



The
University
Of
Sheffield.

Department
Of
Physics &
Astronomy.

Physics Foundation Year Guide

2011-2012

Dr. Davide Costanzo
Room D27 Hicks Building
Tel: 0114 2224549
Email: d.costanzo@sheffield.ac.uk

Mr. Simon Gray
Room F42 Hicks Building
Tel: 0114 2224350
Email: simon.gray@sheffield.ac.uk

Welcome!

Dear Foundation Year Student

Welcome to Sheffield and its Physics & Astronomy Department! We'd like to take this opportunity to wish you well for the forthcoming year's study. Physics is a subject that you may not have studied in depth before. Consider this as a challenge rather than something of which to be fearful. Many of the everyday items around you have their origins in Physics. For example, your toaster, camera, TV, radio, CD player, CD disks and computers were all invented and developed as a result of fundamental understanding of the physics of electricity, magnetism, optics, gravity and other phenomena.

I hope our course makes some impact on you and that you succeed in identifying its relevance to the world we live in. Also, we hope you find the Physics & Astronomy Department and its staff friendly and approachable – if you have any problem, please do not hesitate to discuss it with us. Read the enclosed brief guide, work hard and above all, enjoy the opportunity to learn something new or to regenerate old thoughts before embarking upon your actual degree programme next year.

Physics lectures start on the first Wednesday of term, and continue according to the timetable below.

Best wishes,

Dr. Davide Costanzo
Foundation Year Co-ordinator and Head of Foundation Year Lab

Mr. Simon Gray
Foundation Year Lecturer

Course Structure

The Foundation Year Physics Course is called PHY008. All teaching is done within the Hicks building, so room numbers e.g. D17) and lecture theatres (e.g. LT3) are here. The module contains lectures and laboratory classes as indicated below. Attendance at all lectures and laboratory classes is compulsory.

Lectures are 50 minute sessions in which the lecturer presents information about a particular topic and illustrates the information with examples and applications.

The **lab class** aims to teach you skills of experimental physics. These skills include being able to write a technical report and understanding errors and uncertainty. These are the same important skills that you will need for your degree whether it is in science or engineering. Your laboratory work will be assessed and by working hard you can gain good marks towards your final foundation year grade.

In addition there will be one Physics **help session** every week, when you will be able to discuss physics course issues and problems with your lecturer. These will be held in F42.

Semester one (Autumn)

Lecture Course 1: Kinematics & Dynamics 12 lecture course

Lecture Course 2: Electricity and Magnetism 12 lecture course

Lecture Course 3: Thermal Physics 12 lecture course

Laboratory Class: Fundamentals of Experimental Physics: two 3 hour sessions on Tuesdays 14.00--17.00 Hicks D17. Students will be divided in two groups and will attend the laboratory sessions on alternate weeks:
Group 1: 25/10/2011 and 15/11/2011
Group 2: 1/11/2011 and 22/11/2011

Physics help sessions: Wednesday 11.00 – 12.00, Hicks F42

Semester two (Spring)

Lecture Course 4: Atomic & Nuclear Physics 12 lecture course

Lecture Course 5: Oscillations, Waves and Optics 12 lecture course

Lecture Course 6: Properties of Matter 12 lecture course

Laboratory Class: Fundamentals of Experimental Physics: two 3 hour sessions on Tuesdays 14.00--17.00 Hicks D17. Students will be divided in two groups and will attend the laboratory sessions on alternate weeks:
Group 1: 13/3/2011 and 27/3/2011
Group 2: 6/3/2011 and 20/3/2011

Physics Help sessions: **Wednesday 11.00 – 12.00, Hicks F42**

Assessment

Assessment is performed by formal examination, homework's and laboratory class performance as follows:

Formal examination in January 2012	35 points
Formal examination in May/June 2012	35 points
Laboratory class performance	20 points
Problem class work (2 per lecture course)	10 points

You can see that the dominant contribution is from the two three hour exams. The course pass mark is 40 points out of the 100 listed above. This mark is easily attainable if you work hard, attend lectures, the lab, the help sessions and complete assessed assignments on time.

Lab class assessment

During the year, you will perform 4 experiments. You will be required to write detailed experimental reports for all these experiments (2 per semester). See the next section for more on these reports; the deadlines for submission of these reports are given in the *Assessment deadlines* section below. Each report will be graded out of 5 on the script, which will also include helpful critical and formative comments. The mark scheme is

0	Report not submitted
1	Poor data, description and analysis
2	Good quality data lacking clear description and analysis
3	Good quality data described clearly (lacking full analysis)
4	Good quality data described clearly with full analysis
5	Outstanding description and analysis of good quality data

The lab report marks are then added to your exam and homework mark, so a perfect laboratory performance would result in 20 points in all.

Homework assessment

There will be two homeworks per lecture course (for example, in semester one there will be two homeworks for Dynamics, two for Electricity and Magnetism and two for Thermal Physics). Questions will be handed out one week prior to the deadline. The schedule is given in the *Assessment deadlines* section below. A total of 10 points is awarded for the 12 problem classes set throughout the year.

Assessment deadlines

Lab reports should be submitted to the Hicks reception in the Hicks building room G12 by 4pm of the following days. You need to attach a unique coversheet downloadable from <https://sciencecoversheet.group.shef.ac.uk/>

- 1) 11/11/2011
- 2) 16/12/2011
- 3) 23/3/2012
- 4) 11/5/2012

Homeworks should be handed in on Fri at 10:00 before the start of the lecture.

- | | |
|----------------------------------|------------|
| 1) Kinematics and Dynamics | 14/10/2011 |
| 2) Kinematics and Dynamics | 28/10/2011 |
| 3) Electricity and Magnetism | 4/11/2011 |
| 4) Electricity and Magnetism | 18/11/2011 |
| 5) Thermal Physics | 2/12/2011 |
| 6) Thermal Physics | 9/12/2011 |
| | |
| 7) Atomic and Nuclear Physics | 17/2/2012 |
| 8) Atomic and Nuclear Physics | 2/3/2012 |
| 9) Oscillation Waves and Optics | 16/3/2012 |
| 10) Oscillation Waves and Optics | 23/3/2012 |
| 11) Properties of Matter | 27/4/2012 |
| 12) Properties of Matter | 11/5/2012 |

NB In addition to Physics, you will also take courses in Chemistry and Mathematics. You must pass ALL courses in order to progress into your first year of a degree programme in September 2011.

Foundation Year Laboratory Reports

The assessed laboratory reports should consist of between 4 - 8 pages including all diagrams, graphs and text. The reports are assessed primarily on scientific content and clarity, although some credit will be given for presentation.

When we assess the reports (see the previous section), we'll write as many comments as are necessary on your script in order to give you useful feedback for your next lab report. Don't expect to submit a perfect report the first time; take note of the comments in an attempt to improve each time.

The recommended format for a lab report is as follows:

- o **Title, name, date etc.**
- o **Aim(s) of the experiment**
What was the purpose of the experiment?
- o **Background/introduction**
Try to look up some introductory information about the experimental topic e.g. sound velocity - what is sound? What are sound waves? No more than one page is required to introduce the topic.
- o **Method**
Describe **in your own words** what you did and how you set up the experiment. Draw diagrams to illustrate the experiment. Mention any problems you encountered. Write the report as if one of your colleagues is going to read it in order to learn what you did.
Do not copy out the instruction sheets - you'll gain no credit for doing this.
- o **Results/observations/error discussion**
Describe your results, include data tables, graphs and equations etc. and mention if you believe that the result(s) you have obtained are sensible or not. Try to find a text-book value of the quantity you have measured for comparison. Don't worry about a rigorous mathematical treatment of errors, **but** do think about the sources of errors in the experiment and write down what they are and how they may affect the result(s).
- o **Summary/conclusions**
Summarise the outcome of the experiment. Did it work? Is the result obtained satisfactory? Is there one modification that could significantly improve the experiment's accuracy?

Recommended Books

There are a lot of textbooks which cover physics at this level. If you already have a textbook I am happy to have a look and tell you if it will do. Remember that we do not use calculus, so nor should the book.

Two we recommend are:

Advanced Physics, S. Adams & J. Allday, published by Oxford;

Physics (7th edition), Cutnell & Johnson, published by Wiley.

The latter has been through several editions, and these earlier ones are fine if you can find them second hand. Both books may be cheaper second hand and may be available in the University or from suppliers such as Amazon.