</i> | Office Staff | <i>Room</i> | <i>ext</i> | <i>email</i> |
|------------------------|-------------|------------|--------------|--|-------------|------------|--------------------------|
| Baumberger Dr F | 208 | 1682 | fb40 | Aitken Mrs L M, | 211 | 3100 | lma1 |
| Bonnell Prof I A | 312 | 3140 | iab1 | Anderson Miss V | 211 | 3111 | va3 |
| Brown Dr C T A | 216 | 3129 | ctab | Fitchet Mr G | 211 | 3103 | gf10 |
| Cameron Prof A C | 315 | 3147 | acc4 | Staniforth Mrs L | 211 | 3103 | ls42 |
| Cassettari Dr D | 218 | 3109/3186 | dc43 | | | | |
| Cornwell Prof J F | 340 | 1676 | jfc | Planning and Resources Manager | | | |
| Cruickshank Dr P | 244 | 3196 | pasc | Edwards Dr T J | 207 | 3145 | tje1 |
| Dholakia Prof K | 217 | 3184 | kd1 | | | | |
| Di Falco Dr A | 342 | 3165 | adf10 | Teaching Laboratory Technicians | | | |
| Dominik Dr M | 329A | 3068 | md35 | Kirk Mr L J | 235A | 3132/3148 | ljk2 |
| Dunn Prof M H | 221 | 3119 | mhd | Donaldson Mr P T | 235A | 3132/3148 | ptd |
| Gillies Dr A D | 241 | 3179 | adg1 | | | | |
| Greaves Dr J | 306 | 1681 | jsg5 | Head Janitor | | | |
| Hadfield Dr L J | 304 | 3144 | ljh11 | McQuade Mr A | | 3136 | jan-phys |
| Helling Dr Ch | 318 | 1666 | ch80 | | | | |
| Horne Prof K D | 315A | 3322 | kdh1 | Safety Officer | | | |
| Hooley Dr C A | 304 | 3171 | cah19 | Gavine Mr R C | 172 | 3180 | rcg2 |
| Jardine Prof M M | 318 | 3146 | mmj | | | | |
| Keeling Dr J | 213 | 3121 | jmjk | First Aiders | | | |
| Kemp Dr J | Music | | jk50 | Kirk Mr L J | 235A | 3132/3148 | ljk2 |
| Koenig Dr F | 204 | 3128 | fewk | King Mr S | 132c2 | 7309 | sk18 |
| Kohnle Dr A S | 314 | 3195 | ak81 | Balfour Mr S | 133 | 3178 | stb3 |
| Korolkova Dr N | 311 | 3139 | nvk | Turnbull Dr G A | 205 | 7330 | gat |
| Krauss Prof T F | 215 | 3107 | hospanda | | | | |
| Kruger Dr F | 244 | 3196 | fk20 | Generic School Contact Details | | | |
| Lee Prof S L | 318A | 3143 | sl10 | School Office | 211 | 3111 | physics |
| Lesurf Dr J C G | 340 | 1676/3154 | | | | | |
| Leonhardt Prof U | 317 | 3127/3115 | ulf | School Office opening hours | | | Monday-Friday |
| Mackenzie Prf A P | 207B | 3108 | apm9 | | | | 08.45-11.00, 11.20-17.00 |
| Mazilu Dr M | 252 | 3124 | mm17 | | | | |
| Philbin Dr T G | 231 | 3127 | tgp3 | | | | |
| Rae Dr C F | 132C3 | 7314 | cfr | | | | |
| Samuel Prf I D W | 207A | 3114 | idws | | | | |
| Sibbett Prof W | 209 | 3100 | ws | | | | |
| Sinclair Dr B D | 221 | 3118 | b.d.sinclair | | | | |
| Smith Dr G M | 219 | 2669 | gms | | | | |
| Turnbull Dr G A | 205 | 7330 | gat | | | | |
| Wan Dr K K | 242 | 3210 | kw | | | | |
| Wild Dr V | | | | | | | |
| Woitke, Dr P | | | pw31 | | | | |
| Wood Dr K | 316 | 3116 | kw25 | | | | |
| Zhao Dr H | 316A | 3135 | hz4 | | | | |

Photos of most staff members are available on the School's web pages.

Appendix 3 - Modules to be taught in 2011-12

First semester

| Code | Title | Credits | 2011-12 | Comments |
|--------|-------------------------------------|---------|-------------------|--|
| AS2101 | Astrophysics 2 Condensed | 15 | | For DE Astronomers |
| AS3015 | Nebulae | 15 | KW | |
| AS4025 | Observational Astrophysics | 15 | ACC/JSG | |
| AS5001 | Advanced Data Analysis | 15 | KDH | Also for physicists |
| AS5002 | Magnetofluids & Space Plasmas | 15 | MMJ | Also for physicists |
| AS5003 | Contemporary Astrophysics | 15 | HSZ/CH/JSG | |
| ID4001 | Communication & Teaching in Science | 15 | BDS+ | Can be (astro)-physics based. Interview. |
| PH3012 | Thermal and Statistical Physics | 15 | PASC/SLL | Required by all |
| PH3061 | Quantum Mechanics 1 | 10 | ASK | Required by all |
| PH3066 | Mathematics for Physicists | 10 | CAH | |
| PH3074 | Electronics | 15 | PASC | |
| PH3075 | Applied Vector Calculus* | 5 | CAH | |
| PH4021 | Physics of Atoms | 15 | DC | |
| PH4027 | Optoelectronics & NL Optics 1 | 15 | IDWS/MM | |
| PH4031 | Fluids | 15 | MMJ | |
| PH4032 | Special Relativity and Fields | 15 | NVK | |
| PH4034 | Laser Physics 1 | 15 | FEWK | |
| PH4036 | Physics of Music | 15 | JK | |
| PH4105 | Physics Laboratory 2 | 15 | CFR+ | |
| PH5002 | Foundations of Qu' Mechanics | 15 | KKW | |
| PH5003 | Group Theory | 15 | JFC | |
| PH5005 | Laser Physics 2 | 15 | BDS/MHD/TFK/WS | |
| PH5018 | Laser Physics 2 (extended) | 20 | BDS/MHD/TFK/WS | |
| PH5011 | General Relativity | 15 | MD'k | |
| PH5012 | Quantum Optics | 15 | NVK/FEWK | |
| PH5014 | Interacting Electron Problem | 15 | APM | |
| PH5015 | Apps of Quantum Physics | 15 | KD/MM | |
| PH5016 | Biophotonics | 15 | KD/TFK | |
| PH5183 | Photonics Applications | 15 | TFK/KD/MM AdiF | Must not overlap with PH5015 or PH5016 |
| PH5021 | Organic Electronics & App'ns | 15 | GAT | Includes summer work |
| PH5022 | Organic Semicond' and LCD | 10 | o | DL MatSci only |
| PH5208 | Semicond' Physics & Devices | 10 | GAT | DL Mat Sci only |
| PH5265 | EMSP Solar Power | 6 | IDWS/TFK | Inc Reading week work |

Second semester

| Code | Title | Credits | 2011-12 | Comments |
|--------|-----------------------------------|---------|------------|------------------------|
| AS3011 | Galaxies | 10 | VW | |
| AS3012 | Exoplanetary Science | 10 | ACC/CH | Alternates with AS4021 |
| AS3013 | Computational Astrophysics | 10 | CH/PW | |
| AS4021 | Gravitational Dynamics | 10 | o | Alternates with AS3012 |
| AS4022 | Cosmology | 10 | HSZ | |
| AS4023 | Stars | 15 | ACC | |
| PH3002 | Solid State Physics | 15 | FB | |
| PH3007 | Electromagnetism | 15 | GMS | Required by all |
| PH3062 | Quantum Mechanics 2 | 10 | DC | Required by all |
| PH3073 | Lagrangian & Hamiltonian Dynamics | 10 | UL | |
| PH3101 | Physics Laboratory 1 | 15 | CFR+ | |
| PH4022 | Nuclear and Particle Physics | 10 | ASK | Required by all |
| PH4025 | Physics of Electronic Devices | 15 | GAT | |
| PH4026 | Signals and Coherence | 15 | PASC/JCGL | |
| PH4028 | Advanced Quantum Mechanics | 10 | UL/DC/TP | |
| PH4030 | Computational Physics | 10 | GMS/ADG/MM | |
| PH4035 | Principles of Optics | 15 | FEWK | |
| PH5004 | Quantum Field Theory | 15 | JMJK | |

Both semesters

| Code | Title | Credits | 2010-11 | 11-12 | Comments |
|--------|--|---------|---------|-------|---------------------------------|
| AS4103 | Project in Astrophysics 1 (BSc) | 30 | ACC+ | ✓ | |
| AS5101 | Project in Astrophysics 2 (MPhys) | 60 | ACC+ | ✓ | |
| PH3014 | Transferable Skills for Physicists | 15 | BDS+ | ✓ | Required for all single degrees |
| PH4111 | Project in Physics 1 (BSc) | 30 | DC+ | ✓ | |
| PH5101 | Project in Physics 2 (MPhys) | 60 | DC+ | ✓ | |
| PH5102 | Project in Theoretical Physics (MPhys) | 45 | CAH+ | ✓ | |

These lists are subject to change. There are likely to be changes for the new academic calendar in 2012-13. Please see appendix 2 for staff initials. When more than one staff member is listed the first person is expected to be the module leader.

Pre-requisites are in the Course Catalogue and summarized on the following pages.

| Module Code | Module Brief Title | Credits | Physics BSc | Physics/ Maths BSc | Physics/ Other BSc | Astrophys BSc | Physics MPhys | Physics w Photonics | Astrophys MPhys | Theor Phys MPhys | Theor Phys & Maths | Physics Chem | Pre-requisites, recommended priority study, etc, summarised |
|-------------|-------------------------|---------|-------------|--------------------|--------------------|---------------|---------------|---------------------|-----------------|------------------|--------------------|--------------|---|
| AS2101 | Astro 2 condensed | 15 | | | | AD | | | AD | | | | AD - Taken in JH by direct entry astronomers |
| AS3015 | Nebulae | 15 | | | AB2 | AB2 | | | core | | | | Astronomy 2 |
| AS4025 | Observational Astro | 15 | | | AB2 | | | | Ma2 | | | | Astronomy 2 |
| AS5001 | Advanced Data Analysis | 15 | | | | | | | Ma2 | | | | Comp Phys or Astro or other major computing |
| AS5002 | Magnetofluids & Plasmas | 15 | | | | | | | Ma2 | | | | Appl Vect Calc or MT2003. Fluids rec... |
| AS5003 | Contemp Astrophysics | 15 | | | | | | | Ma2 | | | | Entry to MPhys Astro. Nebulae. Galaxies & Exoplanets recommended. |
| ID4001 | Comms & Teach Sci | 15 | | | | | | | | | | | Entry via interview in previous year. |
| MT3501 | Linear Mathematics | 15 | | | | | | | | core | | | From School of Maths and Stats |
| PH3012 | Thermal & Stat Physics | 15 | core | core | core | core | core | core | core | core | core | core | |
| PH3061 | Quantum Mechanics 1 | 10 | core | core | core | core | core | core | core | core | core | core | |
| PH3066 | Maths for Physicists | 10 | core | core | core | core | core | core | core | core | core | core | |
| PH3074 | Electronics | 15 | | | | | | | | | | | |
| PH3075 | Appl Vector Calculus* | 5 | core | core | core | core | core | core | core | core | core | core | not to be taken if MT2003 obtained already |
| PH4021 | Physics of Atoms | 15 | core | core | core | | core | core | core | core | core | core | QM1 and QM2 |
| PH4027 | Optoelectronics & NLO1 | 15 | | | | | core | core | | | | | Electromagnetism |
| PH4031 | Fluids | 15 | | | | AB2 | | | Ma2 | | | | |
| PH4032 | Special Rel & Fields | 15 | | | | | | | | core | core | | L&H Dynamics or MT4507 |
| PH4034 | Laser Physics 1 | 15 | | | | | core | | | | | | |
| PH4036 | Physics of Music | 15 | | | | | | | | | | | Maths for Phys now or before. |
| PH4105 | Physics Laboratory 2 | 15 | core | | | | core | core | | | | PC1 | |
| PH5002 | Foundations QM | 15 | | | | | | | core | core | core | | QM1 and QM2 |
| PH5003 | Group Theory | 15 | | | | | | | TP1 | TM | TM | | QM1 and QM2 |
| PH5005 | Laser Physics 2 | 15 | | | | | core | core | | | | | Recommend Laser Physics 1. |
| PH5018 | Laser Physics 2 (ext) | 20 | | | | | | | | | | | |
| PH5011 | General Relativity | 15 | | | | | | | | TP1 | TM | | Maths f. Phys. Vect Cal or MT2003. Recc L&H Dyn. & S Rel |
| PH5012 | Quantum Optics | 15 | | | | | | PP1 | | TP1 | TM | | QM1, QM2, and QM3 |
| PH5014 | Interacting Electrons | 15 | | | | | | | | | | | QM1, QM2, Solid State, Thermal and Stat |
| PH5015 | Aps of Quantum Physics | 15 | | | | | | PP1 | | | | | QM1 and QM2 |
| PH5016 | Biophotonics | 15 | | | | | | PP1 | | | | | Principles of Optics or Laser Physics I |
| PH5183 | Photonic Apps | 15 | | | | | | PP1 | | | | | No overlap with other modules allowed. |
| PH5021 | SS Organic Elect & Apps | 15 | | | | | | | | | | | Includes summer work |
| PH5022 | DL Organic Semi&LCD | 10 | | | | | | | | | | | Distance learning MSci Mat Sci only |
| PH5208 | DL Semic' Phys&Dev | 10 | | | | | | | | | | | Distance learning MSci Mat Sci only |
| PH5265 | EMSP Solar Power | 6 | | | | | | | | | | | Shared with postgrads, Activities in Reading Week |

| Module Code | Module Brief Title | Credits | Physics BSc | Physics/Maths BSc | Physics/Other BSc | Astrophys BSc | Astrophys BSc | Physics MPhys | Physics w Photonics | Astrophys MPhys | Theor Phys MPhys | Theor Phys & Maths | Physics Chem | Pre-requisites, recommended priority study, etc, summarised |
|-------------|----------------------------|---------|-------------|-------------------|-------------------|---------------|---------------|---------------|---------------------|-----------------|------------------|--------------------|--------------|---|
| AS3011 | Galaxies | 10 | | | | core | | | | core | | | | Astronomy 2 |
| AS3012 | Exoplanetary Science | 10 | | | | | | | | | | | | Alternates with Gravitational Dynamics |
| AS3013 | Computational Astrophysics | 10 | | | | core | | | | core | | | | Astronomy 2 |
| AS4021 | Gravitational Dynamics | 10 | | | | AB2 | | | | Ma2 | | | | Astronomy 2. Alternates with Exoplanets |
| AS4022 | Cosmology | 10 | | | | AB2 | | | | core | | | | Astronomy 2 |
| AS4023 | Stars | 15 | | | | AB2 | | | | core | | | | Astronomy 2 |
| MT4507 | Classical Mechanics | 15 | | | | | | | | | TM | | | |
| PH3002 | Solid State Physics | 15 | core | | | | | core | core | | core | | core | |
| PH3007 | Electromagnetism | 15 | core | core | core | core | core | core | core | core | core | core | core | Phy 2B, MT2001, Appl Vect Calc or MT2003 |
| PH3062 | Quantum Mechanics 2 | 10 | core | core | core | core | core | core | core | core | core | core | core | QM1 |
| PH3073 | Lagran. & Ha. Dynamics | 10 | | | | | | core | core | rec | core | TM | | Physics 2B, MT2001, and know vector calculus. AntiReqMT4507 |
| PH3101 | Physics Laboratory 1 | 15 | core | | | | | core | core | | | | PC1 | |
| PH4022 | Nuclear & Part'l Physics | 10 | core | core | core | core | core | core | core | core | core | core | core | Physics 2B, QM1 and QM2 |
| PH4025 | Phys of Electronic Dev | 15 | | | | | | | | | | | | EM, Thermal & Statistical, QM1 |
| PH4026 | Signals and Coherence | 15 | | | | | | | | | | | | |
| PH4028 | Advanced QM | 10 | | | | | core | | core | | core | | | QM1 and QM2 |
| PH4030 | Computational Physics | 10 | | | | | core | core | core | | core | | | |
| PH4035 | Principles of Optics | 15 | | | | | | | core | | | | | |
| PH5004 | Quantum Field Theory | 15 | | | | | | | | | core | core | | QM1 and QM2. L&H Mech or MT4507. Foundations QM rec. |

| | | | | | | | | | | | | | | |
|--------|--------------------------|----|------|--|--|------|------|------|------|------|------|---|----|--|
| AS4103 | Astrophysics BSc Project | 30 | | | | | | | | | | | | |
| AS5101 | Astrophysics Mphys Proj | 60 | | | | core | | | | core | | | | |
| PH3014 | Transferable Skills fP | 15 | core | | | core | core | core | core | core | | | | |
| PH4111 | Physics BSc Project | 30 | core | | | | | | | | | | | |
| PH5101 | Physics MPhys Project | 60 | | | | | core | core | core | | | | MC | Chem/Phys do this or Chem Proj |
| PH5102 | Theory MPhys Project | 45 | | | | | | | | | core | M | | Theory/Maths do this or Adv Maths Proj |
| MT5999 | Advanced Maths Proj | 40 | | | | | | | | | | M | | Theory/Maths do this or TP Proj |
| CH5441 | Chemistry Project | 40 | | | | | | | | | | | MC | Chem/Phys do this or Physics Proj |

AB2 – BSc Astrophysics must choose at least two of these modules. Ma2 likewise for MPhys Astronomy, etc. Please check main handbook entries.

A larger version is available on the School website.

Appendix 4 - Degree programmes

General

The following modules comprise a "common core" for all students taking single honours degrees in the School of Physics and Astronomy.

| | | |
|--------|------------------------------------|------------|
| PH3007 | Electromagnetism | 15 credits |
| PH3012 | Thermal and Statistical Physics | 15 credits |
| PH3014 | Transferable Skills for Physicists | 15 credits |
| PH3061 | Quantum Mechanics 1 | 10 credits |
| PH3062 | Quantum Mechanics 2 | 10 credits |
| PH3066 | Mathematics for Physicists | 10 credits |
| PH3075 | Applied Vector Calculus* | 5 credits |

Taken together these modules are worth 80 credits. They are normally all taken in the Junior Honours year.

In the tables below, the modules which are listed form the compulsory components of the degree in question. Normally, students select additional optional modules to make up the credits necessary for the degree, observing the restrictions imposed by Senate on the number of credits which must be obtained at a given level. Although students are expected to select optional modules predominantly from honours modules in physics and astronomy, a small number of modules may sometimes be chosen in other disciplines, e.g. in Mathematics, subject to the approval of the Adviser of Studies. Joint honours programme students should have similar numbers of credits during their programme from the two schools involved.

Honours BSc and BEng degrees require a minimum of 240 credits to be gained during the two year honours programme, of which at least 210 credits must be at 3000 and 4000 level and at least 90 credits must be at 4000 level. (For the BSc degree programme Physics with French (or Spanish) With Integrated Year Abroad, the honours programme lasts an extra year, and a further 60 credits must be obtained in the course of the year spent abroad.)

MPhys, MEng and MSci degrees require a minimum of 360 credits to be gained during the three year honours programme, of which at least 330 credits must be at 3000, 4000 and 5000 level and at least 120 credits must be at 5000 level.

* This module is excluded from the list for all students who have already taken MT2003 Applied Mathematics.

For each degree programme the recommended sequence of modules to be taken is as shown below, but circumstances occasionally arise in which some variation is necessary and desirable, e.g. when a student is abroad for a year as part of an exchange programme. Please note that some modules are given only every second year, which may make minor changes to the order of a student's programme..

A. BSc programmes

Physics - single honours

| | |
|----------------|--|
| Junior Honours | Common Core modules PH3002 Solid State Physics PH3101 Physics Laboratory 1 |
|----------------|--|

| | |
|----------------|--|
| Senior Honours | PH4021 Physics of Atoms PH4022 Nuclear and Particle Physics PH4105 Physics Laboratory 2 PH4111 Project in Physics 1 |
|----------------|--|

Physics - joint honours

| | |
|----------------|--|
| Junior Honours | Common Core modules except need not do PH3014. Those taking the joint degree in Mathematics and Physics need not attend PH3066 Mathematics for Physicists |
|----------------|--|

| | |
|----------------|--|
| Senior Honours | PH4022 Nuclear and Particle Physics Project in physics or other discipline. |
|----------------|--|

Physics with French or Spanish

| | |
|----------------|---|
| Junior Honours | Common Core modules except need not do PH3014 PH3002 Solid State Physics PH3101 Physics Laboratory 1* |
|----------------|---|

| | |
|----------------|---|
| Senior Honours | PH4021 Physics of Atoms PH4022 Nuclear and Particle Physics PH4111 Project in Physics 1 |
|----------------|---|

* Alternatively PH4105 Physics Laboratory 2 in the SH year.

Astrophysics

| | |
|----------------|---|
| Junior Honours | AS2101 Astronomy and Astrophysics 2 (condensed) [⊗] Common Core module AS3015 Nebulae (one of choices, see SH) AS3011 Galaxies AS3013 Computational Astrophysics |
| Senior Honours | AS4103 Project in Astrophysics 1 PH4022 Nuclear and Particle Physics At least two of AS3015 Nebulae (may be taken in JH) AS4021 Gravitational Dynamics (some years in JH) AS4022 Cosmology AS4023 Stars AS4025 Observational Astrophysics PH4031 Fluids |

B. MPhys programmes

Physics

| | |
|----------------|---|
| Junior Honours | Common Core modules PH3002 Solid State Physics PH3101 Physics Laboratory 1 |
| Senior Honours | PH3073 Lagrangian and Hamiltonian Dynamics PH3074 Electronics PH4021 Physics of Atoms PH4022 Nuclear and Particle Physics PH4028 Quantum Mechanics 3 PH4030 Computational Physics PH4105 Physics Laboratory 2 |
| MPhys year | PH5101 Project in Physics 2 |

[⊗] For level-two-entry students who have not already taken AS2001

Physics with Photonics

Junior Honours

Common Core modules
PH3002 Solid State Physics
PH3101 Physics Laboratory 1
PH4034 Laser Physics 1

Senior Honours

PH3073 Lagrangian and Hamiltonian Dynamics
PH3074 Electronics
PH4021 Physics of Atoms
PH4022 Nuclear and Particle Physics
PH4027 Optoelectronics and Nonlinear Optics 1
PH4028 Quantum Mechanics 3
PH4030 Computational Physics
PH4035 Principles of Optics
PH4105 Physics Laboratory 2

MPhys year

PH5005 Laser Physics 2
one of PH5012, PH5105, PH5016 , PH5020
PH5101 Project in Physics 2

Astrophysics

Junior Honours

AS2101 Astronomy and Astrophysics 2[†]
Common Core modules
AS3011 Galaxies
AS3013 Computational Astrophysics

Senior Honours

AS3015 Nebulae (if not taken in JH)
AS4022 Cosmology
AS4023 Stars
PH3073 Lagrangian and Hamiltonian Dynamics *
PH4022 Nuclear and Particle Physics
at least two of { AS4021 Gravitational Dynamics (may be in JH)
AS4025 Observational Astrophysics
PH4031 Fluids

at least two of { AS5101 Project in Astrophysics 2
AS5001 Astronomical Data Analysis
AS5002 Star Formation and Plasma Astrophysics
AS5003 Contemporary Astrophysics

[†] If not already taken AS2001

* Recommended, but not compulsory

Theoretical Physics

| | |
|-----------------|--|
| Junior Honours | Common Core modules PH3002 Solid State Physics PH3073 Lagrangian and Hamiltonian Dynamics |
| Senior Honours | MT3501 Linear Mathematics* PH4021 Physics of Atoms PH4022 Nuclear and Particle Physics PH4028 Quantum Mechanics 3 PH4030 Computational Physics PH4032 Special Relativity and Fields |
| MPhys year | PH5002 Foundations of Quantum Mechanics PH5004 Quantum Field Theory PH5102 Project in Theoretical Physics |
| At least one of | { PH5003 Group Theory PH5011 General Relativity PH5012 Quantum Optics |

* Could be taken in the JH year

Theoretical Physics and Mathematics

| | |
|-----------------|---|
| Junior Honours | Common Core modules (may exclude PH3066 and/or PH3014 if wished) PH3073 Lagrangian and Hamiltonian Dynamics or MT4507 Classical Mechanics |
| Senior Honours | PH4022 Nuclear and Particle Physics PH4028 Quantum Mechanics 3 PH4032 Special Relativity and Fields |
| MPhys year | PH5002 Foundations of Quantum Mechanics PH5004 Quantum Field Theory PH5102 Project in Theoretical Physics or MT5999 Advanced Project in Mathematics |
| At least one of | { PH5003 Group Theory PH5011 General Relativity PH5012 Quantum Optics |

C. MSci programme

Physics and Chemistry

| | |
|--|---|
| Junior Honours or Senior Honours | Common Core modules excluding PH3014 PH3002 Solid State Physics PH4021 Physics of Atoms PH4022 Nuclear and Particle Physics At least one of PH3101 Physics Laboratory 1 PH4105 Physics Laboratory 2 |
| MSci year | PH5101 Physics Project 2 and at least 15 credits of PH5000 level modules or CH5441 Chemistry Project and at least 30 credits of PH5000-level modules |

Note: Normally students will take physics modules (listed above) in their JH year and chemistry modules (specified by the School of Chemistry) in their SH year, or vice versa, in order to avoid timetabling problems. The choice of order is left to each student. But concurrent study of each subject (subject to timetable restrictions) may be preferred, and the adviser should then be consulted in order that the specified modules are taken in a suitable order.

Due to timetabling issues, MSci Physics-based projects may need to spread over the session in a slightly different manner to the MPhys projects. Students involved are invited to talk with the School's project coordinators about this.

E. Comparative Timetable

The following tables are intended to provide a better understanding of how the various degree programmes compare in the JH and SH years, particularly in respect of single honours degrees for which students may be initially undecided as regards choice and may wish to postpone a final decision until as late as possible. The tables show for example that all single honours BSc and MPhys students follow the same programme in the first semester of the JH year, after which a separation begins to occur in the curriculum for Theoretical Physics and Astrophysics degrees. For those who are qualified to take the MPhys degree and wish to study Physics or Astrophysics, a final decision between the BSc and MPhys degrees may be postponed until the end of the JH year.

The option of taking AS2101 Astronomy and Astrophysics 2 (condensed) in the first semester of JH will normally apply only to those who chose Direct Entry into year 2 and who have not had the chance of taking this module already.

The number shown after each module is the number of credits for that module.

Junior Honours BSc and MPhys

| 1st semester | | 2nd semester | | | |
|--|----|----------------------------|-------------|-------------------------|------------------------|
| All programmes | | Phys | Phys w Phot | Th Phys | Astrophys |
| Thermal and Stat Physics | 15 | Solid State Physics 15 | | | Galaxies/ Choice 10 |
| AS2101 Astr & Astrophys | 15 | Physics lab 1 15 | | | Choice 10 |
| <i>Or</i> Choice (eg Electronics, Lasers 1,...) | | | | | |
| Maths for Physicists | 10 | Lagr/Ham Dynamics 10 | | Comp Astrophys 10 | |
| Quantum Mechanics 1 | 10 | Quantum Mechanics 2 10 | | | |
| Applied Vector Calculus | 5* | Electromagnetism 15 | | | |
| Transferable | | Skills for Physicists 15 | | | |

* Only for those who have not taken MT2003

Note: There is a minor exception to the rule that the first semester in JH is the same for all programmes. Students who are interested in taking the MPhys degree in Physics with Photonics are advised that, in order to preserve this possibility, (a) the option of taking AS2101 (for those who previously took direct entry to year 2) is not available, and (b) they must select Laser Physics 1 as their “choice” in the first semester. Following this route, students will retain not just this possibility but other degree options until at least the end of the first semester.

Senior Honours BSc

| 1st semester | | 2nd semester | |
|---------------------|----------|---------------------------------|-----------------------|
| Phys | Astro | Phys | Astro |
| Physics lab 2 15 | Choice** | Choice 15 | Galaxies / Choice** |
| Physics of Atoms 15 | Choice** | Nuclear and Particle Physics 10 | |
| Choice 15 | | Physics Project 1 30 | Astro Project 1 30 |
| Choice 15 | | | |

* if not already taken, otherwise Choice.

** BSc students in Astrophysics in SH must include at least two modules in astrophysics in addition to the Astrophysics Project – see degree specifications.

Senior Honours MPhys

| 1st semester | | | | 2nd semester | | | | | |
|------------------|------------------------------|-------------------------------------|----------------|------------------------------|---------|----------------------------|--------------|---------------------------|----------------|
| Phys | Ph w Ph | Th Phys | Astro | Phys | Ph w Ph | Th Phys | Astro | | |
| Physics lab 2 | 15 | Special Relativity and Fields 15 | Choice** 15 | Computational Physics | 10 | Quantum Mechanics | 3 10 | Galaxies / Choice** 10 | |
| Electronics | 15 | *Linear Maths 15 | Nebulae 15 | Nuclear and Particle Physics | | | 10 | Cosmol 10 | |
| Physics of Atoms | | | 15 | Lagrangian/Hamil Dynamics | | 10 | Choice 15 | Stars 15 | |
| Choice | Opto & Nonlin Optics 1 15 | Choice | | Choice | 15 | Principles of Optics 15 | Choice | 15 | Choice** 10 |

* if not already taken, otherwise Choice.

** MPhys students in Astrophysics in SH must include two further Astrophysics modules in their programme – see page 29. In addition they are recommended to take PH3073 Lagrangian and Hamiltonian Dynamics in the second semester, although it is not a compulsory module.

Note: it is assumed that students taking the MPhys in Physics with Photonics have taken Laser Physics 1 in their JH year.

Appendix 5. AS2101 Level Two Astrophysics – condensed

Those students who entered at level two and who plan to proceed to an astrophysics degree will not have done AS2001 in their entry year so should instead do AS2101 in their JH year. This module is a condensed version of AS2001. It does not contain any lab work, and does not have the lecture material on observational techniques. It is a 15 credit module, running in the 11-12 slot.

Disclaimer:- Some of the arrangements detailed in this booklet may have to be changed, and there may be errors. The School will endeavor to notify registered students of any updates to this document.