The University Of Sheffield.

Department Of Physics & Astronomy.

Second Year Information 2011-2012

THE SECOND YEAR PROGRAMMES

The second year programme forms the central part of your degree. It consists mainly of core modules, which build on the material introduced in the first year, so that on completion you will have at your disposal the knowledge needed to tackle the more specialised content of the final years. As usual, the academic year is divided into two semesters, each with a formal examination period and all the work done in each semester will be completed and examined at the end of that semester. The combination of laboratory work, homework assignments and the need to prepare for the examination means you will have to organise your work schedule very carefully to make sure you keep up with the progress of the course and meet all the relevant deadlines.

Unlike the first year, your second year performance does contribute directly to your final degree class. The BSc classification is determined from the weighted average of the second and third year marks in the ratio 1:2, and the MPhys classification from years 2, 3, and 4 in the ratio 1:2:2. Furthermore, if you are registered for the MPhys degree, you must achieve a mean mark of at least 55% in your second year. If you do not, you will be required to change to the BSc. It is particularly important, for both these reasons, that you achieve your full potential in the second year modules. In particular, **resit marks are capped at 40%**, however well you perform in the resit exam – so it is very much in your interests to pass everything first time! If you fail modules on the resits in August you may be required to retake the failed modules next year and the marks will still be capped at 40%. You will not be able to repeat the whole year but only the failed modules. More information about the University of Sheffield regulations can be found on: http://www.shef.ac.uk/calendar (see, in particular, link to 'Downloads: General Ordinances and Regulations for 2011-12').

THE SECOND YEAR PHYSICS PROGRAMME

The second year programme is made up entirely of 10-credit modules. **All** second year students on single Honours Physics must **take ten core Physics modules**. Students on Dual Honours Physics courses must take **seven core Physics modules.** (In Dual Honours with Maths or Philosophy, one of these is actually taken in the third year, for timetabling reasons.)

PHY202	Quantum Mechanics	(Autumn)
PHY203	Thermal Physics	(Autumn)
PHY204	Solid State Physics	(Spring)
PHY205	Electromagnetism	(Spring)[1]
PHY206	Atomic Physics and Relativity	(Spring)
PHY221	Topics in Classical Physics	(Autumn)[2]
PHY226	Mathematical Methods for Physics & Astronomy	(Autumn)
PHY227	Optics	(Spring)[2]
PHY230	Experimental Physics 1	(Autumn)[3,4]
PHY231	Experimental Physics 2	(Spring)[3,4]

Notes

1. Taken in third year by Dual Physics/Maths and Physics/Philosophy.

2. Not taken by Dual Honours students.

3. Dual Honours students take *one* of these (which one depends on programme); Theoretical Physics students should take PHY225 (Programming in C, Autumn) and PHY207 (Numerical and Computational Physics, Spring) instead of PHY230 and PHY231. PHY230 and PHY231 are optional modules for Theoretical Physics students.

4. PHY207 Numerical and Computational Physics and PHY225 Programming in C are compulsory for Theoretical Physicists.

Single Honours Physics students must take 20 further credits from a list of approved options, including physics, computer programming, astronomy and medical physics. MPhys students *must* take PHY225 Programming in C. Dual Honours students have no choice of modules within physics, since it is essential that the core physics curriculum is fully covered at this level. Both PHY207 and PHY225 are compulsory for theorists whereas they are both optional for BSc Physics and PHY207 is optional for the MPhys. Theorists have two optional (20 credit) modules in this year that they can choose from 13 courses that are taken from Astronomy, Medical Physics, Physics and Mathematics. For more information, see Undergraduate regulations for the Department of Physics and Astronomy: http://www.governance.dept.shef.ac.uk/Science/p-ug-phy.pdf

OUTLINE STRUCTURE OF SECOND YEAR PHYSICS MODULES

The experimental work in second year is organised as two separate modules (PHY230 and PHY231). The end-of-semester examination carries significant (70%) weight in the taught modules, while the experimental modules (PHY230 and PHY231) are assessed entirely by coursework. PHY207 Numerical and Computational Physics is assessed by coursework and progress tests. The deadlines for all coursework are rigorously enforced and attendances at lectures and other classes noted. Late submissions of the coursework including lab work will be penalised.

It is essential that you attend the Introductory and the Laboratory meeting, which will take place at 3-5 p.m. on Monday, 26 September 2011, starting in LT06 in Dainton building, Chemistry Department (not the Hicks building!) and moving at some point to the Second Year Laboratory (E32 in Hicks building).

Important information will be given to you at the meetings concerning the Year structure, coursework, timetable and arrangements for the laboratory.

Apart from the lab modules, other modules are lecture-based, with each 10-credit module having two lectures per week. The core lecture courses are supported by **tutorials, homework** and **problem classes,** of which the last two count towards the assessment. It is essential that you complete all this coursework. This is required of you under the University of Sheffield Students' Charter. If you fail to complete the assessed course work for a module in which the course work comprises 30% of the module mark, you should get a **minimum grade of 57%** in the end-of-semester examination in order to obtain the module **pass mark of 40%.** Past experience has shown that there is a strong correlation between failing to hand in coursework and failing the module completely. If you find yourself failing to hand in work, you should discuss this with the 2nd Year tutor as a matter of urgency.

Tutorials

You will be assigned a tutor at the beginning of each semester. It is your responsibility to arrange a time for your tutorial with your tutor in the first week of the semester.

Tutorial sessions are at weekly intervals throughout both semesters, starting in week 2 of each semester. These tutorials will either involve you in solving problems, preparing material on specific topics or discussing chosen aspects of your coursework. You will be expected to contribute fully in these sessions, and to have put in sufficient preparatory work. You will be expected to talk to your group and use the board. The tutorials are aimed at helping you with the course, and in developing your communication and presentation skills.

Tutorials are compulsory. If you cannot attend a tutorial for any reason, you must see your tutor immediately.

Problem Classes

In addition to tutorials, there will be 8 problem classes per semester. The aim of these is to develop problem solving skills and understanding, by tackling the problem sheets associated with the courses. There are two problem classes in each of the core subjects (i.e. PHY202, 203, 221, 226, 204, 205, 206 and 227), and they contribute 10% to the marks for these modules.

The assessment for problem classes works as follows:

Prior to a problems class the course lecturer will give you the problem sheet. Ideally, you should attempt the problems before the problem class session. You should attempt to answer all the problems at the problems class. You should seek help when necessary. The academic member of staff taking the problem class (and their assistant) are there to provide as much help as required – you should make as much use of this help as you can. You should then hand in neat solutions at the following problem class session for marking. **Late submission of the problem class work is not accepted**. Clearly, if you attend all the problem classes, and make use of the help available to fully answer the set questions you can obtain the full 10%.

Homework Exercises

The purpose of the homeworks is to provide practice in applying the ideas and concepts met in the lectures. This will enhance your problem-solving skills which are a critical part of your training as a physicist. It is also useful practice for the numerical parts of the end-of-semester examination questions.

A timetable of all the homework exercises will be given out in week 1. All homework exercises must be handed in to the G12 Office on or before the deadline announced by the lecturers and given in the timetable. Late submission will be penalised. You will need **YOUR** official cover sheet, which will have already your UCard number coded, to allow the exercise to be marked anonymously in accordance with University guidelines. Please, see http://www.shef.ac.uk/physics/teaching/ for guidance on the coursework submission. The homeworks contribute 20% to each module mark.

Assessment of Modules

Except for the case of those modules where special arrangements apply (such as PHY207, PHY225, PHY230, PHY231), the assessment of all the other taught modules is on the following basis:

End of Semester Examination 70% + Homeworks 20% + Problem Classes 10%.

Resit Examinations

As explained in the main part of the Undergraduate Guide it is generally not possible to resit course work (the few exceptions are listed at the end of this note). Hence if you fail to complete any of the course work for a module in which the course work comprises 30% of the module mark, you face having to achieve a **minimum grade of 57%** in the resit examination in order to obtain the module **pass mark of 40%!**

It is therefore very much in your interest to attempt all homeworks and attend all problems classes.

THE SECOND YEAR ASTRONOMY PROGRAMME

ALL second-year students on the Dual Honours Astronomy courses must take all five second-year astronomy modules and PHY226 (10 credits each, three modules per semester):

PHY213	Stellar Structure and Evolution	(Autumn)
PHY216	Galaxies	(Spring)
PHY217	Astronomical Techniques	(Autumn)
PHY226	Mathematical Methods for Physics & Astronomy	(Autumn)
PHY229	Extrasolar Planets and Astrobiology	(Spring)
PHY232	The Dynamic Interstellar Medium	(Spring)

PHY226 is the same module that is listed in the Physics programme. It is designed to equip you with the mathematical techniques you will need to tackle the rest of your degree programme.

OUTLINE STRUCTURE OF SECOND YEAR ASTRONOMY MODULES (PHY213/216/217/229 & 232)

The second year astronomy modules are all lecture-based. Most are assessed primarily by end-of-semester examination, with a coursework component accounting for 20−30% of the total module mark. The coursework takes a variety of forms:

Homework Exercises (PHY232)

The purpose of the homework is to provide practice in applying the ideas and concepts met in the lectures. This will enhance your problem-solving skills: a critical ingredient of your training as an astronomer and also one of the primary reasons why physical science graduates are valued by employers. It is also useful practice for the numerical parts of end-of-semester examination questions.

All homework exercises must be handed in to G12 on or before the deadline announced by the lecturer. Late submission will be penalised. You will need **YOUR** official cover sheet, which will have already your UCard number coded, to allow the exercise to be marked anonymously in accordance with University guidelines. Please, see http://www.shef.ac.uk/physics/teaching/ for guidance on the coursework submission.

Essay (PHY216)

Essay assignments are intended to develop your ability to retrieve information from a variety of sources and distil your findings into a concise, accurate and well-written report. These are essential skills which you will use repeatedly in your later career, whether in astronomical or physical research, industry, commerce or the public sector.

Detailed instructions regarding the essay titles, style, word limits, deadlines and so on will be provided by the lecturers concerned, but here are a few general guidelines:

- Read the brief. Adjust your writing style and the level of technical detail according to the audience you are asked to address: a magazine article for the educated layman is different from an essay aimed at your fellow second-year students, and different again from a professional review article for specialists in the field.

- Do not plagiarise. If we find that your essay has been copied, either word for word or with minor rephrasing, from another source, you will be given a zero grade and a formal note will be placed on your student record. Intellectual theft of this kind is illegal, dishonest, unethical and simply wrong. Details about what exactly constitutes plagiarism, and how to avoid it, can be found on the Department's website at http://www.shef.ac.uk/physics/teaching.html (click on "Plagiarism and Collusion").

- Do not simply list facts. Your essay needs to have a coherent structure and a good flow: the more lively and interesting it is, the better. Marks will be given for originality of treatment (within the limits of the brief) and for evidence of critical thought and judgment.

- Proof-read! You will be assessed on your mastery and clear exposition of the subject material, but also on your writing and presentation skills. Bad grammar and spelling will be penalised: so will presentational flaws such as poor or uncaptioned illustrations, misplaced page breaks, and inept typesetting. If you use Word, learn how to use the equation editor.

- Meet the deadline. Late submissions will be penalised.

Laboratory work (PHY213/229 & 232)

Three of the astronomy modules have an associated lab – PHY213, PHY229 and PHY232. In the first semester, you will be expected to attend the astronomy lab for approximately 3 afternoon sessions, as well as completing the observing practical – see below. In the second semester, you will be expected to attend the astronomy lab for approximately 6 sessions. This weighting towards the second semester has been deliberately introduced to balance the fact that most of the dual astronomy students will be doing physics labs during the first semester.

The topics of the lab exercises are loosely linked to the material of the taught course, but – as with the first year course and the second year physics laboratory – the aims of the lab are more geared towards the development of specific skills in problem solving, data analysis and presentation of results than simply to illuminating the taught material. The course lecturer will be on hand in the lab to assist you with any problems you encounter.

The lab exercises will be assessed largely on the basis of your written reports. It is important to emphasise that we require a full formal report, not just a lab diary or a collection of notes.

Guidelines on report writing and error calculations are available in the lab; here are a few basic principles:

- The report should be properly structured, with a brief introduction describing the general background and motivation, followed by sections on theory (if applicable), method, analysis, results and conclusions.

- All numerical results must include full consideration of errors, which must be properly carried through any calculations. You should explain the source(s) of error and justify the numerical estimates you have made. A number of good books on this subject exist, e.g. Les Kirkup's Experimental Methods (John Wiley, 1994) and Louis Lyons' Data Analysis for Physical Science Students (Cambridge Univ. Press, 1991).

- You should think carefully about how to present your data in the most effective way. Graphical presentation is usually best where possible, although you may wish to include the source table of measurements as an appendix for reference. Graphs should be properly labelled (axis labels, scale, units, title, legend or key); data points should have error bars; fits to data should be explained and errors on fit parameters calculated.

- There will be bonus marks for developing the practicals beyond the instructions in the lab sheets. The more initiative you can show, the better.

Observational work (PHY217)

As part of PHY217 you will be expected to complete a simple observational project using the telescopes on the roof of the Hicks building. These projects are designed to give basic hands-on experience of astronomical observing and can be completed in only a few hours of telescope time. You are encouraged to design your own projects, but it is important to **discuss the scientific suitability with the course lecturer before starting your planning!** If you can't think of a project, the course lecturer will be happy to recommend some options. The deadline for choosing a project is **Friday, 7 October 2011**. If you have not chosen a project by then, a project will be assigned to you!

There are 3 aspects to the observing practical, which counts 20% towards your overall grade for this module:

1. **Planning**: talk to the course lecturer to discuss which object(s) to observe, what the conditions need to be, whether or not you want to (or should) use filters (and if so, which filters), how to determine your exposure times, etc. You will need to include a section on your planning in the final report.

2. **Data acquisition**: To ensure the availability of staff and equipment, you will be required to attempt your observations in a specified period, which will be announced during lectures. Sign-up sheets covering this period will be posted on the Astronomy notice board outside the astronomy teaching laboratory.

   Note that in principle all of Mondays through Fridays are available!

   Although you should be able to complete all your observations in a single session, to allow for the vagaries of the British weather we expect that all students should sign up for **at least** two evenings per week until they have successfully completed their observing. If you cannot do this, you **must** discuss the problem with the lecturer **before** the start of the designated observing period, or as soon as the problem (e.g. illness) becomes apparent. We advise completing the observations as soon as possible: if the weather seems to be clear and settled at any time in the first week, make a special effort to sign up. Attendance at the observing is compulsory – you will not receive any marks for the practical if you fail to show up or, if the weather is bad for part of the specified observing period, you have not shown much initiative to sign up for other time slots. Make arrangements with Paul Kerry for the night(s) you want to observe. Only if the entire period is unusable, or if you have genuinely serious reasons as to why you could not do the observations (up to the discretion of the teaching staff), will this component not count towards the final mark. In all other cases, you must also include a narrative on the observations (conditions, time/date, settings used, etc.).

3. **Analysis and report**: After you have obtained your observations, you will need to work them out, analyse and interpret them, using the computers and software available in the astronomy teaching laboratory. Obviously, this will form the major part of your final report. Please follow the same style as for a formal laboratory report. **Submission deadline: Thurs, 15 December 2011, 15:30** to the departmental office (G12).

Problem classes

There will be one astronomy problem class each week. Each class will be devoted to one of the astronomy modules being taught in that semester, following a timetable set by the year tutor at the start of the semester. The aim of the problem classes is to develop problem solving skills and understanding by tackling problem sheets associated with the courses. Three members of staff will be on-hand to provide assistance during the classes. **Attendance at the classes is compulsory for dual astronomy students**. Single Honours students taking one or more astronomy modules as options are not required to attend problem classes, but are encouraged to do so.

SUMMARY OF SECOND YEAR MODULES AND RESIT REGULATIONS

The following table summarises the Second Year Physics and Astronomy modules. It lists the course work components and identifies which of these components it is possible to resit.

Module	Credits	Exam	Course work	Resit of course work
PHY202 Quantum Mechanics	10	70%	Problem classes 10%, Homeworks 2x10%	No resit of coursework
PHY203 Thermal Physics	10	70%	Problem classes 10%, Homeworks 2x10%	No resit of coursework
PHY204 Solids	10	70%	Problem classes 10%, Homeworks 2x10%	No resit of coursework
PHY205 Electromagnetism	10	70%	Problem classes 10%, Homeworks 2x10%	No resit of coursework
PHY206 Atomic spectra and Relativity	10	70%	Problem classes 10%, Homeworks 2x10%	No resit of coursework
PHY207 Numerical and Computational Physics	10	0%	Computing projects (lab) 50%, formal assessments 2x25%	Resit of assessments and projects possible
PHY213 Stellar Structure and Evolution	10	80%	Lab 20%	No resit of coursework
PHY216 Galaxies	10	80%	Essay 20%	Resit of essay possible
PHY217 Techniques of Observation	10	80%	Observing practical 20%	No resit of observing practical
PHY221 Classical Physics	10	70%	Problem classes 10%, Homeworks 2x10%	No resit of coursework
PHY225 Programming in C	10	35%	Labs 15%, Formal Assessments 2x25%	Resit of assessments possible
PHY226 Mathematical methods for Physics and Astronomy	10	70%	Problem classes 10%, Homeworks 2x10%	No resit of coursework
PHY227 Optics	10	70%	Problem classes 10%, Homeworks 2x10%	No resit of coursework
PHY229 Extrasolar planets and Astrobiology	10	80%	Lab 20%	Resit of coursework possible
PHY230 Experimental Physics I	10	0%	100% lab work	No resit possible
PHY231 Experimental Physics II	10	0%	100% lab work	No resit possible
PHY232 The dynamic interstellar medium	10	70%	Lab 20%, problem sheets 10%	No resit of coursework