UNIVERSITY OF STRATHCLYDE

DEPARTMENT OF PHYSICS

2011/2012 HANDBOOK

for

3rd YEAR STUDENTS

MPhys

Honours BSc Physics

Honours BSc in Physics with Teaching

Honours BSc in Mathematics and Physics

This handbook should help guide you through your studies, but if you have any questions please do not hesitate to ask. Our friendly and experienced staff will be glad to help. We are one of the most successful physics departments in the UK and our teaching was awarded the top grade of "excellent" in the Government assessment of Scottish Universities. Our courses are accredited by the Institute of Physics. They are designed to be exciting, stimulating and rewarding. We think you will enjoy them.

With best wishes

Prof Rob Martin
Head of Department

This Handbook should be read in conjunction with the University's STUDENT HANDBOOK that can be accessed at http://www.strath.ac.uk/student/

Courses

MPhys

This is a broad-based degree with an emphasis on modern physical principles. The final year of this course differ from that of the BSc Physics degree in that students encounter classes on subjects that are necessary to produce a graduate physicist capable of working in a research environment in either industry or academia. Students can choose optional classes in Year 4 and then extend the depth of coverage of these subjects through Year 5.

Within the MPhys degree structure, there is the opportunity for students to tailor their classes in the final two years to a given specialisation in a particular subject area. This is done by selecting classes relating to a certain area of expertise offered by the department and pursuing a project in that area.

Honours BSc Physics

This is a comprehensive degree providing students with a thorough grounding in the fundamentals of physics. As with the MPhys degree students can, during the 4th and final year of the course, select optional classes from a range of diverse topics from theoretical physics through plasma physics to photonics.

Honours Physics with Teaching

This degree is offered in conjunction with the School of Education in Faculty of Humanities and Social Science and is a qualification that is designed to prepare graduates to be teachers of physics in secondary schools. This degree not only covers the same core physics syllabus of the BSc Physics degree but also allows students the time to acquire the educational theory and classroom practice necessary for registration with the General Teaching Council for Scotland.

Honours BSc Mathematics and Physics

The aim of this degree is to provide students with a joint qualification in Mathematics and Physics by providing the opportunity to pursue Mathematics and Physics to a high level. It contains the physics necessary for future fundamental and applied work, along with computational and theoretical physics. Again in the 4th year students can choose optional classes from both the Physics and Mathematics departments.

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We look forward to welcoming you into the third year of your study. We aim to work with you to achieve a valuable year's study this year, whether it is to graduate with a Pass Degree or progress on for a BSc Honours or MPhys degree. Whatever your plans, we hope your study is successful. We know it will be challenging, and involve much hard work, but we believe that you will find the effort well worthwhile, an investment to prepare you for your chosen career.

THE ACADEMIC YEAR 2011/2012

REGISTRATION : Monday 19th September 2011 – Friday 23rd September 2011

Important events which you must attend during this week, if you are in your first year of study, are

Faculty Induction Session on 21st September 2011 between 12.00 noon – 2.30 pm in room JA 3 25 of the John Anderson Building.

First Day Meeting for all 3rd Year students on Friday 23rd September 2011 from 12.00 – 13.00 in room JA 3 14

SEMESTER I :

University closed	**Monday 26th September 2011**
Teaching Weeks 1 – 12	**Tuesday 27th September 2011 – Friday 16th December 2011**
Christmas Vacation	**Saturday 17th December 2011 – Sunday 1st January 2012**
University closed	**Monday 26th December 2011 – Wednesday 4th January 2012**
Revision Week	**Thursday 5th January 2012 – Friday 6th January 2012**
Examination Weeks	**Monday 9th January 2012 – Friday 20th January 2012**

SEMESTER II :

Teaching Weeks 1-12	**Monday 23rd January 2012 – Friday 27th April 2012**
Spring Vacation	**Monday 2nd April 2012 – Friday 13th April 2012**
University closed	**Friday 6th April 2012**
University closed	**Monday 9th April 2012**
Revision Week	**Monday 30th April 2012 – Friday 4th May 2012**
Examination Weeks	**Tuesday 8th May 2012 – Friday 1st June 2012**
University closed	**Monday 7th May 2012**
University closed	**4th & 5th June 2012**

Resit Examinations begin **Wednesday 8th August 2012** (normally of two weeks duration)

These dates are correct at the time of publishing but you are advised to check http://www.strath.ac.uk/studying/currentstudent/keydates/ regularly for any changes

GENERAL INFORMATION

The Further and Higher Education Charter for Scotland was published in 1994. A leaflet outlining its main points is available from the University's Administrative centre, in the McCance Building. The University's academic provision was inspected by the Enhancement Lead Institutional Review (2010) and was given the highest rating possible.

The Faculty of Science includes the Departments of Physics**,** Mathematics and Statistics, Computer & Information Science, Pure & Applied Chemistry as well as the Strathclyde Institute of Pharmacy and Biomedical Sciences which comprises the bioscience departments. The Faculty, one of four in the University, has administrative and financial powers devolved to it by the University.

The current office-holders in the Faculty are:

Dean:	Professor Iain Hunter
Vice-Deans:	Dr A Mulholland (Knowledge Exchange)
	Professor Alan Harvey (Research)
	Dr Chris Prior (Academic)

Permanent administrative staff of the Faculty are:

Faculty Manager:	Ms Bronagh Dallat
Assistant Faculty Manager:	Mrs Jill Kyle

Enquiries to Faculty staff can be presented at the Student Business enquiry desks in the McCance Building. [They also deal with changes of address, changes of registration for classes or courses, medical certificates and the administration of the Examination Boards that consider your end-of-year examination results.]

The Department is housed mainly in the **John Anderson (JA) building**, but some staff have offices and laboratories in the adjacent Colville (Col.) Building, linked at levels 3, 4 and 5. The John Anderson Building is open Monday to Friday from 8.00 am to 10.00 pm. After 6.00 pm access is only via the main door (level 5) or via the Colville Building as the subsidiary entrances are locked to maintain security.

The Department makes available JA8.18 (The Bob Illingworth Room) as a **Student Reading Room**. You are asked to cooperate by not using 8.18 for conversing, eating or drinking. This room is for students of all years, and of all courses. (Please treat it with care, or else the facilities will be withdrawn.) There is a student common room and a computer room on JA level 5.

The Department has over **30 academic staff.** The Head of Department (2010/2013) is Professor Rob Martin (JA 8.02).

Information on the Department and its staff can also be obtained from the Department Website http://phys.strath.ac.uk

Should you need to contact a member of staff, contact details can also be found on the Department Website http://phys.strath.ac.uk/information/people/people.php . Alternatively, messages for staff may be left in their pigeonhole on the 8th floor of the John Anderson Building, outside JA 8.31. (Please note, names are above pigeonholes, not under.) Besides its academic staff, the Department also includes research fellows, research assistants and research students who, besides their research activities, participate in the teaching of the Department. In addition there are also technical and secretarial staff. **Photographs** of all the staff are displayed on the **8th. Floor of the John Anderson Building** outside JA 8.03.

The Department uses the internet to communicate with students and so it is essential that you check both your university email account and any class announcements made through the University VLE MyPlace.

On timetables and notices, each building on the Campus is identified by a prefix. Originally these were mostly single letters, and the John Anderson Building was denoted by K.

This is still used by the University in its timetables for classes and examinations, but the more user-friendly notices issued by the Department use two letter building prefixes, like JA for the John Anderson Building, LT for the Livingstone Tower, etc.

YOUR DEGREE COURSE

Course Requirements

Each degree course is made up of a number of classes. A full year's curriculum normally totals a minimum of 120 credits. The classes you choose must be agreed with your Adviser of Study (see below) and then you will be able to complete your registration with the University. The details of the core physics and mathematics classes you will take this year are given in Appendix 1. Further information about all the classes offered this Department can be found at http://phys.strath.ac.uk/undergrad/classes.php.

Each degree course is governed by a set of Regulations that specify the compulsory classes you must follow for that degree course as well as the progress requirements to move from one year to the next year of a given degree course. The Regulations that govern your year of study are given in Appendix 2 and the full regulations can be downloaded from http://www.strath.ac.uk/corporateservices/gmpt/academicaffairs/publications

In addition to the Regulations that are specific to your chosen course you are bound by a set of general regulations and these can be read at

http://www.strath.ac.uk/corporateservices/gmpt/academicaffairs/publications/ (for 2009/10 onward years 1, 2, 3 select Part 2A)

At the Start of the Year

There will be a 1st Day Meeting for all students in Year Three of their chosen degree course. This will take place in JA 3.14 at 12 noon.

If you wish to take additional classes over and above the core compulsory classes that make up the Third year curriculum you may discuss this with your Adviser of Study. Should you decide to take any additional classes you may change these classes through PEGASUS but there are restrictions on changing your classes after the 3rd week of each semester. Your Adviser will approve any changes It is important that your **class registration** be correct as,it is used to check the feasibility of draft exam timetables.

Timetables

The timetables for each degree course will be available on the Departmental website at the start of each semester.

http://phys.strath.ac.uk/undergrad/timetable/semester1.php

http://phys.strath.ac.uk/undergrad/timetable/semester2.php

Advisers of Study

The Course Advisers for 3rd year:-

MPhys	Dr O. J. Rolinski, JA 6.12, ext. 4230	o.j.rolinski@strath.ac.uk
Physics BSc Honours	Dr O. J. Rolinski, JA 6.12, ext. 4230	o.j.rolinski@strath.ac.uk
Physics with Teaching BSc Honours	Dr O. J. Rolinski, JA 6.12, ext. 4230	o.j.rolinski@strath.ac.uk
Mathematics and Physics BSc Honours	Dr O. J. Rolinski, JA 6.12, ext. 4230	o.j.rolinski@strath.ac.uk
Mathematics and Physics BSc Honours	Dr G. McKay, LT10.27, ext 3660	g.mackay@strath.ac.uk
Natural Sciences BSc	Dr. A. B. McCruden, SIBS 4.59 ext. 3749	a.b.mccruden@strath.ac.uk

Personal Development Advisers (PDA)

As well as an Adviser of Study, you will also be assigned to a member of academic staff who will act as your Personal Development Adviser (PDA). The role of the PDA is to encourage you to reflect on your study in Physics and help you develop to be a Physicist who is enquiring, engaged, enterprising and ethical, all the attributes necessary for a graduate fit for the 21st Century. Should any problems arise during your study your PDA will be able to direct you to the relevant support staff. If you have any problems then please do inform the Department so that we can put measures in to help you.

Student-Staff Committee

The Department has a **Student-Staff Committee** (Convener Dr O. Rolinski) that is made up of student representatives from each year and a number of academic staff. Students are invited to choose their own representative in the first two weeks of the first term. The Committee has an important role, resolving difficulties that may arise. The Students Association offers training on how to be an effective representative. The Committee considers anything that affects the teaching of the courses or Student-Staff relations. Problems that are personal to you should be raised with your PDA or Adviser of Study. Matters affecting a group of students should be raised in the first instance with any staff member directly involved, but if this fails to resolve the matter, or if it raises wider issues, then ask your Student-Staff Committee Representative to raise it at their next meeting.

Textbooks

Obtain your essential **textbooks** at the first opportunity.

REPORT WRITING

A key skill for any physicist is to communicate the outcomes of an investigation to a wider audience. During your course you will be expected to write formal reports on the practical work that you undertake in years 1 to 3 and the final year projects that you take in your 4th and 5th year of study. During the first three years of your study at Strathclyde the Department will give you the necessary training on how to write a report and this will include advice on the structure and content of the report, how to reference and how to avoid plagiarism. The Department will use the anti plagiarism software Turnitin (https://turnitin.com/static/index.php) to check for plagiarism.

ADVICE FOR STUDENTS WITH SPECIAL NEEDS

The University is committed to supporting students with special educational needs, which may range from dyslexia to mental health problems. To this end the University has a dedicated unit, the Disability Service. Please refer to your University Handbook for further details and see http://www.strath.ac.uk/disabilityservice/

To ensure the Department meets your needs as defined by the Disability Service, Ms K. Munro (kirsten.munro@strath.ac.uk) and Dr T. Han (t.han@strath.ac.uk) are the Departmental Disability Contacts. Should you have any questions then please do not hesitate to contact either of them.

SAFETY REGULATIONS

These apply to all parts of the University. Your attention will be drawn to these when they affect you. Particular care needs to be exercised in laboratories, and in general, you are not allowed to work in a laboratory unsupervised. For this reason, it is not usually possible to make up time lost for any reason during a laboratory session by putting in extra time later. The Department's safety rules are listed at the back of this handbook.

INFORMATION TECHNOLOGY, PEGASUS AND MYPLACE, AND PERSONAL TRANSFERABLE SKILLS

Expertise in *information technology* (IT) and well developed *personal transferable skills* are essential if you are to maximise your performance in the academic work of your chosen course. Essays, laboratory and project reports, for example, must normally be word processed while the ability to analyse and plot experimental data using available software packages is essential for progress in scientific research. Familiarity with IT also allows you to search the internet and electronic databases for reference material to assist in the writing of assignments and dissertations. In the later years of the course, the emphasis on project work trains you in the planning and performance of research, while the preparation and delivery of presentations, gives you the confidence to communicate your results and their relevance to both specialists and non-specialists as is required of professional scientists.

Year 1: *Laboratory reports, spreadsheets, e-mail, internet,*

Year 2: *Laboratory reports, library skills and the preparation and delivery of a talk.*

Year 3: *Laboratory reports, essay, project training, industrial project and its written and poster presentation, problem solving.*

Years 4 & 5: *Research project and its written and oral presentation, problem solving, research training and communicating physics.*

PEGASUS and MYPLACE

The University has developed its own information server known as PEGASUS that is used to provide services to both staff and students. Please refer to your University Handbook for further information. In addition to PEGASUS the University has a VLE, MYPLACE, and this is used to provide copies of lecture notes, assignments, tutorial questions etc., as well as providing discussion forums for students. As with PEGASUS you will receive training on the use of MYPLACE in the first weeks of your course and information relating to MYSPACE can be downloaded from http://classes.myplace.strath.ac.uk/

3rd YEAR PERFORMANCE

The third year of your degree course is a very important year. Your performance in this year's examinations will determine whether you remain on the degree you are currently studying and also the level of degree award. In the case of MPhys students, if you do not achieve a credit-weighted average of greater than 50 % over your third year you will be transferred to either the BSc Honours Physics degree or the BSc Physics degree. For students currently on the BSc Honours degree your 3rd year performance counts towards the level of award as defined by the degree algorithms given in Appendix 3.

ATTENDANCE

ATTENDANCE AT TUTORIALS AND LABORATORY SESSIONS IS MANDATORY AND THE DEPARTMENT WILL BE MONITORING ATTENDANCE AT PHYSICS LECTURES. FAILURE TO MAINTAIN A HIGH LEVEL OF ATTENDANCE MAY RESULT IN TERMINATION OF YOUR REGISTRATION.

ASSESSMENT and PROGRESS

There are a variety of methods by which classes are examined and the lecturer at the start of a class should give the relevant details. You should note that **the pass mark for classes at Levels 1 - 4 is 40% and for Level 5 classes it is 50%.** Note that the credits associated with a class are indivisible. You cannot be awarded a fraction of its credits for meeting part of its requirements.

The most common assessment method is by examination. The conduct of examinations is covered by University regulations including:

1. You need to produce your student identity card at exams.
2. You are forbidden to have with you in the exam room notes of any sort unless the exam instructions explicitly permit them. [Possession of such notes in the exam room is an offence, irrespective of whether use is made of them.]

In *Physics* examinations note that for the same reason you must not take into the exam graphic calculators with memory bank facilities, and in particular, no calculator with alphabetic input. (In *Physics* and *Mathematics* exams, *programmable* calculators are forbidden. Other Departments may have other special restrictions for their examinations.)

PLAGIARISM

Plagiarism most commonly involves the passing off of another person's work as your own and is regarded as a form of academic dishonesty. Plagiarism more often than not involves the copying of another person's work, be it a figure, text, experimental data or homework for example and not acknowledging the source of the work. Plagiarism can be avoided by suitable referencing. For more details on plagiarism please see the University Handbook and follow this link

http://www.strath.ac.uk/media/ps/cs/gmap/academicaffairs/policesandprocedures/student-guide-to-academic-practice-and-plagiarism.pdf for guidelines on plagiarism.

If you are unsure of any aspect of this, please contact the department. The department will make extensive use of software capable of detecting plagiarism.

EXAMINATION ATTEMPTS

All students will be entitled to TWO attempts only to gain the credits for any class. These attempts will normally comprise the First Attempt taken in either the January or the June Diet of Examinations and the Second Attempt taken in the August re-sit Diet of Examinations. For some classes, such as Practical classes or classes with significant elements of continuous assessment, both attempts may take place during the 1st and 2nd semesters. It is the lecturer's responsibility to outline the assessment procedure for the class at the start of the course.

THIRD YEAR RE-SIT EXAMINATIONS FOR BSc HONOURS STUDENTS

The level of award of your degree is determined by the Faculty of Science Degree Award Algorithm as detailed in Appendix 3. The algorithm uses the FIRST ATTEMPT mark for any Level 3 or Level 4 class. If you fail a 3rd year Level 3 class and do not need the credits for progression then it is not necessary to take the re-sit examination. Re-sitting a failed examination will only improve your transcript and not your degree award

TARGETS

You should aim to obtain the credits for all your classes because progress to later years of the course and the award of the degree depend on your cumulative total.

In brief for the progression requirements for the various degrees are summarised in the following table but full details can be found at http://phys.strath.ac.uk/undergrad/handbook

Progression Requirements

	3rd to 4th Year
Degree	**Credit Requirements**
BSc (Hons) Physics degree	In order to progress to the fourth year of the course, a student must have accumulated at least 360 credits from the course curriculum including 60 credits at Level 3 or above.
BSc (Hons) Physics with Teaching degree	In order to progress to the fourth year of the Honours course, a student must normally have accumulated at least 360 credits from the course curriculum including 60 credits at Level 3 or above.
BSc (Hons) Mathematics and Physics degree	In order to progress to the fourth year of the course, a student must have accumulated at least 360 credits from the course curriculum including 120 credits at Level 3 or above..
MPhys degree	In order to progress to the fourth year of the course, a student must have accumulated at least 360 credits from the course curriculum.

FOR THE BSc and MPhys DEGREE YOU MUST ACHIEVE AN APPROVED STANDARD OF PERFORMANCE WITH REGARDS TO LEVEL OF STUDY AND ACADEMIC ACHIEVEMENT. FOR THE MPhys DEGREE THE DEPARTMENT DEFINES THIS LEVEL AS A CREDIT-MARK AVERAGE OF BETTER THAN 50 %. FOR THE BSc HONOURS DEGREES THE DEPARTMENT DEFINES THIS LEVEL AS A CREDIT-MARK AVERAGE OF BETTER THAN 45 %.

The Honours degrees are classified into four grades, Class I (a "First"), Class II(i) (an "Upper Second"), Class II(ii) (a "Lower Second") and a Class III (a "Third").

MPhys degrees require an extra year of study and are classified as for BSc Honours degrees, except there is no Class III.

The level of award is determined by the Faculty of Science Degree Award Algorithm which is given in Appendix 3.

Students who fail to qualify for a degree may be eligible for the award of the Diploma or Certificate of Higher Education.

Details of the average mark that you must achieve for each level of award are given in the General Regulations that govern your study whilst at Strathclyde. These can be viewed at http://www.strath.ac.uk/corporateservices/gmpt/academicaffairs/publications/ (select Calendar Part 2a and then look at Regulation 11.1.50)

EXAMINATION BOARD DECISIONS

Whichever method of assessment is used an Examination Board will consider the results of your examinations. The Board meets first in June and also, to consider the results of August re-sit examinations, in September. The Boards of Examiners will take one of the following decisions which will then be notified through PEGASUS. Whether you progress from one year to the next is determined by your performance in the examination diets. The University operates a Compensation Scheme, details of which can be found here.

PASS

This means that you have passed in all the examinations in your curriculum, and that you are free to progress to the next year of your degree course without any resit examinations.

RESIT

This decision indicates that you have to resit and pass the examination(s) in the class or classes specified before you can be permitted to proceed to the next year of your course. Only the first attempt is normally permitted in the Final Honours examinations.

MAY PROCEED

This means that although you have not passed in all of your examinations, you have obtained enough passes to go on to the next year of your course. This will apply only after the resit diet of examinations.

DO NOT PROCEED (SUSPEND)

If, by the September Examination Board, you have not satisfied the progress regulations, your registration will be suspended and you will not be permitted to attend classes for the following session. Instead, you must first resit and pass in enough classes in order to be allowed to continue on your course of study.

TRANSFER

A student who does not meet the requirements for progress on a degree course may be required to transfer to the corresponding degree in the subject

WITHDRAW

A student whose performance is considered to be so bad that none of the above alternative decisions would be appropriate will be required by the Examination Board to withdraw from his or her present degree course.

Alternatively, it may be feasible to transfer to an alternative course in a subject that is more closely aligned to your present career intentions.

PASS BY COMPENSATION

The University Compensation Scheme has been applied to this class. Your overall level of performance is such that the you have been awarded the credit for the class even though the mark that you have achieved for the class is less than the standard pass mark (40 %).

ATTEMPT DISCOUNTED

The Examination Board recognises that factors, such as ill health or adverse weather may have affected your performance in the class.

The mark you achieve for the class is discarded and the next attempt at the class is regarded as the first* attempt. (*If the mark discounted is a re-sit the attempt will be regarded as the same number as the re-sit attempt e.g. 2nd, 3rd or 4th attempt.)

ERASMUS SCHEME

Student Exchange Abroad

The Department has exchange agreements with a number of Universities in Europe, in Austria, Germany, France, Poland, and Switzerland that allow students to spend up to a year studying abroad during their 3rd or 4th year. There are many benefits to studying abroad, from help with foreign language skills to enhancing your CV. You can find more information on the scheme at the Erasmus website http://www.britishcouncil.org/erasmus-benefits.htm. Keep an eye on the notice boards outside Dr F. Papoff's office (Room JA 8.09) on the 8th Floor for news.

If you are interested and would like to know more, see Dr F. Papoff before November. The number of such places is limited and preference is given to those whose academic progress suggests they will benefit from the extra challenge of study abroad.

STUDENT PROJECTS

The Department and University offer students the opportunity to undertake a project placement in the vacation between either 3rd and 4th year or 4th and 5th year. These projects are awarded on a competitive basis and so to be considered for a project you must be performing to a high standard throughout your time at Strathclyde.

PRIZES

A number of prizes are given at the end of each year of each course. The value of the prizes is usually quite modest: they are intended only as an incentive and encouragement as you work towards your degree. Details of the prizes can be found in Appendix 4 of this handbook.

ABSENCE

Please refer to the University Handbook and website for guidance on absence policy and procedures.

MOVING HOME

It is important to keep Student Business informed of **any change in your address**, else important information (like examination and graduation information) might go astray. Changes of address may be updated through the University's Information Server PEGASUS.

DIFFICULTIES

If you find yourself with a problem or in difficulty the University has people and procedures in place to help (please refer to the University Handbook for contact details of all the main University services) but within the department help is also available. You can go and see your PDA or adviser in the first instance. Do not delay getting help as often the problems are much reduced if tackled early enough. If they cannot give help themselves, they will often know of others who can help.

HAVE YOU THOUGHT ABOUT YOUR FUTURE?

The **Careers Advisory Service** (Livingstone Tower, Level 5) has a Student Employment Service specifically designed to help not only with your career when you are ready to leave the University (whether or not your University career has been successful), but can also help with finding temporary jobs during vacations. They also advise on finding jobs abroad. You can find out more about it at the Student Jobs section of the Careers Service web site at www.careers.strath.ac.uk/ses/index.shtml and from the University Handbook.

Have you considered the Erasmus Scheme? Please see above for further details.

How much good experience can you gain from now on? How will you keep a record of your development for future reference?

If you want to find out more about the career options for subject graduates, call in the Careers Service and ask for the Signpost Sheet 'Your Degree in subject ….'

What Next?' You can view this on the web at www.prospects.ac.uk and enter 'signposts - subject' in the key word search on the front page.

At least a year before leaving the University, you should register with the service. Not only do they provide much information on possible careers, they will also arrange a programme of job interviews for you (known as the "Milk Round") with companies looking for employees.

Besides arranging job interviews for students who are (or think they may be) in their final year at University, the Careers Advisory Service also can help find temporary/vacation employment. They also advise on study opportunities abroad.

Surveys have shown that Strathclyde University's graduates are more likely than most graduates from elsewhere to find a job quickly. Nevertheless the job situation remains difficult nationwide and it is important to think through what career you might follow well before you graduate. Apart from the benefits of being early in the race for the better jobs, the realism produced by knowing the job market usually helps motivate your study.

Third Year: Career Planning and Development: Career Choice

It is now that you should make every effort to identify the most suitable career/employer for you to pursue after graduating - if you have not done so earlier. Even if you plan to continue to an honours year, you will be able to concentrate on studying and job search if you have already identified your next steps. This is also the year during which you should start to create a good network of contacts and gain some experience directly relevant to your career aspirations if your work experience has been of a general nature to date.

A wide range of careers will be open to you and all will make use of the knowledge and skills you have acquired during your course.

To find out more about careers directly using your chosen subjects:

- Collect information from the Careers Resource Centre
- Use the occupational section of Prospects at www.prospects.ac.uk
- The Careers Service reference book 'What Do Strathclyde Graduates Do?' lists the jobs our recent Physics graduates have entered.
- The national picture for physics graduates can be accessed at www.prospects.ac.uk - from the front page follow 'students' 'career planning' to 'think about opportunities' to 'what do graduates do?' and enter 'physics' in the pull down list.

For help in identifying the best career for you, there are several options and the Careers Service can assist with all of these:

- Work with a careers adviser - you will make fastest progress if you work through the first 2 stages of the Route to a Career section of the Careers Service web-site at www.careers.strath.ac.uk/guidance/route/index.html. Work through the specialist programme Prospects Planner available only at the Careers Service.
- Work on-line through Prospects Quick Match at www.prospects.ac.uk. Select the 'students' link on the front page and then Quick Match. This programme is best used if you are already very clear about your personal skills and qualities.
- A variety of self-help reference books from the Careers Resource Centre, level 5, Livingstone Tower.
- Attend the seminar 'First Steps to choosing your Career' from the Careers Essentials programme. You will be issued with a copy of the booklet advertising all Careers Service seminars at the beginning of first semester or you can see it at www.careers.strath.ac.uk/guidance/seminars.shtml.

SAFETY

Safety is YOUR business and responsibility at all times. These notes supplement the Department's Safety Regulations and should be read carefully.

Potential hazards in physics laboratories include fire, electrical, materials and chemicals, machinery, gas cylinders, "common" accidents, ionizing radiation, laser UV, and microwave radiation. Special precautions are necessary for work on the roof of the John Anderson Building.

Fire

Unlikely but potentially fatal to many people if it should happen. No smoking in labs. Do not let waste paper accumulate. Do not leave gas burners on unattended. Electrical equipment, especially older power supplies can go on fire if short circuited and wrongly fused. Rotary pump motors can seize (i.e. jam) and go on fire if not properly protected. In general switch off unattended equipment unless there is a good reason for leaving it on. Know where the fire exits are.

Electrical

Current through heart stops operation of heart. Use safety equipment (see below). When adjusting equipment keep one hand away from equipment and away from any earthed conductor. This reduces current through heart from two-handed contact from 'live' to 'earth'. Know about resuscitation procedures - see notices displayed in every lab.

- Mains operated equipment including 5V power supplies, desk lamps etc.: Safety depends on correct wiring of plug, good quality cable, right fuse, proper earthing. "Tingly feeling" in finger when touching equipment indicates that it is not earthed properly. Report defects to demonstrator or lab technician - do not leave it for someone else.

- High voltage capacitor banks are very dangerous. Lethal charge is stored long after power supply switched off if fault occurs in protection circuits. Safety depends on good insulation and safety checks before alteration or maintenance (forbidden to students).

- Any high voltage equipment. "Tracking" occurs across surface of insulator. High voltage can then appear at unexpected places. Switch off power supply when altering circuit.

- Darkroom equipment - e.g. safety lights, driers etc. Dangerous because the darkroom is usually small, badly lit and wet (you are well earthed and hence at risk).

Materials and chemicals

- Many common chemicals and solvents are toxic - cancer an important risk, e.g. Benzene, Carbon Tetrachloride, Chloroform. Good ventilation important. Tap water is not necessarily drinking water.

- Many solvents are inflammable - especially Benzene.

- Do not tip solvents down sink unless it is certain they will do no harm.

- Unless you have good knowledge of chemistry, do not mix chemicals without first getting expert advice.

- Alkali metals (e.g. sodium, potassium) react explosively with water.

- Mercury fumes are poisonous. If mercury gets spilled, inform demonstrator.

- Liquid nitrogen is cold but causes burns. Make sure it cannot splash into your eyes or onto your clothing.

- Asbestos fibres can lodge in lungs - cancer years later. Be cautious with asbestos and seek advice (there shouldn't be any asbestos in the lab).

- Many chemicals can cause dermatitis or other skin ailments (some people more susceptible than others). Keep your hands away from chemicals (gloves available if needed). Wash your hands if they should come into contact with chemicals of any sort.

- In general - do not eat in labs. Wash hands after leaving lab and before eating. Label all containers of chemicals and never use lemonade or similar bottles to store chemicals in.

Machinery

- In lab, rotary pumps have powerful electric motor with drive belt. Belt guard is not infallible protection against long hair or tie being caught up in belt. Fans on diffusion pumps are also a hazard.

- In machine shop - get expert advice. You should not use machines without supervision.

Gas cylinders

Contain gas at high pressure (~ 200 atmospheres). If a cylinder topples over, the danger results from its large weight and from the possibility that the cylinder neck may fracture (ejecting the valve). Gas cylinders should be secured to wall. Two valves to operate - get advice from demonstrator the first time you use one.

"Common" accidents e.g. falling down stairs, tripping over obstacles etc. Keep passageways clear of obstacles (e.g. bench stools, books, unused equipment) - especially in darkened labs. No horseplay in labs.

Radioactive or X-ray sources are covered by special rules. They must not be used without an approved scheme of work signed by the Department Radiation Protection Advisor.

Lasers are divided into classes:

1	Harmless
2 or 3A	Low power but precautions needed
3B	Medium power - severe eye damage possible
4	Severe eye and skin damage possible

Before using any laser other than a class 1 you must have permission from your Supervisor who will arrange for an approved scheme of work signed by the Departmental Radiation Supervisor.

Roof of the John Anderson Building – You are forbidden to go onto the roof unless you have permission in writing from your Project Supervisor. He will tell you the current procedures.

Finally your first accident may be one we have not thought of yet. So be careful.

We believe the information provided in this handbook is correct at the date of publishing but may be subject to revision.

N.B. THIS HANDBOOK CAN BE SUPPLIED IN A VARIETY OF FORMATS TO SUIT YOUR NEEDS. PLEASE CONTACT THE DEPARTMENT FOR MORE INFORMATION

Appendix 1 – Class Descriptors

FACULTY OF SCIENCE
CLASS DESCRIPTOR

Class Code: PH 350		**Class Name:** Experimental Physics	
Type: Compulsory	**Level:** 3	**Credits:** 40	**Semester:** 1 and 2
Class Coordinator: Dr C. Trager-Cowan		**Tel:** 3465	**Email:** c.trager-cowan@strath.ac.uk
Teaching Staff: Dr C. Trager-Cowan, Dr N. Lockerbie			
Pre-requisites: PH 250 Experimental Physics, PH 251 Mechanics, Optics and Waves, PH 252 Quantum Physics and Electromagnetism, PH 253 Properties of Matter			

CLASS DELIVERY (HOURS):

LECTURES	TUTORIALS	LABORATORIES	ASSIGNMENTS	SELF STUDY	TOTAL
24	0	200	76	100	400

CLASS ASSESSMENT

Examination and Continuous assessment

25 % Examination and 75 % continuous assessment

Re-submission of continuous assessment

GENERAL AIMS

This class is designed to extend the laboratory training experienced by students in their first two years of study.

LEARNING OUTCOMES

By the end of the course students will be able to

1. Understand the operation of basic electronic components
2. Be able to build and characterise simple electronic systems
3. Undertake open ended laboratory work

SYLLABUS

The aim of the class is two fold - to describe the principles of electronic circuits which are widely used in physics laboratories showing how simple circuits can be designed and constructed in the laboratory and to introduce students to open-ended practical work in the laboratory conveying the basic skills of instrument handling and report-writing. Students are required to complete experiments selected from a range of topics that are covered in the 3rd year curriculum.

The electronics practical are supported by a series of lectures that cover: Analogue Electronics. Revision of previous work, input and output resistance, RC circuits, Laplace transform methods, the npn transistor and its use as a current source, an ac amplifier, and in a two stage amplifier.

Digital Electronics. Combinational and sequential logic: logic gates with practical examples, flip-flop circuits, Boolean algebra, multiplexing, encoding and decoding, microprocessor systems.

Operational amplifiers, circuit analysis and applications as current source or amplifier. Transducers and their applications. A laboratory project involving the design and construction of an electronic circuit forms a part of the class.

RECOMMENDED TEXT / READING

FACULTY OF SCIENCE

CLASS DESCRIPTOR

Quantum Physics and Electromagnetism

Class Code: PH 352		**Class Name:** Quantum Physics and Electromagnetism	
Type: Compulsory	**Level:** 3	**Credits:** 20	**Semester:** 1
Class Coordinator: Dr N. Langford		**Tel:** 3077	**Email:** n.langford@strath.ac.uk
Teaching Staff: Prof. S. M. Barnett, Prof. G-L Oppo, Dr S. Virmani			
Pre-requisites: PH 252 Quantum Physics and Electromagnetism, MM 211 Mathematics 3B			

CLASS DELIVERY (HOURS):

LECTURES	TUTORIALS	LABORATORIES	ASSIGNMENTS	SELF STUDY	TOTAL
48	24	0	0	128	200

CLASS ASSESSMENT

Format: Examination

1st Attempt: Students will be awarded the credit for the class by performance at an approved standard in the Written Examination

Re-sit: Re-working of 1st attempt examination Pass / Fail

GENERAL AIMS

The aim of this course is to extend the study of quantum mechanics and electromagnetism.

LEARNING OUTCOMES

By the end of the course a student shall;

- Determine the expectation value for a wavefunction.
- Understand commutators and be able to derive specific relationships using commutators.
- Explain the significance of raising and lowering operators and apply these operators to specific systems such as the harmonic oscillator.
- Describe wavefunctions in terms of spherical harmonics.
- Discuss the physical significance of the Stern-Gerlach experiment.
- Understand spin and spin statistics. Explain the difference between Bosons and Fermions and discuss the significance of the Pauli principle and how it leads to the periodic table.
- Understand the basic concepts of time independent and time dependent perturbation theory.
- Be able describe a transverse electromagnetic (TEM) waves and explain the significance of the mode indices.
- Be able to analysis the propagation of TEM waves in vacuum and dielectric materials.
- Use the Poynting vector to describe energy flow.
- Understand the concepts of radiation pressure and momentum.
- Understand the significance of the complex propagation constant and use it to determine the skin-depth of a conducting material.

- Explain the significance of the conservation of both electric and magnetic field at a boundary between non-conducting dielectrics.
- Use the boundary conditions to determine reflection and transmission coefficients with electric field perpendicular and parallel to the plane of incidence.
- Outline the origin of total internal reflection.
- Describe the propagation of electromagnetic waves in waveguide structures.
- Determine the cut-off frequency for waveguide structures.
- Explain the origin of radiation from moving charges and apply this concept to different types of dipole oscillator.
- Be able to determine how antenna detect radiation.

SYLLABUS

Quantum Physics: Brief revision of quantum physics delivered in PH 252. Operators, expectation values and commutation relationships. Harmonic oscillator and raising and lowering operators, energy spectrum and probability densities. Angular momentum operators, spherical harmonics. Hydrogen atom and quantum numbers. Stern-Gerlach Experiment, electron spin. Identical particles – Bosons and Fermions, Pauli exclusion principle. Time-independent perturbation theory. Time-dependent quantum mechanics, Schrodinger and Heisenberg pictures, time-dependent perturbations and Fermi's Golden Rule.

Electromagnetism: Brief revision of electromagnetism delivered in PH 252. Transverse electromagnetic waves in free space and dielectrics. Dispersion and complex propagation constant. Attenuation and skin-depth in conducting media. Boundary conditions at interfaces – reflection and transmission coefficients, Snell's law and refraction. Total internal reflection. Waveguides and waveguide dispersion and cut-off. Plane waves using scalar and vector potentials. Faraday's law in a moving frame of reference. Poynting vector and energy flux for an em wave. Characteristic impedance, radiation pressure and momentum. Retarded potentials. Radiation from accelerated charges, short electric dipole and half-wave electric dipole. Radiated power. Antennas – dipole antenna, phased arrays, gain and antenna paramenters.

RECOMMENDED TEXT / READING

Recommended text(s):

FACULTY OF SCIENCE

CLASS DESCRIPTOR

Class Code: PH 353		**Class Name:** Properties of Matter	
Type: Compulsory	**Level:** 3	**Credits:** 20	**Semester:** 2
Class Coordinator: Dr N. Langford		**Tel:** 3077	**Email:** n.langford@strath.ac.uk
Teaching Staff: Dr B. McNeil, Prof. K. P. O'Donnell			
Pre-requisites: PH 252 Quantum Physics and Electromagnetism, PH 253 Properties of Matter, MM 211 Mathematics 3B			

CLASS DELIVERY (HOURS):

LECTURES	TUTORIALS	LABORATORIES	ASSIGNMENTS	SELF STUDY	TOTAL
48	24	0	0	128	200

CLASS ASSESSMENT

Format: Continuous and Examination

1st Attempt: Students will be awarded the credit for the class by taking the Written Examination

Break down of assessment:

Examination 85 %, Homework 15 %

Re-sit: Re-working of 1st attempt examination Pass / Fail

GENERAL AIMS

The aim of this course is to extend a student's knowledge of the properties of matter from that covered in the Level 2 class PH 253 Properties of Matter.

LEARNING OUTCOMES

By the end of the course a student shall be able to;

- Apply Boltzmann statistics to thermal systems.
- Explain the partition of energy in a system of particles.
- Understand the difference between Fermions and Bosons.
- Explain the origin of degeneracy in a system.
- Describe the differences between Bose-Einstein and Fermi-Dirac distributions.
- Understand why solids form crystals.
- Explain the connection between atomic bonding and band theory.
- Understand the concept and use of reciprocal lattices.
- Explain electrical behaviour of different materials.
- Show a quantitative understanding of semiconductor doping.
- Describe the thermal properties of solids in terms of the phonon.
- Describe optical processes in solids in a semi-classical model.

SYLLABUS

Statistical Mechanics: Clausius Inequality, Definition and conceptualisation of Entropy, Central (or Fundamental) Equation of Thermodynamics, Introduction to Thermodynamic Potentials and the 3rd law of thermodynamics. Basic principles of statistical mechanics – microcanonical average, Boltzmann entropy, canonical & grand canonical ensembles, partition and grand partition functions. Applications of statistical mechanics –adiabatic cooling of solids, non-degenerate and degenerate systems, partition function for harmonic oscillators, density of states, Einstein and Debye theory of the heat capacity of solids, black body radiation Plank law. Perfect classical gas - derivation of Ideal gas laws, Maxwellian distribution functions. Perfect quantum gases: Bose-Einstein and Fermi-Dirac distributions, blackbody radiation, degenerate Fermi gas and free electron model of metals. Fermi energy, electronic heat capacity, breakdown of free electron model. Degenerate quantum gas: Bose-Einstein condensation.

Solids: Electrical properties of solids. Bonds and bands: metals, semiconductors and insulators. Reciprocal lattice and Brillouin zones. Bloch theorem and Kronig-Penney model, Nearly free electrons, Ziman and Feynmann (tight-binding) models of band structure. Dispersion relations, phase and group velocity. Fermi energy and density of states. Intrinsic and extrinsic semiconductors – electrons and holes. **Thermal properties** of solids– Einstein and Debye models of specific heat capacity, phonons. **Optical properties** of solids – photons, light absorption and emission processes, Einstein coefficients, oscillator strength and cross-section. Stimulated emission. **Materials Characterisation**: X-ray diffraction, Hall and Seebeck effects, spectroscopic techniques.

RECOMMENDED TEXT / READING

Recommended text(s):
Solids: Introduction to Solid State Physics by Charles Kittel
http://eu.wiley.com/WileyCDA/WileyTitle/productCd-EHEP000803.html
Solid State Physics by Ashcroft and Mermin

FACULTY OF SCIENCE
CLASS DESCRIPTOR

Department of Physics

Class Code: PH 355		**Class Name:** Physics Skills	
Type: Compulsory	**Level:** 3	**Credits:** 20	**Semester:** 1 and 2
Class Coordinator: Dr H J Fraser		**Tel:** 3420	**Email:** h.fraser@phys.strath.ac.uk
Teaching Staff: Prof. S. Kuhr, Dr H. Fraser, Dr S. Virmani			
Pre-requisites: PH 151, PH 152, PH 251, PH 252, PH 253, MM 111, MM 112, MM211.			

CLASS DELIVERY (HOURS):

LECTURES	TUTORIALS	LABORATORIES	ASSIGNMENTS	SELF STUDY	TOTAL
24	12	0	64	100	200

CLASS ASSESSMENT

Format: Continuous and Examination

1st Attempt: 60 % Continuous Assessment, 40 % Examination

Re-sit: 50 % Examination, reattempt original examination, plus 50 % resubmitted written-only assignments from continually assessed part of course.

GENERAL AIMS

The aim of this course is to further develop students' physics knowledge base and transferable skills in preparation for the project undertaken in 4th and 5th year of the course; focusing on oral, written and graphical presentations, literature and group-work skills, individual data analysis and interpretation skills, and basic grounding in physics problem solving. As part of the transferable skills development students will be given opportunities to design marking schemes and use these schemes for peer based assessment.

LEARNING OUTCOMES

By the end of the course a student shall;

- Be aware of the requirements for effective group / team work.
- Be able to complete a literature survey.
- Be aware of different referencing systems and aware of the pitfalls of web-based referencing.
- Be able to prepare and deliver a poster presentation.
- Develop and give an oral presentation using computer based presentation software.
- Be able to undertake scientific analysis and dissemination of data at the forefront of Physics today.
- Demonstrate problem solving skills as applied to material seen in the first three years of the course.

SYLLABUS

Research Project preparation:- library skills; literature searches, electronic articles, researching a topic via the literature; assessing and delivering an oral presentation, poster presentations, brainstorming, understanding the structure and research remit of the Department of Physics, choosing and researching a BSc, MSci project. A literature survey will be undertaken between Nov – Jan in the students chosen preferential area of research for the following year, and a 15 minute oral presentation on the same subject area assessed during January exam diet. Given the nature of the group work and continual assessment, attendance at the lectures is compulsory and together with homework counts 5 % towards the final exam mark.

Problem solving:- Problem based tutorials which address application of 1st and 2nd year physics to problems seen in both science and technology. Attendance at tutorials is compulsory, as is homework which must be submitted on a weekly basis. Participation and homework contribute 5 % to the final exam mark.

RECOMMENDED TEXT / READING

For Problem Based Learning: Benson University Physics (Wiley)

DATE MODIFIED

20th August 2009 by Dr H J Fraser

FACULTY OF SCIENCE

CLASS DESCRIPTOR

DEPARTMENT OF MATHEMATICS & STATISTICS

Class Code: **MM311**		**Class Title:** **Mathematics 4B**		
Type: UG **Elective**	**Level: 3**	**Credits:** **20**	**Semester:**	**1 and 2**
Class Coordinator: **Dr. P. Knight**		**Tel:**	**Email:**	
Teaching Staff:				
Pre-requisites: MM111/MM112 and MM211, or equivalent				
Students: Physics				
Overlaps: MA300, MA301				

CLASS DELIVERY (HOURS)

LECTURES	TUTORIALS	LABORATORIES	ASSIGNMENTS	SELF STUDY	TOTAL
48	24	0	48	80	200

CLASS ASSESSMENT

3-hour degree examination in May/June with August resit.

GENERAL AIMS

Statistics: To give a grounding in basic methods of data presentation and the use of standard numerical summaries. To present the laws of probability and the probability distributions most commonly used in the Physical Sciences.

Partial Differential Equations: To introduce Fourier series and partial differential equations, concentrating mainly on some linear equations of practical importance (one-dimensional wave equation, one-dimensional diffusion equation and two-dimensional Laplace equation).
Functions of a Complex Variable: To introduce some elementary complex analysis and its applications.
Integral Transforms: To introduce the Fourier transform and explain its physical interpretation.
Special Functions: To indicate the properties and applications of functions such as Legendre polynomials Bessel functions and the gamma function.

LEARNING OUTCOMES

On completion of this class, the student should

- be able to construct and interpret bar charts, pie charts, histograms, stem and leaf plots and boxplots;
- be able to find the mean, median, standard deviation and semi-interquartile range of a data set and to make use of them appropriately in presenting data;
- be able to calculate probabilities relating to finite sample spaces using the laws of probability;
- be able to use and interpret the Binomial, Geometric, Poisson and Normal distributions;
- be able to test hypotheses and construct confidence intervals;
- know what a Fourier series is, and know how, and in what sense, it can represent a function, both periodic and non-periodic (on a finite interval);
- be able to obtain a Fourier series for a given function;
- be able to solve some simple partial differential equations using several techniques, particularly that of separation of variables;
- be able to apply Cauchy's Integral Theorem and the residue theorem to complex and real integrals;
- be able to derive simple Laurent expansions;
- know the definition and simple properties of the Fourier transform;
- be able to obtain a Fourier transform of a given function;
- know basic properties of Bessel functions, Legendre polynomials and the gamma function.

SYLLABUS

Statistics:
Presentation and summarisation of data: histograms, stem-and-leaf plots, box plots. Good and bad presentation. Introduction to Exploratory Data Analysis. Measures of location: mean, median, mode. Measures of spread: variance/standard deviation, range, quartiles and semi-interquartile range.
Probability Theory: Introduction. Origin of probability ideas. Assignment of probability. Basic laws: P(A or B), P(not A), P(A and B), P(A|B). Independence. Bayes' theorem.
Random Variables: General results. Discrete and continuous random variables. Expectation, variance, moments, quartiles. Mean and variance of linear combinations.

Some useful distributions and common applications: Bernoulli trials and the Binomial and Geometric distributions. Poisson process and the Poisson and negative exponential distributions. Measurement of errors and the Normal Distribution and Central Limit Theorem.
Other applications of the Normal Distribution: sampling distribution of the mean, approximation to the binomial, sums of random variables.
Elementary hypothesis testing and confidence limits.

Partial Differential Equations:
Periodic functions; trigonometric Fourier series; statement of convergence properties; exponential form. Odd and even functions; Fourier series for odd and even functions; Fourier series representation for a function defined on a finite interval; half-range sine and cosine series. Basic concepts for partial differential equations: order, linearity, direct integration, comparison with ODEs, substitution methods of solution, homogeneous, D'Alembert's solution of the wave equation, initial/boundary conditions, superposition. Derivation of wave equation and diffusion equation in one space dimension and of Laplace's equation in 2-D; indication of generalisation to 3-D. Solution by separation of variables in Cartesian co-ordinates; applications of Fourier series; brief mention of inhomogeneous equations.

Functions of a Complex Variable:
Derivative; Cauchy-Riemann equations; contour integration; Cauchy's integral formula; Taylor and Laurent series; residue integration method.

Integral transforms:
Complex, sine, cosine, Fourier transform; physical interpretation of Fourier transform.
Special Functions:
Legendre polynomials; Bessel functions; the gamma function.
Transferable Skills: See Level 3S spreadsheet for details.

RECOMMENDED TEXT / READING

* Chatfield, C. *"Statistics for Technology"* (Chapman and Hall). D519.5024 CHA, ISBN: 0-41225-340-2.
** Stephenson, G. *"Mathematical Methods for Science Students"*, (Longman) [Chapters 15 and 24]. D 510.245 STE, ISBN: 0582444160.
** Stephenson, G. *"Partial Differential Equations for Scientists and Engineers"* (Imperial College Press). D515.35302 STE, ISBN: 1-86094-024-2.
** Kreyszig, E. *"Advanced Engineering Mathematics"* (Wiley). D510.2462 KRE, ISBN: 047133328X.
** James, G. *"Advanced Engineering Mathematics"* (Addison-Wesley). D510.2462 JAM, ISBN: 0201596210.
** Wylie, C.R. & Barrett, L.C. *"Advanced Engineering Mathematics",* (McGraw Hill). D510.2462 WYL, ISBN: 0070722064.

Appendix 2 – 3rd Year Degree Regulations

These are correct at the time of publishing but you should check the Physics link at http://www.strath.ac.uk/corporateservices/gmpt/academicaffairs/publications university calendar part 2a contents regularly for any changes

MPhys

Third Year

12.17.7 All full-time students shall undertake classes amounting to 120 credits as follows:

Compulsory Classes		Level	Credits
PH 399	Physics*	3	120
**PH 399 Physics* comprises*			
PH 350	Experimental Physics	3	40
PH 352	Quantum Physics and Electromagnetism	3	20
PH 353	Properties of Matter	3	20
PH 355	Physics Skills	3	20
MM 311	Mathematics 4B	3	20

12.17.8 Students may, with the approval of the Adviser of Study, also undertake a project during the summer vacation following Third Year as follows:

Optional Class			
PH 465	Industrial Project	4	20

Progress

12.17.15 In order to progress to the fourth year of the course, a student must have accumulated at least 360 credits from the course curriculum.

BSc Physics

Third Year

11.17.5 All full-time students shall undertake classes amounting to 120 credits as follows:

PH 350	Experimental Physics	3	40
PH 353	Properties of Matter	3	20
PH 355	Physics Skills	3	20
and			
for intending Honours students			
either			
PH 352	Quantum Physics and Electromagnetism	3	20
MM 311	Mathematics 4B	3	20
or			
PH 252	Quantum Physics and Electromagnetism	2	20
MM 211	Mathematics 3B	2	20
for other students			
either			
PH 357	Interactive Physics	3	20
and 20 credits chosen from Regulation 11.17.7 or such other classes as may be approved by the Adviser of Study			
Or			
PH 252	Quantum Physics and Electromagnetism	2	20
MM 211	Mathematics 3B	2	20

A student with a pass in a class may substitute another class with the approval of the Adviser of Study.

Progress

11.17.11 In order to progress to the fourth year of the course, a student must have accumulated at least 360 credits from the course curriculum including 60 credits at Level 3 or above.

BSc Physics with Teaching

Third Year

11.29.46 All full-time students shall undertake classes amounting to 120 credits as follows:

Compulsory Classes		Level	Credits
PH 352	Quantum Physics and Electromagnetism	3	20
PH 353	Properties of Matter	3	20
PH 355	Physics Skills	3	20
PH 360	Practical Physics	3	20
X9 406	Pedagogy and Placement Learning 1*	4	20
X9 494	Pedagogy and Curriculum Physics with Science 1	4	20

A student with a pass in a class may substitute another class with the approval of the Adviser of Study

*Induction Block (10 days), Serial Days (15 days), June Block (10 days)

Note: Education classes start in the last week of August, prior to the normal beginning of year 3.

Progress

11.29.51 In order to progress to the fourth year of the Honours course, a student must normally have accumulated at least 360 credits from the course curriculum including 60 credits at Level 3 or above.

BSc Mathematics and Physics

Third Year

11.15.45 All full-time students shall undertake classes amounting to 120 credits as follows:

Compulsory Classes		Level	Credits
MM 301	Mathematics 31	3	20
MM 302	Mathematics 32	3	20
PH 352	Quantum Physics and Electromagnetism	3	20
PH 353	Properties of Matter	3	20

Optional Classes

40 credits chosen by Honours students from List A; and by other students from Lists A and B.

List A			
MM 303	Mathematics 33	3	20
MM 304	Mathematics 34	3	20
MM 305	Mathematics 35	3	20
PH 355	Physics Skills	3	20
List B			
PH 254	Computational Physics	2	20

Classes listed in Regulations 11.15.3 and 11.15.4 not previously taken, or further Elective Classes.

Progress

11.15.50 In order to progress to the fourth year of the course, a student must have accumulated at least 360 credits from the course curriculum including 120 credits at Level 3 or above.

Appendix 3 – Faculty of Science Degree Award Algorithm

Principles

1. Given that the SCQF (which underpins the University's General Regulations) is based on "Levels of Study" rather than "Years of Study", the algorithm should reflect this by being composed from credit weighted means of marks over "Levels of Study" rather than "Years of Study".
2. It is the mark at the first attempt at any class that is used in the calculation.
3. For all degrees (Honours and Integrated Masters) classes at the two highest levels of study will be included; i.e. normally Levels 3 and 4 for Honours and Levels 4 and 5 for Integrated Masters. Exceptionally, where a curriculum for the award of an honours degree includes level 5 classes these shall be included in the algorithm as if they were Level 4 classes where this is to the benefit of the student.
4. All classes at each appropriate level in the students required curriculum shall be included in the calculation unless a class is assessed only on a Pass/Fail basis in which case it is omitted from the algorithm.
5. The weightings of the marks in the Composite Mark Algorithm shall reflect the credit value of the class and also the level of the class to reflect the general consensus that the marks at the higher level of study should have significantly more bearing on the final outcome.
6. Any exception form the Faculty Final Assessment Composite Mark Algorithm must be approved by the Faculty Board of Study.

The Composite Mark Algorithm

The Faculty Composite mark Algorithm shall be

$$C = \frac{\sum w_i c_i m_i}{\sum w_i c_i}$$

where *ci* is the credit value of the class, *mi* is the percentage mark gained in the class.

For Honours Degrees the sum is over all level 3 and level 4 classes in a students required curriculum, and *wi* = 1 for level 3 classes and 3 for level 4 classes. Where a curriculum for the award of an honours degree includes level 5 classes these shall be included in the algorithm as if they were Level 4 classes where this is to the benefit of the student.

For Integrated Masters the sum is over all level 4 and level 5 classes in a students required curriculum, and *wi* = 1 for level 4 classes and 3 for level 5 classes.

Alternatively, denoting the credit weighted average (CWA) mark for level 3, 4 and 5 classes by $L3$, $L4$ and $L5$ respectively, this can be calculated **for Honours** by

$$C = \frac{mL3 + 3nL4}{m + 3n}$$

where *m* and *n* are the numbers of credits at Level 3 and Level 4 respectively; and **for Integrated Masters** by

$$C = \frac{mL4 + 3nL5}{m + 3n}$$

where *m* and *n* are the numbers of credits at Level 4 and Level 5 respectively.

Where a curriculum contains the **same number** of credits (normally 120) at both levels included in the algorithm, the calculation is equivalent to

For Honours: $0.25*L3 + 0.75*L4$
For Integrated Masters: $0.25*L4 + 0.75*L5$.

Appendix 4 – Prize Information

Prizes and Rubric for their Award

Astronomical Society of Glasgow Prize (£50)
Offered annually by the Astronomical Society of Glasgow for award to the most distinguished student in the final examinations for a BSc Honours or MSci degree in Mathematics or Physics.

[2]Professor James Blyth Memorial Prize (£15 in books)
Founded in 1908 by students and friends as a tribute to the memory of Professor James Blyth MA LLD FRSE Professor of Natural Philosophy in the Glasgow and West of Scotland Technical College from 1880 to 1906. Awarded to a meritorious student in the first year class in Physics.

[2]Kelvin Prizes (two: £45 in books or instruments)
Founded in 1962 by Mrs Hilda M Beilby, daughter-in-law of a former Head of the Governors of the Royal Technical College, Sir George T. Beilby LLD DSc FRS, to commemorate the name of her grand-uncle, Lord Kelvin. One prize awarded to a meritorious student in the final year of an undergraduate course in the Department of Mathematics and the other to a meritorious student in the final year of an undergraduate course in the Department of Physics.

[2]Malcolm Kerr Prizes (six: £15)
Provided by an endowment arising under the terms of the Deed of Settlement of the late Malcolm Kerr, stationer in Glasgow. Four prizes awarded to meritorious students in the first year class in Physics, and two to meritorious students in the first year class in Biology.

Frank Leslie Prize (£50)
Founded in 2000 by the Department of Mathematics, in association with the Department of Physics, in commemoration of the late Professor Frank M Leslie DSc FRSE FRS, Professor in the Department of Mathematics from 1979 to 2000. Awarded to a meritorious student in the final year of the joint honours BSc course in Mathematics and Physics.

A. S. McLaren Prize in Physics (£20)
Founded in 1978 by the former School of Mathematics, Physics and Computer Science as a memorial to Mr A S McLaren, Lecturer and Senior Lecturer in the former Department of Natural Philosophy from 1946 to 1977. Awarded annually on the recommendation of the Head of the Department of Physics to the student who achieves the best performance in the second year Physics Laboratory.

[2]Professor James Muir Prize (£18)
Founded in 1939 under an endowment by students and friends to commemorate Professor James Muir MA DSc ARCST FIntsP Professor of Natural Philosophy in the Royal Technical College from 1906 to 1938. Awarded to a meritorious student in the final year of the course for a BSc or MSci degree in Physics.

Fred Stern Memorial Prize
Founded in 1978 by students and friends as a tribute to the memory of Dr Fred Stern, Lecturer in the Royal College of Science and Technology from 1957 to 1964, and in the University of Strathclyde from 1964 to his death in 1977. Awarded, on the nomination of the Head of the Department of Physics, to students in that Department who have exceptionally distinguished themselves, either by attainment or improvement. The prize money shall be used for a purpose proposed by the recipient, and agreed by the Head of Department, but this shall always include a suitable book. The amount of the prize shall be determined by the Head of Department, by reference to the accumulated value of the endowment at the time.

Richard Thornely Memorial Prize
Founded in 1987 to the memory of Dr F R Thornley, lecturer in the University of Strathclyde from 1976 to his death in 1987. Awarded, on the nomination of the Head of the Department of Physics, to a third or fourth year undergraduate in the Department of Physics for written work dealing with a specific problem in Physics or Applied Physics, whose solution has social, moral philosophical, cultural, or technological implications. The work will be judged on both the discussion of these implications and on the depth of scientific understanding.

Timetable – Semester 1

	9:00am–10.00am	10.00am–11.00am	11.00am–12.00pm	12.00pm–1.00pm	1.00pm-2.00pm	2.00pm-3.00pm	3.00pm-4.00pm	4.00pm-5.00pm
Monday	PH 352 TG 310	PH 352 TG 310						
Tuesday		PH 352 JW 411		PH 350 JW 408				
Wednesday	PH 352 TG 310	PH 355 Col 330	PH 355 Col 330	MM 311 Tutorial Room to be arranged				
Thursday		PH 352 TG 310	MM 311 JA 314	PH 350 LT 509	PH 350 JA 413	PH 350 JA 413	PH 350 JA 413	PH 350 JA 413
Friday	PH 352 TG 310				PH 350 JA 413	PH 350 JA 413	PH 350 JA 413	PH 350 JA 413

Note: You will be assigned to either a Tuesday Lab grouping or a Wednesday Lab Grouping

Building Codes: AR Architecture Building, Col Colville Building, GH Graham Hills Building, JA John Anderson Building, JW James Weir Building, TG Thomas Graham Building.

These dates are correct at the time of publishing but you are advised to check http://phys.strath.ac.uk/undergrad/timetable/semester1.php regularly for any changes.

Timetable – Semester 2

	9:00am–10.00am	10.00am–11.00am	11.00am–12.00pm	12.00pm–1.00pm	1.00pm-2.00pm	2.00pm-3.00pm	3.00pm-4.00pm	4.00pm-5.00pm
Monday		**PH 353** **TG 310**	**PH 355** **Col 330**					
Tuesday		**PH 353** **TG 310**						
Wednesday		**PH 355** **Col 330**		**MM 311** **Tutorial** **Room to be arranged**				
Thursday		**PH 353** **TG 310**	**MM 311** **JA 314**		**PH 350** **JA 413**	**PH 350** **JA 413**	**PH 350** **JA 413**	**PH 350** **JA 413**
Friday		**PH 353** **TG 314**			**PH 350** **JA 413**	**PH 350** **JA 413**	**PH 350** **JA 413**	**PH 350** **JA 413**

Note: You will be assigned to either a Tuesday Lab grouping or a Wednesday Lab Grouping

Building Codes: AR Architecture Building, Col Colville Building, GH Graham Hills Building, JA John Anderson Building, JW James Weir Building, TG Thomas Graham Building

These dates are correct at the time of publishing but you are advised to check http://phys.strath.ac.uk/undergrad/timetable/semester2.php regularly for any changes.

Contacts

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