UNIVERSITY OF STRATHCLYDE

DEPARTMENT OF PHYSICS

2006/2007 HANDBOOK

for

M.Sc., Pg.D., Pg.C. Students in High Power Radio Frequency Science and Engineering

The Department of Physics at Strathclyde University (Head of Dept. Prof. D.J.S. Birch) is one of the largest physical science departments in the United Kingdom and received a rating of excellent, the highest grading in the Government assessment of physics teaching in the Scottish Universities. The physics courses at Strathclyde have been designed to stimulate excitement and understanding of the subject while maintaining full awareness of the needs of technology.

The MSc, PgD, PgC in High Power Radio Frequency Science and Engineering

This degree course has been created as an advanced postgraduate level course for candidates with strong academic and/or practical background in technical subjects wishing to develop their understanding of the techniques required for the generation, transmission and application of high power, high frequency signals. The curriculum has been developed in conjunction with an Industrial Steering committee to ensure that the graduates will have the knowledge and experience required by major employers in this field. The course offers candidates the wide experience of staff at both the Universities of Strathclyde and Lancaster who have developed their expertise over many years of academic and industrial research.

C O N T E N T S

Welcome to the Physics Department of the University of Strathclyde as you embark on your course in High Power Radio Frequency Science and Engineering. We hope that you will enjoy your time here, and the challenge and illumination offered by your course

THE ACADEMIC YEAR 2006/2007 (PROVISIONAL)

REGISTRATION :September 2006

(Interviews with Advisers should be taking place in August)

SEMESTER I : Tuesday, 26th September 2006 to Friday, 19th January, 2007

University closed Monday, 25th September, 2006.
Teaching Weeks 1 - 12 Tuesday, 26th September - Friday, 15th December, 2006
University closed from Friday, 16th December, 2006-Tuesday 2nd January, 2007 (incl.).
Revision Week Wednesday, 3rd January - Friday, 5th January, 2007
Examination Weeks Monday, 8th January - Friday, 19th January, 2007

SEMESTER II : Monday, 22nd January - Friday, 1st June, 2007

Teaching Weeks 1-10 Monday, 22nd January - Friday, 30th March, 2007
Easter Vacation Saturday, 31st March - Sunday, 15th April 2007
University closed Friday, 6th April and Monday, 9th April, 2007.
Teaching Weeks 11-12 Monday, 16th April - Friday, 27th April, 2007
University closed Monday, 7th May, 2007 (Local Holiday)
Revision Week Monday, 30th April - Friday, 4th May, 2007
Examination Weeks Tuesday, 8th May - Friday, 1st June, 2007

Candidates for the MSc/PgD/PgC in High Power RF Science and Engineering have classes which occur outwith the normal semester schedule. Please see class listings for details later in this handbook and see http://reld.phys.strath.ac.uk/MSc.htm for details on dates. Also candidates undertaking the 90 credit project will be required to undertake work through the summer on their research projects

PROVISIONAL DATES OF SESSION 2003 TO 2010

Session	Semester 1 Teaching Starts (Date + Day of Week)	Christmas Vacation Starts Saturday (Note 1)	Christmas Vacation ends (Date + Day of week)	Semester 2 Teaching Starts Monday (Notes 2 & 3)	Easter Vacation Starts Saturday (+ Weeks Teaching Completed Before Easter – Note 3)	Date of Easter Sunday	Easter Vacation Ends (Sunday, except in 2006)	Session Ends Friday (Note 3)
2003/2004	30/9/03 (Tue)	20/12/03	4/1/04 (Sun)	26/1/04	3/4/04 (10 weeks)	11 April	18/4/04	4/6/04
2004/2005	28/9/04 (Tue)	18/12/04	4/1/05 (Tue)	24/1/05	19/3/05 (8 weeks)	27 March	3/4/05	3/6/05
2005/2006	27/9/05 (Tue)	17/12/05	4/1/06 (Wed)	23/1/06	15/4/06 (12 weeks)	23 April	1/5/06 **(Mon)**	2/6/06
2006/2007	26/9/06 (Tue)	16/12/06	3/1/07 (Wed)	22/1/07	31/3/07 (10 weeks)	8 April	15/4/07	1/6/07
2007/2008	1/10/07 (Mon)	22/12/07	6/1/08 (Sun)	28/1/08	15/3/08 (7 weeks)	23 March	30/3/08	6/6/08
2008/2009	30/9/08 (Tue)	20/12/08	4/1/09 (Sun)	26/1/09	4/4/09 (10 weeks)	12 April	19/4/09	5/6/09
2009/2010	29/9/09 (Tue)	19/12/09	5/1/10 (Tue)	25/1/10	26/3/10 (9 weeks)	4 April	11/4/10	4/6/10

Notes on the Strathclyde Teaching Year

1. The Teaching Year is divided into two Semesters. Each Semester consists of 12 weeks teaching, a revision period, and concludes with examinations. The Christmas vacation is of 2 to 2 ½ weeks duration depending on where the New Year holiday falls in the week. The Easter vacation is of 2 weeks duration and is centred on Easter Sunday ie the vacation is arranged so that 1 week falls before Easter Sunday and 1 week after Easter Sunday.

2. Semester 1 is arranged so that the 12 weeks of teaching are concluded before the Christmas vacation. Immediately following the vacation there is a revision period of 3 to 5 days (depending on where the New Year holiday falls) and the semester concludes with an examination diet of 2 weeks duration.

3. Semester 2 starts immediately after the end of the Semester 1 examinations, there being no inter-semester break. Except in those years when Easter is exceptionally late (2006) the 12 week teaching period is interrupted by the Easter Vacation - the table sets out in parentheses the number of weeks teaching that will be completed before the start of the vacation. Following the teaching period there is 1 week of revision, followed by 4 weeks of examinations.

GENERAL INFORMATION

The Further and Higher Education Charter for Scotland was published in 1994. A leaflet outlining its main points is available from Registry (the University's Administration, in the McCance Building). The physics teaching at Strathclyde University was given the highest rating (Excellent) in the latest inspection, during 1993/94 by inspectors from the Scottish Higher Education Funding Council (SHEFC). Each year the Council inspect new disciplines. So far Strathclyde University is the Scottish University with the highest number of "Excellent" ratings. We hope that you agree with their verdict. One way to keep us up to scratch is to channel your ideas (and complaints!) through the Staff-Student Committee. More of that later.

The Faculty of Science includes the Departments of Physics, Mathematics, Statistics & Modelling Science, Computer Science, Pure & Applied Chemistry as well as a number of biologically orientated departments. The Faculty, one of five in the University, has administrative and financial powers devolved to it by the University. The current office-holders in the Faculty (appointed amongst the academic staff of the Faculty) are:

Dean :	Dr Brian Furman
Vice-Deans :	Professor Iain Hunter (Resource)
	Professor P. Halling (Research)
	Dr D. McGhee (Academic)

Permanent administrative staff of the Faculty (based in the McCance Building) are:

Faculty Officer :	Dr J. McGrath
Assistant Faculty Officer :	Ms. F. Webster
Registry, Science :	Mrs. L. Munro

Enquiries to Faculty staff can be presented at the Faculty of Science enquiry desk 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 mainly housed 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 8.00am to 10.00pm. After 6.00pm 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 room JA5.12 as a Student Common Room and room JA8.18 (The Bob Illingworth Student Reading Room) as a Student Study Room. You are asked to cooperate by not using 8.18 for conversing, eating or drinking. The student rooms are for students of all years, and of all courses. (Please treat the rooms with care, else the facilities will need to be withdrawn.

The Department has over 30 academic staff. The Head of Department (2004/2007) is Prof. D.J.S. Birch (JA 8.02). A list of Academic Staff and Research Staff with Teaching Responsibilities is given in Appendix 6.

Should you need to contact a member of staff try his/her office listed in Appendix 6. Alternatively, messages for staff may be left in their pigeonhole on the 8th floor of the John Anderson Building, outside JA8.31. (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. There are also technical and secretarial staff. Photographs of all the staff are displayed on the 8th. Floor of the John Anderson Building outside JA8.03.

Students should watch for notices placed on the MSc-HPRF noticeboard located on the 8th floor of the Colville Building

Note that on many timetables and notices, each building on the Campus has a prefix. Originally these were mostly single letters, the John Anderson Building was denoted by K and the Colville Building by E. This may still be used in some timetables and schedules (e.g. for classes and examinations), but an alternative system uses clearer building prefixes, like JA for the John Anderson Building, LT for the Livingstone Tower, Col for the Colville etc.

Advisers of Study

The Course Advisers for the MSc in High Power Radio Frequency Science and Engineering are:-

Prof. A.D.R. Phelps	E7-06, ext 3166
Dr. K. Ronald	E6-34/E8-01, ext 3484

AT THE START OF THE YEAR

If you are starting your course of study either on part time or full time basis then you will receive a registration form before the start of the first taught module (usually in September) and will be invited to meet with your advisor of studies to determine your curriculum for the coming year including the compulsory classes and any approved optional classes from the postgraduate curriculum of the department. All classes have a credit value that you obtain if you pass the class assessment and examination procedures. Once you have agreed on a curriculum approved by the adviser you may proceed to register at the Science Faculty desk in the McCance Building.

It is important that your class registration be correct as (amongst other things) it is used to check the feasibility of draft exam timetables. There are special forms to be completed for class changes, available from the Undergraduate Office (Faculty of Science counter, McCance Building). There are restrictions on changing your classes more than 2 weeks into the semester. Any change needs also the approval of your Course Adviser.

As the year proceeds, your adviser remains available to help you with academic advice.

Counsellors

As well as an Adviser of Study, studnts are also assigned a Counsellor. The role of the Councellor is concerned with ensuring that your progress through your university studies is as free of problems and difficulties as possible. Postgraduate students are asked to name a member of the academic staff (please speak to them in advance to ensure that they are able to fulfill these duties) who will act as their councellor, and should have an interview as soon as possible after the commencement of studies. Please advise Ms. Louise Carbry of your Councellors name so that it may be added to your departmental records.

As your course progresses, students often find that their problems are more academic than personal, so your Adviser may be of greater help in these cases. But try to keep in touch with your Counsellor so that there is always at least one member of the academic staff who is aware of your special needs and circumstances.

The Centre for Academic Practice (Graham Hills Building) provides a wide range of support and counselling services. These range from Study Skills Induction Days to more specialised help, addressing the needs of mature students or overseas students. They also run sessions on examination technique later in the term that are highly recommended.

The Department has a Post-Graduate Staff/Student Committee (Convener Dr. J. Jeffers, K6-09) made up of a number of academic staff together with representatives of the postgraduate students of the department. One student from the MSc/PgDip/PgC in High Power Radio Frequency Science and Engineering should be elected in the first two weeks of teaching to represent the interests of the group on the committee. The Committee has an important role, resolving difficulties that may arise. The Students Association offer training on how to be an effective representative. The Committee considers anything that affects the teaching of the courses or Staff/student relations. Problems that are personal to you should be raised with your Counsellor or Adviser. 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 Staff/Student Committee Representative to raise it at their next meeting.

The pigeonholes outside JA 8.05 are available to assist communication with your representative.

The Faculty Board of Study, which is the Committee which manages Faculty business also has two student representatives. Their names will be included on notices about the Staff/Student Committee once they are known.

Andersonian Library

The Andersonian Library in the Curran Building is the main University Library. Its services are described in leaflets available at the entrance. Courses in the use of facilities like CD-ROM, Library searches and guided tour around the Library are offered to students in the first semester.

Safety regulations 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 regulations governing project work are more stringent. These are summarised in Appendix 3.

INFORMATION TECHNOLOGY AND PERSONAL TRANSFERABLE SKILLS

Candidates starting this course will have a background in technical areas and it is therefore assumed that they will already have a knowledge of the proper methods of recording experimental and numerical and theoretical work, understand how to use a library, and presentation of results and the use of computational equipment to facilitate these processes. It is anticipated that students entering this advanced degree will be familiar with the use of computers to prepare reports and analyse data. However there will be opportunities to further develop all of these skills during the course of study.

YOUR CLASSES THIS YEAR:

Obtain your essential textbooks (appendix 1) at the first opportunity. Book Trader in the Students Association holds over 1000 second hand books being sold by students at half price or less. You may wish to check here before venturing forth to pay the full price for your necessary textbooks. Book Trader can be found in ask4 on level 4 of the Students Union.

The core classes for the MSc/PgD/PgC in High Power Radio Frequency Science and Engineering (some flexibility may be possible) are

PH901:	Advanced Electromagnetics (Lancaster)	13th-24th September 2004
PH902:	Physical Processes (Strathclyde)	8th-19th November 2004
PH903:	HPRF Passive Components (Strathclyde)	10th-21st January 2005
PH904:	HPRF Active Components (Lancaster)	7th-18th February 2005
PH905:	Power Supplies and High Power RF Issues (Strathclyde)	7th-18th March 2005
PH906:	High Power RF Systems (Lancaster)	18th-29th April 2005

Compulsory for candidates for the Degree of MSc and optionally for candidates for the PgD

PH907 'High Power RF Project'

Candidates for the PgD (if not taking PH907) and PgC

PH908 'High Power RF Short Project'

The classes PH901 -906 form a combined teaching scheme by the Universities of Strathclyde and Lancaster to offer candidates the benefits of the breadth of experience developed over many years of research at the two establishments. Videoconferencing will be used to allow staff at either establishment to lecture to students at both locations. The Strathclyde videoconferencing room is located on the top floor of the Colville Building.

ASSESSMENT AND PROGRESS

The different methods by which classes are assessed are described in Appendix C. The pass mark for level 5 (PG) 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 commonest 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 the 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 Mathematics exams, program-

mable calculators are forbidden. Other Departments may have other special restrictions for their examinations.)

Some of the classes are partly examined on the basis of coursework completed during the period of study, and the projects are largely assessed on this basis

At the end of the course, an Examination Board considers your progress, see appendix 8. At intermediate points in the curriculum your adviser of studies may advise you or require you to change your registration and/or curriculum. NOTE Appendix 5 is not relevant to this course

TARGETS

You should aim to pass all of your classes to obtain the credits allotted to them because progress towards your qualification depend on the cumulative total. The requirements of the three qualifications differ so you should read the requirements of the course regulation carefully. It may be possible or necessary to transfer your registration between the three qualifications depending on your progress to obtaining the required targets.

Resits?

It is possible to resit failed examinations in the classes making up the HPRF courses, but only one resit is normally permitted and it will normally be in the following year with the next cohort. Unsatisfactory project dissertations may be re submitted, but normally only once and within three months of its initial submission. Resit and Re submission is only for the award of the credits, the marks are capped at 50%

SPORT AND PHYSICAL RECREATION

The Department of Physical Education offers all members of the University the opportunity to participate in physical activity as a means of achieving a healthier lifestyle, to develop new physical skills and to maintain or improve their sporting talents. The Department is located in the Sports Centre on the John Anderson Campus at the top of John Street, very close to the Students' Union. Facilities include a twin court Sports Hall containing 6 badminton courts and facilities for all major indoor games, a separate activities room which houses fitness classes and a range of martial arts, 6 squash courts, a weight training room and a newly-opened cardiovascular fitness suite containing 70 exercise machines and personal weight training stations. In the Royal College Building, accessed from John Street, there is a 20 yd x 10 yd 4-lane swimming pool, above which is a traditional gymnasium. The University Playing Fields are sited at Stepps. Facilities include grass and rugby pitches and a floodlit sand-filled artificial turf hockey pitch. The Department offers a range of fitness classes, fitness testing, health and lifestyle consultations, weight and fitness room inductions, sports coaching classes, and swimming and lifesaving classes. The Department also provides facilities for many of the Sports Clubs run through the Student Sports Union. The Department coordinates the University/Glasgow City Council Sports Bursary programme for elite sportsmen and women and the Royal & Ancient Golf Bursary Programme, details of which are available from the Departmental Office.

For full details of facilities, classes, opening hours, and other queries, contact :Tel: 0141-548 2446 (Swimming Pool - 0141-548 2017)E-mail: ags.98104@strath.ac.uk Web: www.strath.ac.uk/Departments/PhysEd

HAVE YOU THOUGHT ABOUT YOUR FUTURE?

It is never too early to think about what you will do with your degree. Most university students are clear that one of their principal reasons for committing to a degree course is career enhancement, yet many leave career matters to the last minute - sometimes with negative consequences.

Subject graduates may progress to directly related careers. Some find satisfying careers with some connections, and others may choose 'any discipline' careers such as sales executive/manager, Civil Service. Others follow postgraduate study to obtain specific professional qualifications or advance their academic standing.

Careers Advice

By choosing this course many of you are making a conscious choice of an area of science and engineering in which you want to seek employment. Others will still have fairly open minds, but you should think about this NOW. Hopefully by now most of you will have built up a portfolio of transferable skill and some work experience- almost all employers will have an interest in the work experiences you have had and how you have developed from these.

They will also be interested in how you use your leisure and social time, things like voluntary work, sport and other leisure activities or committee involvement in university or outwith.

The tasks that you perform every day as a student - weighing up conflicting theories, drawing on disparate and fragmentary evidence and then reaching a measured conclusion - are amongst the tasks that employers want of graduate entry managers and professionals. They will also value your familiarity with methods of research, your objectivity, your capacity to manage large quantities of information and to organise it in a logical and coherent manner.

Regardless of the career you enter, the skills acquired through your degree will have to be accompanied by a set of personal skills. A particular skill set will be necessary for a career in Physics, whilst a different combination of skills will be appropriate if you use your degree to enter a different discipline. A wide range of graduate employers have defined the main skills they look for in behavioural terms and you can see these on the Careers Service web-site at www.careers.strath.ac.uk/employers/skills.shtml.

All literature on graduate occupations held by the Careers Service describes both the tasks involved and the skills necessary to do the job well, so it can be well worth browsing around the careers resource centre at this stage.

Many of the skills you will need to enter a good graduate career are being developed and practised through your course work and through your social and leisure activities. Each is of significant value - never underestimate this. Some day soon an employer will ask you to write about these in a CV or application form or describe them at interview - you can make that easier for yourself by reflecting on your experiences and recording the skills you are using as you go along. The Careers Service web-site has a specific section to assist you with this process - look at careers.strath.ac.uk/employers/skills.shtml. To see how to describe the skills and qualities you possess in a good CV format, look at www.careers.strath.ac.uk/ses/student/cv/index.shtml. This gives an example of the type of CV you can use when seeking part-time/vacation work. This type of application is of most relevance at this stage and is a good stepping stone towards the ultimate graduate CV. Careers Service staff are happy to help you at all stages of the process.

Careers Advisory Service is on level 5 of the Livingstone Tower. Besides arranging job interviews for students who are (or think they may be) in their final year at University, they also can help find temporary/vacation employment. They also advise on study opportunities abroad.

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' and other relevant seminars 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. Topics such as applications, CVs, interview skills, assessment centres and how to look for a job are all included.

Decisions will need to be made at various stages of your course and the timing of these will vary depending on your career focus. Some opportunities have closing dates very early in the academic year, even before Christmas. It is important to balance the requirements on your time of the process of seeking employment and pursuing your academic course to ensure that neither suffers.

Exploration of the occupational, postgraduate and employer information available from the Careers Service resource centre, at www.careers.strath.ac.uk/inforoom.shtml and at www.prospects.ac.uk. The prospects site contains some of the most comprehensive occupational and postgraduate information in the world. From the front page follow 'career planning' to 'think about opportunities' to 'occupations' or 'postgraduate study'.

Develop your CV with help from the Model CV Pack available from the Careers Service and advice at www.prospects.ac.uk/student/cidd. Follow 'career action' and then 'applications'. You can discuss and refine your CV or applications in consultation with a careers adviser during weekly CV/Application Form drop-in sessions. This is appropriate whether you are applying for employment of for postgraduate study.

Identify sources of vacancies for your areas of interest including national and local vacancy bulletins searchable on the Careers Service web site at www.careers.strath.ac.uk/vacancies/index.shtml or available fortnightly from the Information Point. Careers Service staff are happy to help you at whatever stage of the career planning job search process you have reached.

Might you be graduating at the end of this academic year? See Appendix 9 - Graduation..

Do not forget to register for Graduation - see Appendix 9.

About January 2004 Dr. R. Martin will be arranging talks and research group visits for those interested in doing postgraduate research in this department. For postgraduate research elsewhere, obtain the Directory of Postgraduate Study from the Careers Office and consult your counsellor or Adviser.

The primary graduation ceremony next year is expected to be in the first two weeks of July. A second ceremony will usually be held in November. For MSc candidates in HPRF the November may be most appropriate . You need to register 3 months beforehand to graduate. Posters around the University will advise you when to do this.

Your counsellor or adviser will provide references for you, if you ask.

PROBLEMS AND CRISES

Got a problem, can't find your Counsellor or don't know who to contact? Mrs Sandra Steele (JA 8.03 of the John Anderson Building or e-mail to s.m.steele@strath.ac.uk) will point you in the right direction. She won't have the answer to your problem but is sure to 'know a man (or woman) who does'. The important thing when you have a problem is not to do nothing, thinking that if you ignore it, it will go away. Problems don't usually, they usually just get bigger that way. Very often a problem can be solved if it is met at the beginning.

Student Advisory and Counselling Service :

The Service offers support to all home/EC students on any matter affecting students' wellbeing while at university whether this is a new, long standing problem or a crisis. It is a useful place to contact on any issue, including stress and emotional problems, relaxation, motivation, course choice, achievement, low mood, loss, change and relationships. Most students are seen individually although group work is also offered. There is helpful reading material on our website which is also available in the office.

Counselling offers an opportunity to talk about any personal issue without judgement or pressure. It is also a place to express feelings and perhaps reach new understandings or make decisions.

Students may need information or advice and our staff have knowledge of the many options and further sources of help available to students.

The Service is open to students from both the John Anderson and Jordanhill Campuses. There is also a Service provided specifically for students at Jordanhill on the ground floor of the Henry Wood Building.

Appointments and enquiries can be made in person, by telephone or e-mail :

Student Advisory and Counselling Service, Level 4, , Graham Hills Building, 50 George Street

Tel: 0141-548 3510 E-mail: r.sacs@mis.strath.ac.uk Web: http://www.mis.strath.ac.uk/SSS/sacs

Moving home?

It is important to keep both the University Registry and the Department informed of any change in your address, else important information (like examination and graduation information) might go astray. Change of Address forms are available from the Student Office, JA 8.31.

Falling ill?

Student Health Service : The Student and Occupational Health Services run daily consultative clinics for students with physical or psychological problems. The service is located on Level 1 of the Livingstone Tower. The doctors at the Service can refer students for specialist treatment if appropriate. (Note: all students should also register with a G.P.).

Contact : 0141-548 3916 (JA Campus)

E-mail : i.jamieson@strath.ac.uk Web: http://www.mis.strath.ac.uk/SSS/

Medical certificates Many of the University's regulations ask for medical certificates to be submitted in case of absences. A doctor's certificate often involves payment of a fee but for some cases (see below) a self-certificate (which is free) will suffice.

For absences of seven days or less

The self-certification convention applies where there is absence from classes or tutorials for seven or less consecutive University teaching days. The self-certification form is available free from the Registry.

For absences of more than seven days

Where sickness results in absence of more than 7 normal University days, the student is required to submit a medical certificate. If the absence continues for 14 days or more, Registry will inform the SAAS or relevant grant awarding body.

For absences from an examination or failure to complete assessed course work

The self-certification convention does not apply and a student absent from a formal examination, class test or who fails to submit an assessment/assignment on time because of illness must submit a medical certificate.

NB: Examination Boards will not take account of special pleading for illness unless it is accompanied by the appropriate medical certification (Self-certification is not adequate for this purpose).

All medical certificates need to be given either to the Department of Physics (Adviser of Study, Counsellor or Student Office, JA 8.31) or to Registry (Science), McCance Building.

The Chaplaincy :

The Chaplaincy provides students with the opportunity to join a community across both campuses, offering friendship, support and advice. There are two full-time chaplains, one non-denominational and one Roman Catholic, together with a number of part-time chaplains of various faiths, and a part-time International Chaplain.

The Chaplaincy Centre, including the Ark Café, is located in the St. Paul's Building (John Street).

Contact : 0141-548 4144

e-mail: marjory.macaskill@strath.ac.uk

web: http://www.mis.strath.ac.uk/SSS/

GETTING ADEQUATE FINANCIAL SUPPORT

Finance for students taking MSc/PgD/PgC in HPRF

There are a number of studentships available to support students on this course and they are awarded on a competitive basis. The relevant fees are defined at:

http://reld.phys.strath.ac.uk/fees.htm.

Candidates may also be sponsored by industry (possibly as an employee), the sponsor will pay the industrial fees tot he University with the level of subsistence to be determined between the student and sponsor. In the case of industrial employees and candidates seeking to self-fund their course the part time option may help them to balance their academic and employment commitments.

In cases of financial hardship, in some cases small grants are available from the Access Fund. Contact Student Finance in the McCance Building for advice on this. Information on this Fund can be found in the Home Page of the University Web site. See under 'Students: Service Departments: Student Affairs". Crisis loans are also available, but being loans, they must be repaid.

Remember the Student Advisory Service (Level 4, Graham Hills Building) can help with advice on most matters including financial problems

Student Finance Office :

The Student Finance Office offers advice to home/EC students on financial matters, including assistance for students with finance difficulties, e.g. assistance with applications for awards from the Hardship Fund and the Mature Student Bursary Fund or loans from the University's Emergency Aid Fund. The office also provides advise to students and others on queries in relation to fees, loans, bursaries and so on. (Please note: there is a separate Adviser to International Students - Jim Wilson - whose office is based in the University's International Office, Graham Hills Building.)

The Student Finance Office is located in the McCance Building, 2nd Floor (not to be confused with the main University Finance Office on the Ground Floor). Appointments and enquiries can be made in person, by telephone or e-mail :

Room 2.28, McCance Building, 16 Richmond Street, Glasgow, G1 1XQ.

Tel: 0141-548 2753 E-mail : s.finance@mis.strath.ac.uk Web: http://www.mis.strath.ac.uk/SSS/

General Information :

Give careful thought to securing adequate financial support before the year starts. For most people, the constraints of time and money are such that they will only get one opportunity to do a degree. The courses at the University of Strathclyde (other than evening classes and some MSc's) are designed for full-time study, which involve not just attendance at lectures, tutorials and practical sessions but additionally much private study too, doing background reading or tutorial exercises, reports or assignments.

Of course, it is recognised that some students need to supplement their income by some part-time employment, but this must not clash with your course schedule. However sympathetic the Department is with your problems, it remains the case that such work puts in jeopardy your University career if it reduces your study hours.

Some part-time work can be stimulating, a refreshing change from studying all day, but if you have to do it, it should eat more into your leisure time than your study time! The recent Cubie Report recommended that students limit any employment to a maximum of 10 hours per week.

Do not blow your chance of a University degree (which can greatly enhance your future career prospects) by grossly underestimating - as many do - how much work a degree involves.

Talk over with your counsellor or adviser any financial or medical problems you may have. They will help you decide whether your circumstances offer a realistic chance of your succeeding in your course.

If your financial or medical problems are very severe, you perhaps should consider postponing your degree course (delayed entry or a year out?) until your finances or health position looks more favourable. (But you must weigh this against the dangers of losing momentum in your studies, and the fact that study gets harder as you get older.) (Note that "taking a year out" is not a right. You would need to appeal to be allowed this, setting out your reasons why you feel it would be helpful.)

The following advice, on a widespread problem of student life, is reprinted from the Herald 14.2.1995).

'Don't borrow more than you can afford' is golden rule

In addition to loans, hard-pressed students are being driven to run up overdrafts and other debts.

Student loans are a major commitment, but they are a long term form of debt, being repaid only when students secure salaries of more than 85% of the national average. But other debts present an immediate concern.

Rent arrears, fuel bills and overdrafts can all be problems in the short term. A survey at Edinburgh University showed 47% of students having outstanding debts at the end of last session. One student commented: "I have to work during term to stop myself getting into a lot of debt. I feel I can't concentrate on my studies because of this."

It is hard to avoid debt, so the need to get a summer job is clear. But jobs are not easy to find and are often poorly paid. Summer can prove a time of hardship for some students as, along with 16 and 17 year olds, students are excluded from the benefits safety net.. This leads to National Union of Students claims that students are worse off than people on income support.

In addition, students are often unaware of where to turn for help. They need to be aware of advice services provided by consumer and trading standards departments, universities, student unions, and citizens advice bureaux. Advice sought early can help to avoid later problems. General debt advice is based on common sense:

DON'T borrow more than you can afford.
TRY to budget and to make priorities about debts.
READ the small print on credit agreements.
BORROW only from recognised, legal lenders.
If you are unsure, go to someone for advice.

Ian Barr, a final year student at Strathclyde University said "Student debt won't go away. But advice might make it easier to handle."

STUDENTS WITH SPECIAL NEEDS

Special Needs Service :

The Special Needs Service offers advice and assistance to students (and prospective students) with disabilities. Assistance is available in relation to claims for Disabled Student Allowance, advice on the purchase and use of special IT equipment, and liaison with academic staff on behalf of students, e.g. in relation to adjustments which might be made in the light of a disability.

The Special Needs Service is located in Level 4 of the Graham Hills Building. Contact :

Special Needs Service,

Level 4, Graham Hills Building, 50 George Street, Glasgow, G1 1QE.

Tel: 0141-548 3402 e-mail: a.simpson@mis.strath.ac.uk web: http://www.mis.strath.ac.uk/SSS/

OTHER DIFFICULTIES:

Go and see your counsellor 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. For instance, many specialist advisers are listed in the booklet on student life. They include

1. The Student Advisory and Counselling Service (4th floor, Graham Hills Bldg., 50 George St.).
2. The International Student Adviser Mr. Jim Wilson (International Office, Level 4, Graham Hills Building)
3. The Chaplaincy Centre (St. Paul's Building, opposite the Students Union).
4. The Student Health Service (1st floor, Livingstone Tower)
5. Family Planning/Well Woman Clinic (1st floor, Livingstone Tower, Tuesdays 1pm)
6. Adviser to Students with Disabilities, Mrs. Anne Simpson (Level 4, Graham Hills Building)
7. Students Association Welfare Office (Students Union, 90 John Street)
8. Residence Services (Level 4, Graham Hills Building, 50 Richmond Street)

APPENDIX C

Assessment of the classes for the MSc/PgD/PgC in High Power Radio Frequency Science and Engineering

The classes PH901-906 will normally be assessed by combination of the candidates performance in written examinations and performance in the coursework (including laboratory work and the maintenance of a laboratory notebook and journal). In all cases a mark of 50% is required for the award of the credits. Resits will be possible, but only for the credit associated with the class, the mark being capped at 50%, and will usually be allowed only once and in the following year with the next cohort. The examinations WILL NOT NORMALLY TAKE PLACE IN THE USUAL UNIVERSITY DIETS. Poor performance in laboratory based coursework cannot be rectified by repeating the work although reports may be resubmitted. Classes PH907 & 908 will be assessed on the basis of the students preparation, to the satisfaction of the board of examiners a dissertation and a paper based on the dissertation in a format suitable for publication in an appropriate journal. Candidates may be required to submit to a Viva-Voce examination and will be required to present the results of the research to the peer group. The overall class mark will be calculated using a prescribed method based on the mark for the dissertation, paper and presentation. An unsatisfactory project dissertation may normally be resubmitted only once and within 3 months of its initial submission. Students may be told in cases where their performance in a particular class during the year is considered especially poor, that they are "Not Qualified" (or NQ) to sit the degree examination which disqualifies you from obtaining the credit. If this arises from non-submission of coursework then enquire whether late submission might requalify you to proceed. Alternatively, non-submission of coursework can result in your mark being returned to Registry as "OC" (Outstanding Coursework). In this case, you will not be awarded the credit (even if you have passed the examination) until the coursework has been submitted.

APPENDIX 1

SYLLABUS AND BOOKLIST OF THE MAIN CLASSES FOR PHYSICS STUDENTS

Booklist recommendation *** = Essential, ** = Strongly Recommended and * = Recommended

12 902 Advanced Topics in Physics (MRes)

Module : (A) Advanced Mathematical and Numerical Methods
Lecturer : Prof. S. M. Barnett
(24 Lectures, MRes, 10 PG credits
Semesters I and II)

Textbook : Advanced Mathematical Methods for Engineering and Science Students, G. Stephenson and P. M. Radmore (Cambridge University Press).

The course concentrates on practical methods for solving mathematical problems of the type that occur frequently in theoretical physics. The material is presented in a mixture of liectures and a significant number of problem classes. Emphasis is placed on acquiring skills by practice. The course comprises five topics : (i) suffix notation and tensors, (ii) special functions, (iii) contour integration, (iv) applications of contour integration and (v) integral transforms.

Pre-requisites :
Assessment :
Examination :

Module : (B) Advanced Superconductivity
Lecturer : Prof. G. B. Donaldson
(12 Lectures, 0 Tutorials, MRes, 10 PG credits, Semester I)

Textbook : Fundamentals of Superconductivity, V. Z.Kresin and S. A. Wolf (Plenum), ISBN 0-306-43474-1

The aim of this course is to provide an introduction to basic theory and applications of superconductivity, both for those with a general interest and for those considering research or development work in this field.

Pre-requisites :
Assessment :Essay
Examination :

Module : (C) Light-Matter Interaction : Class Contact : Prof. G-L. Oppo
Lecturers : Prof. G-L. Oppo
(24 Lectures, 6 Tutorials, MRes, 10 PG credits
Semesters I and II)
Textbook : Quantum Optics, M. O. Scully & M. S. Zubair, Cambridge (1997)

This course covers the elementary principles underlying the interaction between coherent light and atoms (or ions). Topics include resonance fluorescence, density matrix, optical Bloch equations, electomagnetically induced transparency, coherent population trapping, laser cooling and phaseonium.

Pre-requisites :None
Assessment :
Examination :

Module : (D) Atomic Processes in Plasmas - Class Contact : Prof. H. P. Summers
Lecturer : Prof. H. P. Summers
(24 Lectures, MRes, 10 PG credits
Semester 1)

Textbook : "Astrophysical & Laboratory Spectroscopy" - Proc. 33rd Scottish Universities Summer School in Physics (1987) NATO Advanced Study Institute (Ed. R. Brown & J. Lang);Astrophysical Quantities - C. W. Allen (Athlone);References to original papers.

1 Introduction
- 1.1 Laboratory and astrophysical plasmas
- 1.2 Thermodynamic equilibrium and the non-LTE environment2Reactions in plasmas
- 2.1 Radiative processes
- 2.2 Collisional processes

3 Emission of radiation
- 3.1 Coupling of the atom to the radiation field
- 3.2 Electric dipole emission coefficients

4 Basic population modelling
- 4.1 Statistical balance equations
- 4.2 The radiative-cascade case
- 4.3 The collisional-radiative picture

5 Hydrogen
- 5.1 Astrophysical spectra
  - 5.1.1 Recombination spectra
  - 5.1.2 Microwave lines
- 5.2 Laboratory spectra
  - 5.2.1 The collisional excitation case
  - 5.2.2 Collisional-radiative coefficients
  - 5.2.3 Stark spectra from hydrogen beams

6 Complex atoms
- 6.1 Metastables
- 6.2 Line emission from complex ions
- 6.3 Generalised collisional-radiative models

7 Radiative transfer
- 7.1 The transfer equation
- 7.2 Line broadening
- 7.3 Continuous absorption of hydrogen
- 7.4 Continuous emission of hydrogen

8 The ionisation state
- 8.1 Collisionally excited plasmas
- 8.2 Radiatively excited plasmas

9 Astrophysical plasma diagnostics
- 9.1 Density and temperature diagnostics
- 9.2 Differential emission measure analysis
- 9.3 Spectral simulation

10 Laboratory plasma diagnostics
- 10.1 Influx spectroscopy
- 10.2 Charge exchange spectroscopy
- 10.3 Beam emission spectroscopy

10.4 Transport simulation

Pre-requisites :12.481
Assessment :Examination
Examination :Take home paper consisting of 2 sections, each containing 2 questions. Answer Book to be returned in 2 days.

Module : (E) Fluorescence Spectroscopy : Class Contact : Dr O. J. Rolinski
Lecturer : Dr O. J. Rolinski
(12 Lectures, 6 Tutorials, 6 Practicals, MRes, 10 PG credits
Semester I)

Textbook : Principles of Fluorescence Spectroscopy, J. R. Lakowicz, Planum Press, New York, 1999

The early studies on fluorescence in the 1930s led Aleksander Jablonski to propose the scheme for the energetic transitions in fluorescing molecules, which is now known as the Jablonski diagram. This experimental achievement was later fully confirmed and developed by quantum mechanics. Nowadays, fluorescence spectroscopy has developed rapidly as a unique tool for probing the microenvironment in chemical, biological and even medical applications. The proposed lectures will reflect the dynamics of progress in fluorescence spectroscopy in recent years. It will start from the experimental and quantum mechanical backgrounds and then will concentrate on new applications with nm resolution.

Pre-requisites :None
Assessment :Written Critical Review of one of a selection of research papers
Examination :

Module : (F) Topics in Photonics and Ultrafast Physics - Class Contact : Dr D. A. Jaroszynski
Lecturer : Dr D. A. Jaroszynski and Dr K. Wynne
(24 Lectures, 6 Tutorials or Mini-workshops, 0 Practicals, MRes, 10 PG credits
Semester I or II)
Textbook : see URL: http://dutch.phys.strath.ac.uk/UFP/

Introduction to ultrashort pulse lasers and amplifiers, wavelength conversion, time-resolved experiments. Applications of ultrashort pulses (sub-cycle pulses of radiation, broadband coherent excitation, symmetry, spectroscopy and selection rules). Laser-plasma interactions (dispersion, propagation of waves and parametric instabilities). Studies of collective radiation-matter interations (Ponderomotive force, Raman and Compton amplification, superradiance, laser-undulator-plasma interactions). Fourier plane filtering and arbitrary pulse shape generation. Pulverised atoms, exploding solids and ultrashort x-rays (High order harmonic generation, Intense fields, ionisation and ablation hard x-ray generation and photonuclear reactions). Femtosecond laser machining (a practical demonstration of micromachining by writing all the students names in a space less than a millimetre, will be given.)

Pre-requisites :None
Assessment :Continual assessment, problem sheets and project (essay). Mini-workshop to discuss a selection of topics.

Module : (G) Advanced Plasmas, Electrons and Discharge Physics - Class Contact : Prof. A. D. R. Phelps & Dr R. S. Stewart
Lecturers : Prof. A. D. R. Phelps, Dr R. S. Stewart, Dr A. W. Cross, Dr G. R. M. Robb
(20 Lectures, 4 Tutorials, 0 Practicals, MRes, 10 PG credits
Semester I)

Textbook :

A brief overview of Plasma Physics is followed by a treatment of the kinetic theory of plasmas, Landau damping and microinstability theory. Relativistic electron beam theory is introduced and the mechanisms of coherent radiation produced by relativistic electron beams are discussed. Applications to free electron lasers, electron cyclotron masers and CARMS are treated. Contemporary topics in discharge physics including discharges relevant to plasma processing are presented.

Pre-requisites :None
Assessment :Essay on a research topic related to the course plus continuous assessment.

Module : (I) Advanced Topics in Semiconductor Physics
Lecturers : Prof. K. P. O'Donnell, Dr I. M. Watson, Dr R. W. Martin, Dr C. Trager-Cowan and Dr M. Yakushev
(24 Lectures, MRes, 10 PG credits, Semester II)

This course will consider semiconductor materials and emphasise how their optical and electronic properties make them useful in new technology. The topics covered will include fundamental materials issues (band

structure, quantum transport, etc.), and the growth and characterisation of bulk semiconductors and heterostructures.

Pre-requisites :
Assessment :Continuous, presentation and report
Examination :

12 904 Research Skills : Class contact : Prof. G. B. Donaldson
Lecturer : Prof. G. B. Donaldson
(12 Lecture and tutorial hours, MRes, 10 PG credit
Semester II)

Research Skills is intended as an introduction to the organisation, management, funding and performance of research. The class deals with the following topics: (i) academic and industrial research and sources of funding in the UK, (ii) the postgraduate research career, (iii) writing a research proposal, (iv) managing and reporting a research project, (v) proposal and manuscript refereeing, (vi) the UK's Research Assessment Exercise.

Prerequisites :None
Assessment :Continuous
Examination :None

12 905 RESEARCH SKILLS 2
(Semester ?, 12 lecture hours, 20 tutorial hours, 10 credit, PG
Lecturers : Prof. G-L. Oppo

Textbook: -

Important and fundamental skills for research in both experimental and computational physics are transferred to the students.

Pre-requisite :
Assessment :
Examination :

12 907 Communicating Physics : Class Contact : Dr K. Wynne
Lecturers: Dr K. Wynne, Miss J. Beswick, Prof. D. Jaroszynski and Dr C. Trager-Cowan
(12 lecture and tutorial hours, MRes, 10 PG credit
Semester II)
URL :http://phys.strath.ac.uk/12-490/

Textbook : None

The aim of this class is to introduce the techniques of communicating and popularising physics. Individually and in groups, students will perform a number of exercises linked to some or all of the following topics: scientific journalism, physics in art and literature, physics webpage and discussion forum, science festivals and science centres

Prerequisites :None
Assessment :Continuous
Examination :None

12 908 Managing Technological Innovation : Class contact: Dr. A. Cunningham
Lecturer : Prof. G. W. Hamilton
(12 lecture hours, 3 tutorial hours, 24 hours project, MRes, 10 PG credit,
Semester I)

Management of all aspects of innovation, including patenting and other legal protection, R & D planning, market research, production and selling. The course introduces management tools, including the work breakdown structure, network, diagram and cash-flow tables. Several case studies of the planning of new products and processes are described. Project work concentrates on the production by groups of students of business plans mapping out the different stages of product innovation.

Prerequisite: None
Assessment: :Written Exam (50 %), Team Aural Presentation of Project (10 %), Team Project Report (40 %)
Examination :Main Exam : January - 1 hr 30 mins.

12 909 Superconducting Technology : Class Contact: Dr. C.M. Pegrum
(Semester I, 24 lecture hours, 6 tutorial hours, PG, 10 credits
Mon. & Fri. 10 - 11)
Lecturer : Dr C. M. Pegrum

Textbook: * - SQUIDS, The Josephson Effect, J.C. Gallo 0-750-30051-5

The aim of this course is to provide an introduction to basic theory and applications of superconductivity, both for those with a general interest and for those considering research or development work in this field. Introduction : Discovery of superconductivity, occurrence. Zero resistance, critical temperature, critical magnetic field. Meissner state, thermodynamics, free energy and entropy. Evidence for an ordered state and energy gap. Microscopic view - Cooper pairs, pair interaction, ground state. The superconducting wavefunction, phase coherence, supercurrent density. Fluxoid and flux quantisation. London equation, penetration depth, coherence length. Type I and Type II materials. The vortex state; lower and upper critical fields. Josephson effects : Tunnel junctions, junction wave-functions. The DC Josephson equation. Current-voltage characteristics for junctions: role of single and paired electrons. The AC Josephson effect, applications in metrology, mixing and detection. Junction models, solutions of equations for single junctions; analogies with other non-linear systems. Chaotic states. Quantum interference: (a) Single junctions - effects of magnetic flux; (b) Two junctions in a loop - Superconducting Quantum Interference Devices (SQUIDs), flux dependence. (c) Multi-junction devices. Digital applications of Josephson devices : Issues of speed and power. Latching logic. Non-latching Single Flux Quantum (SFQ) circuits. High-temperature superconductivity : Brief history of high temperature (HTS) superconductors. Present status: materials, properties, structures. Fabrication techniques for bulk materials and thin films. HTS Josephson devices - junctions, SQUIDs, flux-flow amplifiers, microwave devices, bolometers. Prospects for high-power applications - wires, cables, machines, bearings, etc. Applications of SQUIDs : Biomagnetism: Magnetoencephalography (MEG), magnetocardiography (MCG). Non-Destructive Evaluation: Methods, advantages, applications. Superconducting accelerometers: Principle of operation, gravity gradient measurement. The Satellite Test of the Equivalence Principle (STEP) experiment. Other applications.

Pre-requisite :Electromagnetism and Quantum Physics at 2nd Year level.
Assessment: :Examination
Examination :Main Exam - January 2 hrs

12 913 Advanced Laser Physics : Class Contact: Dr. N. J. Langford
(Semester II, 24 lecture hours, 6 tutorial hours, 4th year, 1 credit,
Tue. 11 - 1)
Lecturer : Dr N. J. Langford

Textbook: ** - Optical Electronics, A. Yariv (Saunders) 4-833-70274-6

** - Laser Electronics J.T. Verdeyen Prentice Hall 2nd Ed. 0-134-23655-X

An advanced class in which the detailed physics of lasers is discussed with particular attention paid to the nonlinear interaction between the intracavity light and the lasing medium. At its conclusion students should understand the principle of operation of all conventional lasers and the various temporal and spectral modes of operation. Steady state gain dynamics. Review of two level system, classical electron oscillator, gain and inversion, threshold gain, gain saturation. Frequency of oscillation, spatial hole burning, optimum output coupling. Transient gain analysis. Cavity lifetime, relaxation oscillations, Q-switching and pre-lase Q-switching, active and passive mode-locking, pulse measurement techniques. Resonator Physics. Electric field distributions in cavities, geometric optics applied to cavities, cavity stability conditions. Gaussian beam optics, interaction between cavity and radiation field, mode-matching.

Pre-requisite: 12 330 Laser Physics and Applications and 12 370 Modern Optics
Assessment: :Examination
Examination :Main Exam - May 1 hr 30 mins.

12 917 Quantum & Nonlinear Optics : Class Contact: Dr. J. Jeffers
(Semester II, 24 lecture hours, 4 tutorial hours, PG, 10 credit,
Mon. 11 - 12 & Tue. 10 - 11)
Lecturer : Dr J. Jeffers

Textbook: ** - The Quantum Theory of Light, R. Loudon (Oxford Univ Press) 3rd Ed.

An advanced class dealing with two areas of modern optics and technological interest: nonclassical and nonlinear effects associated with the interaction between the optical field and matter.

- Classical, quantum and semiclassical descriptions.
- Review of Classical Electromagnetism: EM waves in free space, vector & scalar potentials, solutions of the field equations, the delta function, field energy, linear dielectrics, nonlinear dielectrics
- Optical coherence: spectrum of a fluctuating light beam, collision-broadened source, first-order coherence and the frequency spectrum, Young's intereference fringes, higher-order coherence.
- The quantised EM field: the QM harmonic oscillator, quantisation of the field, zero-point energy.
- States of the EM field: single-mode operators, single-mode number states, coherent states, quantum optical coherence, quantum interferometers and first-order coherence, beam splitters and second-order coherence, wave-particle duality for a single photon.
- Fully quantum description of interactions: fully quantised interactions, photon absorption and emission rates, photoelectric effect.
- Light amplification and lasers: single-mode photon rate equations, fixed atomic populations, single-mode laser theory.
- Nonlinear optical processes: two-photon absorption, nonlinear susceptibilities.
- Quantum effects in nonlinear optics: classical and nonclassical effects, nonclassical effects in parametric down-conversion, optical parametric amplification and squeezing.

Pre-requisite:
Assessment: :Examination
Examination :Main Exam - May 1 hr 30 mins.

PH 901: Advanced Electromagnetics
Dates:13th-24th September 2004
Lecture Times: 15 PG Credits
Lecturer: Prof. A.D.R.Phelps, Dr. K.Ronald, Dr. A.W. Cross, Prof. R. Carter, Dr. A. Dexter
Textbook: see http://reld.phys.strath.ac.uk/curriculum.htm

Aims and Objectives

To develop an understanding of the mathematics underpinning the methods used by Computational Electromagnetic Software to solve Maxwell's equations. Understand how electron paths and currents are computed. Develop an ability to select and use commercial software as appropriate for solving different types of problems. Provide a foundation in electromagnetic energy propagation in waveguides and free space. Enhance fundamental understanding of the science of electromagnetism and mechanics including the relevance and importance of relativity to beam-wave interactions and particle trajectories. A practical emphasis will be placed on the techniques relevant for vacuum electronics.

Content and curriculum

- Techniques for the numerical solution of Maxwell's equations (Finite Difference Time Domain, Finite Element, Method of Moments, Green's functions etc.).
- Application of boundary conditions.
- Relativistic electrodynamics.
- Use of commercial EM software for design and their limitations.
- Particle in cell codes.
- Theory of transmission lines and wave guides.
- Impedance matching.
- Dipole radiation, radiation from point sources, retarded potentials.
- Power flow, energy density and the electromagnetic stress tensor.
- Maxwell's equations as a gauge theory.

Modes of Delivery

The class will occur in a two week intensive course consisting of lectures and tutorials supported by practical and computational coursework.

Pre-requisite: A degree in Physical Science/Electrical or Electronic Engineering or relevant industrial experience
Assessment: Examination and coursework (0.75x (Exam Mark)+0.25x(Coursework Mark))
Examination: see http://reld.phys.strath.ac.uk/curriculum.htm

PH 902: HPRF Physical Processes
Dates:8th-19th November 2004
Lecture Times:15 PG Credits
Lecturer: Prof. A.D.R.Phelps, Dr. K.Ronald, Dr. A.W. Cross, Prof. R. Carter, Dr. A. Dexter
Textbook: see http://reld.phys.strath.ac.uk/curriculum.htm

Aims and Objectives

Understand the properties of matter that relate to the functionality of RF/microwave devices and the physical processes which affect the performance of RF/microwave systems. This will include statistical mechanics, descriptions of the electron distribution function in solids and its impact on electron emission and the phenomenon of quantum barrier tunnelling. Candidates will develop an appreciation of the important areas of solid state, plasma and gas discharge physics and appreciate the limits on the performance of conductors, semiconductors, dielectrics and vacua The high frequency response of ferromagnets will be studied and an appreciation developed of the mechanisms facilitating coupling between charged particles and E-M fields. Candidates will be introduced to the range of techniques for generating and measuring a vacuum and their relative merits.

Content and curriculum

- · Physics of thermionic, photo-electric, and field emission processes.
- · Physics of free electron-electromagnetic radiation coupling.
- · Vacuum breakdown and multipactor.
- · Low pressure gaseous break down.
- · High pressure gaseous breakdown.
- · Ferrites and magnetic properties at high frequencies.
- · Dielectrics and dielectric strength.
- · Skin depth and the heating effect of current.
- · Conductors and superconductors at microwave frequencies.
- · Conduction through oxide layers and passive intermodulation.
- · Vacuum technology.
- · Physical processes in semiconductor RF devices.

Modes of Delivery

The class will occur in a two week intensive course consisting of lectures and tutorials supported by practical and computational coursework.

Pre-requisite: A degree in Physical Science/Electrical or Electronic Engineering or relevant industrial experience
Assessment: Examination and coursework (0.75x (Exam Mark)+0.25x(Coursework Mark))
Examination: see http://reld.phys.strath.ac.uk/curriculum.htm

PH 903: HPRF Passive Components
Dates:10th-21st January 2005
Lecture Times:15PG Credits
Lecturer: Prof. A.D.R.Phelps, Dr. K.Ronald, Dr. A.W. Cross, Prof. R. Carter, Dr. A. Dexter
Textbook: see http://reld.phys.strath.ac.uk/curriculum.htm

Aims and Objectives

Candidates will develop an understanding of the range of methods used to transmit and manipulate electromagnetic radiation in the RF spectral range, including the benefits and limitations of co-axial, hollow and microstrip waveguides. An appreciation will be developed of the principles of operation of a range of components such as couplers, transitions, filters, antenna and windows. Candidates will appreciate the functional behaviour of these components and how they are applied in practice. Understand the characterisation of these components by VSWR, insertion loss and electrical length, and the representation of these qualities by scattering parameters. Develop a foundation in the techniques used to measure and illustrate these properties such as slotted lines, scalar and vector network analysis and Smith charts.

Content and curriculum

- · S-parameters and their measurement.
- · Coaxial line components (bends, tees, tuning components, directional couplers etc.).
- · Wave guide components (bends, tees, tuning components, directional couplers etc.).
- · Micro strip components (bends, tees, tuning components, directional couplers etc.).
- · Impedance matching.
- · Smith Charts.
- · Ferrite components (isolators, circulators & switches).
- · Cavity resonators.
- · Filters
- · Channel combiners, mixers & multiplexers.
- · TR cells.
- · Connectors
- · Accelerator and slow wave structures
- · Horns and antenna
- · Superconducting cavities
- · Mode converters
- · Windows

Modes of Delivery

The class will occur in a two week intensive course consisting of lectures and tutorials supported by practical and computational coursework.

Pre-requisite: A degree in Physical Science/Electrical or Electronic Engineering or relevant industrial experience
Assessment: Examination and coursework (0.75x (Exam Mark)+0.25x(Coursework Mark))
Examination: see http://reld.phys.strath.ac.uk/curriculum.htm

PH 904: HPRF Active Components
Dates:7th-18th February 2005
Lecture Times: 15 PG Credits
Lecturer: Prof. A.D.R.Phelps, Dr. K.Ronald, Dr. A.W. Cross, Prof. R. Carter, Dr. A. Dexter
Textbook: see http://reld.phys.strath.ac.uk/curriculum.htm

Aims and Objectives

Candidates will be expected to develop an understanding of the operation of Microwave/RF amplifiers and oscillators and the techniques used to characterise their emissions. The candidates will attain an advanced knowledge of the operating principles of a range of currently important generators and amplifiers including Traveling Wave Tubes, Klystrons and Magnetrons, plus new fast wave concepts including Gyrotrons and FELs. Understanding will be developed of the numerical techniques used to predict non-linear performance.

Content and curriculum

- · Amplifier/oscillator characteristics.
- · Use of spectrum analysers.
- · Power measurement.
- · Electron guns.
- · Triode and tetrode amplifiers and oscillators.
- · Inductive output tubes.
- · Klystrons.
- · Helix and coupled-cavity TWTs.
- · Magnetrons.
- · Cross-field amplifiers.
- · Gyrotron and gyro-amplifiers.
- · Solid state power amplifiers.
- · Non-linearity and intermodulation
- · PIC cell simulation of vacuum tubes
- · Accelerator and slow wave structures
- · Free electron lasers and other very high power sources
- · Physical processes in semiconductor RF devices.

Modes of Delivery

The class will occur in a two week intensive course consisting of lectures and tutorials supported by practical and computational coursework.

Pre-requisite: A degree in Physical Science/Electrical or Electronic Engineering or relevant industrial experience
Assessment: Examination and coursework (0.75x (Exam Mark)+0.25x(Coursework Mark))
Examination: see http://reld.phys.strath.ac.uk/curriculum.htm

PH 905: Power Supplies and High Power RF Issues
Dates:7th-18th March 2005
Lecture Times: 15 PG Credits
Lecturer: Prof. A.D.R.Phelps, Dr. K.Ronald, Dr. A.W. Cross, Prof. R. Carter, Dr. A. Dexter
Textbook: see http://reld.phys.strath.ac.uk/curriculum.htm

Aims and Objectives

This class aims to develop the students understanding of issues associated with ancillary equipment needed in high power RF systems. This will encompass power supplies of DC and pulsed nature, magnets and vacuum systems. The class will also provide a basic overview of issues associated with safety in high voltage systems and where X-Ray production may occur, hazardous substance issues and mechanical safety.

Content and curriculum

- · D.C. and pulsed power supplies.
- · Switched mode power supplies.
- · Control and protection systems.
- · Cooling systems.
- · Magnets.
- · High voltage safety issues and procedures.
- · RF safety issues and procedures.
- · X-ray and radioactive source safety issues and procedures.

· Dangerous substance safety issues and procedures.

· Mechanical safety issues (esp. vacuum systems, antennae and magnets).

Modes of Delivery

The class will occur in a two week intensive course consisting of lectures and tutorials supported by practical and computational coursework.

Pre-requisite: A degree in Physical Science/Electrical or Electronic Engineering or relevent industrial experience
Assessment: Combination of examination and coursework (0.5x(Exam Mark)+0.5x(Coursework Mark))
Examination: see http://reld.phys.strath.ac.uk/curriculum.htm

PH 906: High Power RF systems
Dates:18th-29th April 2005
Lecture Times:15 PG Credits,
Lecturer: Prof. A.D.R.Phelps, Dr. K.Ronald, Dr. A.W. Cross, Prof. R. Carter, Dr. A. Dexter
Textbook: see http://reld.phys.strath.ac.uk/curriculum.htm

Aims and Objectives

The candidates will be expected to develop an understanding of the practical implementation of a range of HPRF systems including communication and RaDAR, particle acceleration for scientific and medical applications, heating and plasma applications. This will include integration of the knowledge gained from the previous modules so that the candidate can specify appropriate components and equipment to create the necessary infrastructure. An appreciation of contractual matters including procurement, testing and training will be developed.

Content and curriculum

· High power aspects of communications systems.

· Electromagnetic compatibility and conformity.

· Radar.

· Medical and scientific particle accelerators.

· High power handling limitations.

· Issues for high Q superconducting cavities.

· Industrial RF and Microwave heating and processing.

· RF&MW plasma processing.

· Biological effects of Microwaves and RF.

· System specification and design.

· Procurement.

· Assembly, tuning and commissioning.

· Customer acceptance and customer training

Modes of Delivery

The class will occur in a two week intensive course consisting of lectures and tutorials supported by practical and computational coursework.

Pre-requisite: A degree in Physical Science/Electrical or Electronic Engineering or relevant industrial experience
Assessment: Examination and Coursework (0.75x (Exam Mark)+0.25x(Coursework Mark))
Examination: see http://reld.phys.strath.ac.uk/curriculum.htm

PH 907: High Power RF Project
Dates: From Xmas break until September
90 PG Credits from 700 Hours of research

Lecturer: Prof. A.D.R.Phelps, Dr. K.Ronald, Dr. A.W. Cross, Prof. R. Carter, Dr. A. Dexter
Textbook: No Specific Textbook

Aims and Objectives

This class will develop the candidates skills in conducting independent research programmes, including defining objectives, design and creation of experimental apparatus/development of theoretical framework and implementation of numerical techniques, investigation of the problem, notekeeping, determining valid conclusions from the process and presentation of the results.

Content and curriculum

·Project to be chosen in conjunction with adviser for studies and (possibly) an industrial collaborator (possibly the students sponsor)

Modes of Delivery

The class will be of approximately 6 months cumulative duration. It will occur within either the research groups at Strathclyde of Lancaster University or at industrial facilities. Where the project is to take place away from the University campus, in addition to an appointed University supervisor, an experienced on-site scientist or engineer will participate in the supervision. The student and academic supervisor will maintain contact by telephone, e-mail and visits.

Pre-requisite: A degree in Physical Science/Electrical or Electronic Engineering or relevant industrial experience
Assessment: Based on coursework and dissertation see http://reld.phys.strath.ac.uk/curriculum.htm, 0.6x(Dissertation Mark)+ 0.2x(Bench Mark)+ 0.1x(Presentation Mark)+ 0.1x(Paper Mark)
Examination: see http://reld.phys.strath.ac.uk/curriculum.htm

PH 908: High Power RF Short Project
Dates:From Xmas Break until end of second semester
30 PG Credits from 250 hours of research
Lecturer: Prof. A.D.R.Phelps, Dr. K.Ronald, Dr. A.W. Cross, Prof. R. Carter, Dr. A. Dexter
Textbook: No Specific Textbook

Aims and Objectives

This class will develop the candidates skills in conducting independent research programmes, including defining objectives, design and creation of experimental apparatus/development of theoretical framework and implementation of numerical techniques, investigation of the problem, notekeeping, determining valid conclusions from the process and presentation of the results.

Content and curriculum

·Project to be chosen in conjunction with adviser for studies and (possibly) an industrial collaborator (possibly the students sponsor)

Modes of Delivery

The class will be of approximately 3 months cumulative duration. It will occur within either the research groups at Strathclyde of Lancaster University or at industrial facilities. Where the project is to take place away from the University campus, in addition to an appointed University supervisor, an experienced on-site scientist or engineer will participate in the supervision. The student and academic supervisor will maintain contact by telephone, e-mail and visits.

Pre-requisite: A degree in Physical Science/Electrical or Electronic Engineering or relevant industrial experience
Assessment: Based on coursework and dissertation see http://reld.phys.strath.ac.uk/curriculum.htm 0.6x(Dissertation Mark)+ 0.2x(Bench Mark)+ 0.1x(Presentation Mark)+ 0.1x(Paper Mark)
Examination: see http://reld.phys.strath.ac.uk/curriculum.htm

APPENDIX 2

Course Regulations

All of the departments courses have written regulations. These regulations are published in the University Calander:

http://www.mis.strath.ac.uk/Secretariat/Publications/general/publications/index.html

APPENDIX 3

Notes on Safety in Laboratories

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 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 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.

APPENDIX 4

STUDENT COMPLAINTS

The University of Strathclyde endeavours to provide all students with an environment that is educationally supportive, fair and intellectually challenging and where services are provided in an efficient and friendly manner. However, we acknowledge that problems can occur from time to time. When they do or when you are not satisfied that we have acted in accord with our policies and standards we would ask you to let us know as soon as possible using the procedures described below.

Policies, Definitions and Standards

Academic Matters

In partnership with each student, the University undertakes to identify and supervise an approved programme of study and to make a fair assessment of each student's performance at each key stage of their programme. Details of specific study and assessment programmes and criteria for assessment are contained in Course Handbooks available from the appropriate Faculty Officer. Academic Departments frequently invite feedback from students through questionnaires and staff/student committees.

Administrative or Academic Support Services

Most departments that provide Administrative or Academic Support Services for students issue a written account of the services they provide. Services are resource limited but each Department aims to provide an efficient and friendly service. Some have published specific performance standards as part of the Administration's Customer Care Programme. All encourage feedback from students as an input to assigning priorities for development.

Discrimination, Harassment or Intimidation

The University is committed to equal opportunities for all students (and staff) no matter their age, gender, disability, race, culture, religious beliefs or sexual orientation. It wishes to maintain a working and learning environment which welcomes diversity and is free from discrimination, harassment and intimidation. It will act on complaints received and encourage education programmes both to develop awareness of the issues allied to an equal opportunities policy and also to identify any systemic barriers to achieving equal opportunities within the University community. An Equal Opportunities Officer has been appointed to work with staff and students to identify training needs, to develop support mechanisms and to monitor implementation of the University's equal opportunities policy. Further information may be obtained from the Equal Opportunities Officer (Ms. Kate Tuck), Personnel Department, McCance Building, Richmond St. (ext. 4457) or Ms. Kirsty O'Brien, Students Association, John St. (ext. 2060).

Procedures

How can you make a Complaint or Appeal against an Academic Decision?

If you are dissatisfied with an academic decision, concerning for example, assessment grades, progress, awards or classification of awards, please ask for an explanation from those providing the Course, or from the appropriate Faculty Officer. If you remain unhappy with the outcome, you may appeal to the Faculty and Senate Appeals Committees by writing to the Faculty Officer or Academic Registrar as set down in Course Regulations published in Course Handbooks and the University Calendar.

If you are dissatisfied with other academic matters or administrative support services in the University please ask for

an explanation from those providing the Course or the Service. The SUSA Vice President (Welfare) may be able to assist you in making initial approaches. If you remain unhappy with the reply given, a formal written complaint may be made to the Head of the Academic or Administrative Department or Service.

If you believe that you are the subject of discrimination or harassment please seek help from a Designated Harassment Adviser or the Student Advisory and Counselling Service or the Students' Association or your Academic Counsellor, or Adviser of Studies, or the University Chaplains. International students can also seek help from the International Students Adviser. If you so decide, a formal written complaint may be made to the Head of the appropriate Academic or Administrative Department.

Should you remain dissatisfied with the response you receive from a Head of Department or Service or if you feel unable to put your case to them you can pursue the matter further:

a) in the case of complaints about academic matters, by writing to the Dean of the Faculty concerned
b) in the case of complaints about services or about discrimination or harassment, by writing to the Secretary to the University.

How will Complaints be dealt with?

You have a right to complain without fear of recrimination and to expect that your formal written complaint will be considered in confidence and fairly by an unbiased reviewer(s). This may be the Head of Department, the Dean or the University Secretary themselves or their nominees. The reviewer may consult with other unbiased advisers as appropriate.

Procedures for academic appeals to Faculty and Senate Appeal Committees are set out in University Regulations set down in the Calendar and Faculty guidelines.

Procedures for complaints about sexual or racial harassment are set out in the University's policy statement available from the Equal Opportunities Officer (Ms Kate Tuck).

For other formal written complaints you will as a minimum be accorded an opportunity to submit written evidence. Depending on the seriousness of the complaint you may also be accorded an opportunity to have a personal interview with the reviewer, and/or to invoke witnesses and/or to have a full hearing in accordance with the principles of natural justice.

The reviewer will investigate your complaint fully; will make an initial response to you within 7 days; will inform you regularly of the progress of investigations and will advise you of the outcome as soon as practicable.

8th June 1994

Mr. P.W.A. West
Secretary to the University

APPENDIX 5

EXAMINATION BOARD DECISIONS AND APPEALS

Whichever method of assessment is used, the results from all your classes are considered by an Examination Board. The Board meets first in June and also, to consider the results of August resit examinations, in September. The Boards of Examiners will take one of the following decisions which will then be notified to you by letter. (Make sure the University has your current address.)

Note that the Board **only** gives decisions relating to your *present* course, so "Withdraw", "Resit" etc. need to be understood in this context. But if you *change* course (for example, to a Pass Degree course) these decisions do not necessarily still apply. Ask for advice from your counsellor or adviser if in doubt.

(a) 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.

(b) 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. However, it is also expected that you will attempt any resit examinations you have, so as not to carry too many outstanding classes into the following year of your degree, but instead make every effort to obtain credits in all your classes.

(c) 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. In the first, second and third years, students can be allowed up to four attempts to pass an examination, but there is no automatic right to the full number of attempts. However, only one attempt is normally permitted in the Final Honours examinations.

(d) 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.

(e) TRANSFER.
A student who does not obtain sufficient passes to meet the requirements for progress on an Honours degree course may be required to transfer to the corresponding Pass Degree in the subject

(f) 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.

Students who are suspended or required to withdraw from Honours courses will receive details of the BSc degree course in Science Studies. Many students have transferred to this degree after failing to meet the progress requirements of the course of their first choice, and have then succeeded in completing a course more appropriate to their needs.

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

(g) AWARD.
A Pass Degree has been awarded.

Appeals
Students who believe they may have grounds for an appeal against the decision of the Board of Examiners may submit an appeal to the Science Faculty Officer, on one of the following grounds:
1. that there were procedural irregularities in the conduct of an examination;

2. that there were medical, personal, or other circumstances affecting the student's performance (supporting documentary evidence, such as medical certificates, should always be provided);
3. that there was inadequate assessment, prejudice or bias on the part of one or more of the examiners or assessors.

Your Counsellor or Adviser will advise you on drafting an appeal, should you feel this to be necessary.

APPENDIX 6

Academic Staff and Research Sta ff with Teaching Responsibilities, their Room Number and e-mail addresses

Academic/Research Staff		Telephone Extension	Room No.	E-Mail Address
ARNOLD Dr Aidan	R	3357	JA 3.06	a.arnold@phys.strath.ac.uk
BADNELL Dr Nigel	A	4176	JA 8.15	n.r.badnell@strath.ac.uk
BARNETT Prof Stephen	A	3457	JA 7.04	steve@phys.strath.ac.uk
BIRCH Prof David	A	3377	JA 6.13	djs.birch@strath.ac.uk
BROWN Dr Ronal	A	3378	JA 8.10	ronal.brown@strath.ac.uk
CROSS Dr Adrian W	A	4210	COL 7.05	a.w.cross@strath.ac.uk
CUNNINGHAM Dr Alex	A	3474	JA 6.05	a.cunningham@strath.ac.uk
DONALDSON Prof Gordon	A	3367	JA 7.06	g.b.donaldson@strath.ac.uk
DUXBURY Prof Geoffrey	A	3271	JA 8.07	g.duxbury@strath.ac.uk
ELLIOT Prof A. T.	VP			
FERGUSON Prof Allister	A	3359	JA 8.19	a.i.ferguson@strath.ac.uk
FIRTH Prof William	A	3269	JA 8.02	willie@phys.strath.ac.uk
HAN Dr Thomas	A	3267	COL 6.10	t.han@strath.ac.uk
JAROSZYNSKI Prof. Dino	A	3057	COL 6.31	dino@phys.strath.ac.uk
JEFFERS Dr John	A	3213	JA 6.09	john@phys.strath.ac.uk
LANGFORD Dr Nigel	A	3077	JA 8.17	n.langford@strath.ac.uk
LOCKERBIE Dr Nicholas	A	3360	JA 8.16	n.lockerbie@phys.strath.ac.uk
MAAS Dr Peter	A	3185	COL 4.12B	p.maas@strath.ac.uk
MARTIN Dr Richard	R	3265	JA 8.30	ricky@phys.strath.ac.uk
MARTIN Dr Robert	A	3466	JA 8.22	r.w.martin@strath.ac.uk
NICHOLSON Dr Phil	A	3263	JA 7.09	j.p.nicholson@strath.ac.uk
O'DONNELL Prof. Kevin	A	3365	JA 8.20	k.p.odonnell@strath.ac.uk
OPPO Prof. Gian-Luca	A	3761	JA 7.01	gianluca@phys.strath.ac.uk
PAPOFF Dr Francesco	A	3178	JA 8.09	papoff@phys.strath.ac.uk
PEGRUM Dr Colin	A	3358	JA 8.12	colin@phys.strath.ac.uk
PHELPS Prof Alan	A	3166	Col. 7.06	a.d.r.phelps@strath.ac.uk
RIIS Dr Erling	A	3490	JA 8.08	e.riis@strath.ac.uk

ROBB Dr Gordon	R	4726	Col 6.29	g.r.m.robb@strath.ac.uk
ROLINSKI Dr Olaf	A	4230	JA 6.12	o.j.rolinski@strath.ac.uk
ROMANS Dr Ed	R	3361	COL 4.12a	cabs34@strath.ac.uk
RUDDOCK Dr Ivan	A	3268	JA 7.05	i.s.ruddock@strath.ac.uk
SCHMIDT Dr Marc	R	4231	JA 3.08	marc.schmid@strath.ac.uk
STEWART Dr Robert	A	3369	JA 8.21	r.s.stewart@strath.ac.uk
SUMMERS Prof Hugh	A	4196	JA 7.08	h.p.summers@strath.ac.uk
TRAGER-COWAN Dr Carol	A	3465	JA 2.08	c.trager-cowan@strath.ac.uk
WYNNE Dr Klaas	A	3381	JA 8.14	k.wynne@strath.ac.uk
YAKUSHEV DR MICHAEL	A	3374	JA .8.23	michael.yakushev@strath.ac.uk

APPENDIX 7

PLAGIARISM

What is plagiarism?
Plagiarism is the copying of another person's words in your own written work, without giving credit to that person. This term is also sometimes used when someone puts forth an idea as his own, without giving the originator of the idea credit for thinking it up. It is equally unacceptable to use someone else's laboratory readings when the lab supervisor asks you to work independently. "Your" results would then falsely imply that you had gained the necessary laboratory experience.

So what?
In the educated world, plagiarism is regarded as a type of intellectual theft – you are taking the credit for someone else's words or ideas.

How can anyone tell if I copy someone else's work?
Most lecturers can tell, by the style, or because they recognise the passage as something they have read before.

What happens if I'm caught?
In an undergraduate course, you may have to write the essay or report over again, possibly on a new topic. You could also be referred to the University's Disciplinary Committee. In a postgraduate course, the penalties could be worse – it could lead to failure to receive a degree, and black-listing from future academic jobs. It's best to avoid the temptation!

I don't intend to plagiarise, but I can't help it – it's the only way I can think of to express these ideas.
Are you sure? Try taking a few notes on the basic ideas and concepts in the paper you are tempted to copy, then put the paper away and write it in your own words. Put in a few concepts and ideas you've picked up from other papers and ideas of your own – there, you've done it! Don't forget to put in references to the sources of these ideas and concepts.

Well, I agree in general, and most of the essay is in my own words, but there are a few places where Ethel Bloggs says it much better than I could ever say it.
If that's the case, you can quote Bloggs directly – just make certain you give her credit. The standard technique is to put Blogg's words in quotation marks, followed by (Bloggs, 1992) and to give a reference list at the end of your essay a more detailed reference to where Bloggs wrote it in the year 1992. If it is a fairly long passage, set the quotation aside from the rest of the text by indenting and using a different typeface. Ask your essay supervisor for help if you are uncertain of the format.

Why are you telling me this?
We occasionally have problems with students who plagiarise part or all of their assignments and (to be charitable) we are not certain that everyone really understands what plagiarism is, how serious it is, and how to avoid it.

This appendix is reproduced from their Student Handbook (with minor amendments) with permission from the School of Pharmacy.

APPENDIX 8

DEPARTMENT OF PHYSICS

Procedures for assessment for the courses in High Power Radio Frequency Science and Engineering

M.Sc. in High Power Radio Frequency Science and Engineering

The assessment for the degree of M.Sc. in High Power Radio Frequency Science and Engineering will normally be based on:

1) The results from the compulsory and approved optional postgraduate level classes undertaken. Any optional classes to be included in the assessment must be approved in advance by the appropriate Adviser of Study. Results from any resit examinations will be capped at 50%
2) When required by the examiners, the results of any oral examination

The examination board will have available to it a composite mark calculated as follows

$$\frac{\sum_{PG}^{180} Mark \times \text{Class Credit}}{180}$$

Where the summation comprises

i) The project PH907
ii) The best four marks from the primary classes of the course, PH901-906
iii) The best marks from the other primary or approved optional postgraduate classes to give a total summation over 180 credits. If, in order to incorporate the candidates best marks from this category of classes the summation of the credit total for this category exceeds 30 then the weakest class to be included will have its credit weighting reduced in the formula appropriately.

NOTE:

The award of the degree of M.Sc. is subject to the candidate having fulfilled the requirement of obtaining a total of at least 180 SHE Level 5 credits including 60 from PH901-906 and 90 from PH907. Candidates who fail to satisfy the requirements for the degree of M.Sc. will be assessed against the requirements for the Postgraduate Diploma

Rules for distinction

If a candidate achieves a composite mark of 70% and achieves a mark of 70% in the class PH907 then they may be considered for the degree of M.Sc. with Distinction

Pg.D. in High Power Radio Frequency Science and Engineering

The assessment for the Postgraduate Diploma in High Power Radio Frequency Science and Engineering will normally be based on:

1) The results from the compulsory and approved optional postgraduate level classes undertaken. Any optional classes to be included in the assessment must be approved in advance by the appropriate Adviser of Study. Results from any resit examinations will be capped at 50%
2) When required by the examiners, the results of any oral examination

The examination board will have available to it a composite mark calculated as follows

$$\frac{\sum_{PG}^{120} Mark \times \text{Class Credit}}{120}$$

Where the summation comprises either

The project PH907 and the best two marks from the primary classes of the course PH901-906

or,

i) The project PH908,
ii) The best four marks from the primary classes of the course, PH901-906
iii) The best marks from the other primary or approved optional postgraduate classes to give a total summation over 120 credits. If, in order to incorporate the candidates best marks from this category of classes the summation of the credit total for this category exceeds 30 then the weakest class to be included will have its credit weighting reduced in the formula appropriately.

NOTE:

The award of the Postgraduate Diploma. is subject to the candidate having fulfilled the requirement of obtaining a total of at least 120 SHE level 5 credits (including 60 from PH901-906 and 30 from PH908 OR 30 from PH901-906 and 90 from PH907). Candidates who fail to satisfy the requirements for the Postgraduate Diploma will be assessed against the requirements for the Postgraduate Certificate.

Rules for distinction

If a candidate achieves a composite mark of 60% and achieves a mark of 60% in either the class PH907 or the class PH908 then they may be considered for the Postgraduate Diploma with Distinction.

Pg.C. in High Power Radio Frequency Science and Engineering

The assessment for the Postgraduate Certificate in High Power Radio Frequency Science and Engineering will normally be based on:

1) The results from the compulsory and approved optional postgraduate level classes undertaken. Any optional classes to be included in the assessment must be approved in advance by the appropriate Adviser of Study. Results from any resit examinations will be capped at 50%
2) When required by the examiners, the results of any oral examination

The examination board will have available to it a composite mark calculated as follows

$$\frac{\sum_{PG}^{60} Mark \times \text{Class Credit}}{60}$$

Where the summation comprises

i) The best marks from PH901-908 to a total of 30 credits

ii) The best marks from the other primary or approved optional postgraduate classes to give a total summation over 60 credits. If, in order to incorporate the candidates best marks the summation of the credit total exceeds 60 then the weakest class to be included from this category will have its credit weighting reduced in the formula appropriately.

NOTE:

The award of the Postgraduate Certificate. is subject to the candidate having fulfilled the requirement of obtaining a total of at least 60 SHE Level 5 credits, including at least 30 from PH901-908.

Rules for transfer between the M.Sc., Pg.D. and Pg.C. in High Power Radio Frequency Science and Engineering

Candidates for the degree of M.Sc.

If at the end of the taught element of the course the candidate has accumulated no more than 60 credits (including at least 45 from PH901-906) then, in consultation with the adviser of studies, they may have their registration transferred to the Pg.D., they will be permitted to complete the project PH907 for the Pg.D. in one year and retaining the possibility (by consultation with the adviser of study and at the discretion of the board of study, acting on behalf of senate and on the advice of the board of examiners, to defer award) of resitting classes to attain the M.Sc. in two years

If at the end of the taught element of the course the candidate has accumulated no more than 45 credits (including at least 30 from PH901-906) then they will have their registration transferred to the Pg.D. and will be permitted to complete the project PH907 for the Pg.D. in one year and retaining the possibility (by consultation with the adviser of study and at the discretion of the board of study, acting on behalf of senate and on the advice of the board of examiners, to defer award) of resitting classes to attain the M.Sc.

If at the end of the taught element of the course the candidate has not attained at least 30 credits from PH901-906 then they will have their registration transferred to the Pg.C. and will be required to complete the project PH908 for the Pg.C. in one year and retaining the possibility (by consultation with the adviser of study and at the discretion of the board of study, acting on behalf of senate and on the advice of the board of examiners, to defer award) of resitting classes to attain the Pg.D. in two years

Candidates for the Postgraduate Diploma

If at the end of the taught element of the course the candidate has accumulated at least 90 credits (including at least 60 from PH901-906) then, in consultation with the adviser of studies, they may have their registration transferred to the M.Sc., they will be permitted to complete the project PH907.

If at the end of the taught element of the course the candidate has accumulated at least 30 credits from PH901-906 then they will be counselled to complete the project PH907 for the Pg.D. in one year and retaining the possibility (by consultation with your adviser of study and at the discretion of the board of study, acting on behalf of senate the on the advice of the board of examiners, to defer award) of resitting classes to attain the M.Sc.

If at the end of the taught element of the course the candidate has not attained at least 30 credits from PH901-906 then they will have their registration transferred to the Pg.C. and will be required to complete the project PH908 for the Pg.C. in one year and retaining the possibility (by consultation with the adviser of study and at the discretion of the board of study, acting on behalf of senate and on the advice of the board of examiners, to defer award) of resitting classes to attain the Pg.D. in two years

Candidates for the Postgraduate Certificate

If at the end of the taught element of the course the candidate has accumulated at least 90 credits (including at least 60 from PH901-906) then, in consultation with the adviser of studies, they may have their registration transferred to the M.Sc., they will be permitted to complete the project PH907.

If at the end of the taught element of the course the candidate has accumulated at least 30 credits from PH901-906 then they will be counselled to transfer registration to the Pg.D. and complete the project PH907 for the Pg.D. in one year and retaining the possibility (by consultation with the adviser of study and at the discretion of the board of study, acting on behalf of senate and on the advice of the board of examiners, to defer award) of resitting classes to attain the M.Sc.

If at the end of the taught element of the course the candidate does not accumulate at least 30 credits including at least 15 from PH901-906 then their registration may be terminated.

APPENDIX 9

GRADUATION

What is Graduation?
The University holds Degree Congregations each year at which students graduate with degrees of the University. Until you have graduated, in person or "in absentia", you are not entitled to call yourself a graduate. For consideration for many types of employment, it is necessary to be able to show your degree certificate, presented to you at Graduation.

When are the Degree Congregations?
July and November in the Barony Hall. The dates and times for your degree ceremony will be announced in March.

Registration for Graduation

Who should register to Graduate?
All students hoping to graduate should register using the form available from Registry. Registration is essential even if you want to graduate "in absentia" (i.e. the degree is conferred in your absence).

You cannot graduate twice with any degree. If you expect to qualify for a Pass Degree this year, but hope to go on to Honours, you should consider deferring graduation until your Honours Year. Students who graduate with a Pass Degree and then qualify for an Honours degree may apply for a Post-Graduation Honours parchment setting out the subject and class of Honours awarded. No registration fee is required for Post-Graduation Honours.

When do I need to register?
As soon as the forms become available in March. Do not wait until you have sat your examinations or until your award is approved - that will be too late. The deadlines for registration this year are late April for July graduations and late August for November graduations.

What are the fees?
The fees change each year, but for example in 2002 the Graduation fee was £30 or £15 for those graduating "in Absentia": The fee includes your subscription to the Graduates Association and a small charge for administration. The hire charges for the appropriate hood and gown are about £30.

How do I graduate "in absentia"
Your degree will be conferred "in absentia" if you wish (tick the appropriate box on the form). Your degree parchment will be sent to the address given on your graduation form 2-3 weeks after the ceremony.

What happens if I do not qualify in time for graduation?
If you have registered to graduate in July but you do not qualify for the degree in time, Registry will assume that you will graduate "in absentia" at the November ceremony; similarly if you register for November but do not qualify in time your registration would be deferred to July.

Debtors
If you owe the University money for any reason (fees, rent, library fines) you will not be permitted to graduate. You should clear any debts with Finance Office or the Library immediately.

Graduation Day

If you have registered to graduate by the appropriate date and have qualified for the award of the degree, Registry will send you information in the week before Graduation. This will include tickets for two guests to attend the ceremony.

What do I wear?
The correct academic dress (i.e. the gown and hood appropriate to your degree), otherwise you will not be permitted to graduate. The University does not provide gowns, but they can be hired.

Male graduands are expected to wear a dark suit, with a white shirt and dark tie. Female graduands are expected to wear a dark skirt and white blouse or a white or dark dress. If you wish, a recognised national dress (including the kilt) may be worn.