University of Glasgow | School of Physics & Astronomy

PHYS4009: Physics 3 Honours Lab Guide

Laboratory Class Information Guide 2023-24

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1 Welcome statement from Head of School

As the Head of School of Physics and Astronomy, I would like to welcome you to your new class. The School prides itself in providing an excellent and supportive learning and teaching environment that is fully integrated with our research; you will have the opportunity to interact with world-leading researchers working at the cutting edge of a wide range of fields of physics and astronomy, who are tackling some of the biggest contemporary challenges in science and technology.

Having said that, this year is going to be "interesting" to say the least, due to the uncertainties caused by the coronavirus pandemic. We will all be in learning mode this year. Staff will be undertaking a great deal of work in preparing teaching materials to be used in a blended learning approach that is flexible enough to work in different scenarios. We are confident that the current challenges present us with opportunities to re-evaluate and improve how we learn and teach, and for this you will play a critical role. I ask that you not only bear with us in these extraordinary circumstances, but engage with us through any of the available communication channels in letting us know what works and what does not.

One thing that will not change is the School's firm commitment to supporting equally the careers and development of all its students and staff, as exemplified by our receipt of an Athena Swan Silver award. We value the diversity of our student body and recognise that this diversity improves the quality of our work by bringing a wide range of skills and viewpoints. We therefore expect that all staff and students will work productively and professionally together in an atmosphere of mutual respect.

To support this, all our staff and graduate students undertake equality and diversity training, our lab guides include a code of conduct for students, supplementing the University code[1], and we support the University's Dignity at Work and Study policy[2]. You can be assured that any instances of bullying, harassment, or offensive language or behaviour will be both taken

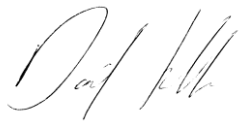
[1] University of Glasgow - MyGlasgow - Academic Policy & Governance - Student Contract

[2] https://www.gla.ac.uk/myglasgow/humanresources/equalitydiversity/dignityworkstudyover/

seriously by the School and treated with sensitivity. Points of support for students are your adviser of studies, your Class Head and Lab Head, and in addition the School has two appointed Equality and Diversity offices, to whom students may speak in confidence.

I wish you success with your current and future studies.

Best wishes



Professor David Ireland
Head of School

2 General Information and contacts

This guide is intended for students enrolled on the PHYS4009 Physics 3 Honours Laboratory Course.

PHYS4009 begins with an Induction lecture at 1100 on the Tuesday of Week 1. The lab class proper then runs on Tuesdays and Thursdays from 1100-1700 in weeks 2 through 11 of Semester 1 (inclusive). The labs will be running fully in person. Details of how follow in Section 5.

2.1 Communication

All information about the lab classes will be communicated via the PHYS4009 Moodle site:

https://moodle.gla.ac.uk/course/view.php?id=30183

Provided you have enrolled on PHYS4009 in MyCampus, you will automatically be registered for access to the relevant Moodle site. As with all other Moodle sites, the login ID and password are those you use to access all University computers, including your student email account. You must regularly check the Moodle site for new information.

We will also be making use of Microsoft Teams. A link to this will be sent to your University email account during Week 1.

2.2 Contacts

PHYS4009 Lab Head:	Dr Peter H. Sneddon Room 251a Tel 0141 330 5312 Email: peter.sneddon@glasgow.ac.uk
PHYS4009 Deputy Lab Head:	Dr Philip Litchfield Room 475 Tel 0141 330 5316 Email: phillip.litchfield@glasgow.ac.uk
PHYS4009 Lab Technician:	Mr Matthew Trainer Room 422a Tel 0141 330 6437 Email: matthew.trainer@glasgow.ac.uk

Lab Area	Lab Lead
IT Module	Dr Phillip Litchfield
	Phillip.Litchfield@glasgow.ac.uk
Materials	Dr Ian MacLaren
	Ian.MacLaren@glasgow.ac.uk
Nuclear	Dr Bjoern Seitz
	Bjoern.Seitz@glasgow.ac.uk
Optics	Dr Johannes Courtial
	Johannes.Courtial@glasgow.ac.uk
Radio Frequency	Dr Andrew Spencer
	Andrew.Spencer@glasgow.ac.uk

3 Code of Professional Conduct in the Laboratory

Our aim is to provide a safe and enjoyable learning experience for all students in the laboratory, whether that is face-to-face or remotely. Whilst we, as staff, will do everything we can to help with this, students also have an important role to play in ensuring that this is achieved. We would specifically like to highlight the following points:

1. The laboratory is a professional working and studying environment. We therefore *expect you to behave in a professional manner towards one another and towards the lab demonstrators and staff at all times*

2. Follow all safety instructions, in terms of both general good practice and with regard to experiment-specific points. This is critical both for your own health and for that of your fellow students. Specifically, *safety instructions given by technicians or the lab demonstrators must be adhered to*.

3. We value the diversity of our student body and recognise that this diversity improves the quality of our work by allowing students to bring a range of skills and viewpoints to inform and enhance their collective achievements. We therefore expect that *students will work productively and professionally together in an atmosphere of mutual respect*.

    a. With this in mind, any form of bullying and harassment – such as on the basis of any personal characteristic (including, but not limited to: nationality, race, disability, gender or gender identity, religion [or proxies for this, e.g. football team allegiance], sexuality, appearance, or age) – is unacceptable.

    b. Please avoid at all times potentially offensive "banter" with your fellow students, which may be hurtful and problematic for some, including those who witness it. Please note that claiming something was “banter” is in no way an excuse for bullying or harassing behaviour.

4. Any reports of bullying, exclusion, or discriminatory behaviour will be taken very seriously by the School of Physics and Astronomy. If anyone wishes to report any untoward behaviour, speech or social media content from any person or group of people in the laboratory, they may do so in confidence to the laboratory head, his/her deputy, to the School Equality and Diversity officers (currently Mrs Angela Eden and Prof Stephen McVitie), or (in the case of staff) to a trade union representative. All such concerns will be treated seriously and in confidence. (This includes incidents where students or staff are the targets or the perpetrators of such behaviour).

5. Some of these points are also included in the University of Glasgow *Dignity at Work and Study Policy* and the *Code of Student Conduct* and can result in disciplinary proceedings, where appropriate.

For further information see:
https://www.gla.ac.uk/myglasgow/humanresources/equalitydiversity/policy/dignityatwork/

https://www.gla.ac.uk/myglasgow/senateoffice/policies/uniregs/regulations2022-23/feesandgeneral/studentsupportandconductmatters/reg33/).

4 The intended learning outcomes of PHYS4009

By the end of the PHYS4009 course, you will be able to demonstrate a knowledge and broad understanding of the key principles of experimental physics.

You should be able to:

- programme straightforward procedures in a high-level computer language
- evaluate random and systematic errors inherent in experimental measurements
- analyse and interpret experimental data and make a critical assessment and draw valid conclusions from the results of experimental investigations
- apply computer software to analyse experimental data and to write scientific reports
- prepare a detailed written report on an experimental investigation
- apply logical analysis to problem solving
- appreciate open problems typical of business situations[3].

More specifically …

Area	Objectives
Induction	▪ To understand the structure of the laboratory ▪ To learn what is expected from you in the laboratory ▪ To understand the Intended Learning Outcomes and Assessment in the laboratory ▪ To appreciate potential difficulties
Skills Revolution (Not running 2022-23)	▪ To apply logical analysis to problem solving ▪ To learn the key to successful teamwork. ▪ To gain exposure to business type problems ▪ To act informatively with industrialists
Experiment	▪ To practice and improve oral presentation skills ▪ To learn how to keep a clear and concise lab record ▪ To develop analytical skills regarding experimental results

[3] Due to the on-going disruption caused by the Covid19 pandemic, it will not be possible to directly address this goal in 2022-23, however many of the skills you develop in the labs will be equally applicable to a business setting (e.g. team working, problem solving, communication)

	▪ To expand understanding of underpinning physics ▪ To perform experiments to a high standard ▪ To reach sensible conclusions from experimental evidence
Report	▪ To develop written skills in structuring reports including o Presenting an experimental method in written form o Presenting results and errors in written form o Logically interpreting results and presenting this analysis in written form o To present a summary and conclusions of your work ▪ To learn to prepare a written document in a specified format
IT Module	▪ To learn to write and verify programs in a widely-used language ▪ To learn to use computational libraries for specialised tasks ▪ To use computers to solve physical problems

5 How PHYS4009 will work

5.1 Timetable

PHYS4009 meets on Tuesdays and Thursdays, 1100-1700. You are expected to put in around 5 hours' worth of work per six-hour session. Lunch and regular breaks are essential! There is no specific timetable within each day – you are free to decide when the best time for your breaks are depending on the work you are carrying out.

Weeks 2-11 encompasses ten weeks. This is divided into 5 fortnight-long Blocks (1, 2, 3, 4 and 5), and you are divided into 5 Student Groups (LB01, LB02, LB03, LB04 and LB05). Each Group will attend the main experimental lab for 3 of the Blocks, the IT Module for 1 Block, and have 1 Block off. Each student will, therefore, carry out 8 weeks' worth of work over the 10 weeks the lab is running. Table 5.1 outlines the timetable for each of the 5 Student Groups.

Table 5.1: Rotation patterns for Student Groups

	Blocks				
Student Group	Block 1 (Wks 2 & 3)	Block 2 (Wks 4 & 5)	Block 3 (Wks 6 & 7)	Block 4 (Wks 8 & 9)	Block 5 (Wks 10 & 11)
LB01	Experiment	Experiment	Experiment	IT Module	Break
LB02	Break	Experiment	Experiment	Experiment	IT Module
LB03	IT Module	Break	Experiment	Experiment	Experiment
LB04	Experiment	IT Module	Break	Experiment	Experiment
LB05	Experiment	Experiment	IT Module	Break	Experiment

Within each Block there are FOUR lab days. All experimental work must be completed within the first THREE of these; the final day of each Block is given over to assessment. (Details on the form of that assessment can be found in Section 7.)

You are expected to undertake some additional work outside the laboratory hours in order to complete the analysis of your experiments, to prepare for your marking interviews (including doing some additional background reading), and to write reports. Students who

do not put in the necessary effort are likely to fall behind with their lab work and not complete the set number of experiments by the end of the year.

Some students on combined honours courses may have lectures which clash with a part of the times for the lab. If this is you, you should attend your lectures and make up any lost time for data analysis or background reading in your own time. Note that no demonstrators will be regularly on duty outside the official hours. If there are larger events that you need to attend that take more than just 1 or 2 hours per week, you should consult with the Lab Head.

5.2 Choosing Student Groups, pairs and experiments

5.2.1 Student Groups

You will have chosen your Lab Group when enrolling on PHYS4009 in MyCampus.

5.2.2 Student pairs

You will tackle the experimental work in pairs. You are free to create your own pair. If you would prefer that the lab head assigns you to a pair, please email him before Thursday of Week 1 to let him know.

COMMUNICATION WITHIN EACH PAIR IS ESSENTIAL SO MAKE SURE YOU KNOW HOW TO CONTACT EACH OTHER.

5.2.3 Experiments

The first experiment that student pairs attempt will be pre-selected by the lab head and announced on the Friday of Week 1. Subsequent choices will be left to you to make via a Moodle Choice – the links for these will be announced on Moodle as Semester progresses.

The PHYS4009 lab is divided into four different experimental sections: Materials, Nuclear, Optics and Radio Frequency. All students are expected to attempt experiments in three different areas. Experiments are chosen on a first-come-first-served basis, though, so students should aim to select experiments as soon as the Moodle Choice is made available to avoid disappointment.

All of the available experiments – and their lab scripts – can be found on the PHYS4009 Moodle site. You are encouraged to read through the script for your next experiment before making your choice so that you can make an informed choice. It would be sensible to have a 2nd choice selected also, just in case.

5.3 Working in the lab

You should refer to Appendices A ("A Day In The Life of the Experimental Lab") and B ("A Day In The Life of the IT Module") for a more detailed indication of how lab days will work.

5.3.1 Experiment Blocks

During the Blocks where you are carrying out Experiments, you will be working in pairs. Both members of each pair are expected to attend the lab every day.

5.3.2 IT Module Block

The IT Module work is tackled individually, not in pairs. All the information for this Block will be posted in the IT Module section of the PHYS4009 Moodle site.

5.4 Lab record/book

Every student is expected to maintain their own, independent record of the work carried out, including any data taken and any analysis carried out.

There is no one specific way to maintain your lab record/book, nor is there one specific set of rules for what they should contain. What follows, though, should be considered good practice.

5.4.1 General lab record/book good practice

- *Lab records should be written up as you go along*. They do not need to be works of art, but they should be understandable to someone else.
- *Lab records should have a sensible structure appropriate to the experiment*. They should contain the "standard" ingredients:
    - *Aims*: What were you trying to show/do?

- *Method*: How did you go about tackling those aims? Make sure you note down all your steps and why you did what you did. (This can be in the form of a simple bullet-point list. Lab records/books are not assessed on the standard of the English … so long as they are understandable.)

- *Results*: Clear record of the data recorded in a suitable form. Tables should always have clear headings; graphs should always have clear labels/scales/headings/etc. Calculations should be clear. Errors should be estimated and accounted for.

- *Discussions and conclusions*: Summarise your results. Tie everything back to your aims. Consider the sources of error. Compare your results with published results, if appropriate.

- *Mistakes are perfectly acceptable* – there isn't a scientist in the world who hasn't messed up a calculation and had to start again or drawn a particularly naff diagram they've wanted to replace. Should you need to correct something, simply score out the first attempt and start again. PUT AWAY THE TIPPEX AND RUBBERS! KEEP AWAY FROM THE DELETE KEY!

- *The form that your lab book/record takes is entirely up to you*. You can maintain a good old-fashioned hand-written book, keep an electronic one in Word (or equivalent), run a Jupyter notebook … The key thing is that whatever you choose allows you to record everything you do and find. Whatever method you use, make sure you can convert it to pdf format – this is the format it will need to be in when it comes time to assess your work.

- During many of your experiments you will generate graphs or draw diagrams. If you are maintaining a hard-copy lab book, *make sure that those graphs are securely fixed into your lab books*. If your record is electronic, make sure you incorporate those graphs/diagrams clearly into the document. And remember that all members of the team who carried out the experiment will need a copy of the graphs since lan books/records are assessed individually. If you create electronic file during the

experiment, make sure to save them in a location you can access them again later.

- Guidance on the best way to maintain a record for the IT Module will be outlined when you tackle that Block.

5.5 Monitoring your progress

You should monitor the rate at which you and your partner are working in relation to the requirements of your experiment – your demonstrators will be able to give you an indication of whether you are on course to finish on time. It is possible to complete individual experiments in less than the allotted time and you should do so if possible. Do not try to rush things though. You have 15-18 hours lab time for each experiment. Use them wisely.

If you fall behind with your work due to absence, please refer to the Section 6 (on Attendance and Absence). If you are attending the lab regularly but are still falling behind with your work, you should discuss the reasons with the demonstrators and/or the Lab Head. You may need to come into the lab at additional times to complete your work, though this may be difficult to arrange. In some cases, it may be better to submit a partly completed experiment for assessment, have it assessed for a suitable fraction of the total marks, and move on to a fresh experiment.

It is extremely important that if you find yourself struggling with laboratory work that you discuss your problems with the Lab Head as soon as possible. The earlier that your circumstances are discussed the more options are available for sorting out any problems.

Students who fail to attend regularly, who fail to carry out the required lab work, or fail to present sufficient work for assessment may receive no credit, as set out below.

6 Absence and minimum requirements for the award of credit

University regulations require that students complete 75 % of a course in order to receive credit for that course. In the context of PHYS4009, “completion” is measured in terms of attendance and submission of work for assessment.

6.1 Attendance

An attendance record will be taken each day. If the attendance of an individual student falls below 75 % they may not receive credit for the course.

6.2 Absence and non-submission of work

If you miss a session, or cannot submit your work on time, but have Good Cause for this, you will not be penalised provided you follow the University's Good Cause Policy. Guidance on this Policy follows. If you do need to record a Good Cause Claim, please also send an email to the Lab Head explaining the situation. If you are uncertain whether your reason counts as "Good", also please contact the Lab Head. He will be able to advise on its "goodness".

6.2.1 Minimum submission level

There are five, equally-weighted components of assessed work in the PHYS4009 course – three experiments, one IT exercise, and the lab report. Each contribute 20 % of your overall grade – to receive a credit-carrying grade you must submit at least 4 out of these 5 components. A maximum of ONE component can be covered by a Good Cause Claim. If you find that you are unable to take part in more than one of the components, it may be impossible for you to complete the PHYS4009 course. Failure to complete this course will prevent you from progressing to level 4. If you find yourself in this situation, you must speak to the Lab Head as a matter of urgency.

6.2.2 How to submit a Good Cause Claim

Submission of a Good Cause Claim is the mechanism that allows your circumstances to be considered by the Board of Examiners. Please note all Good Cause Claims must be submitted within **one week** of the date of the affected assessment. These can be logged for missed sessions, or sessions where you were present, but believe your ability to perform was hindered. In the latter case, students should note that the University's Code of Assessment allows grades to be awarded only on the basis of demonstrated work. So, if you feel that some piece of assessed work has been affected by adverse circumstances, and if staff agree, then the only course of action available is for the grade for that piece of work to be set aside (in the case of continuously assessed work and Class Tests) or to allow a resit (in the case of Degree Exams) – marks cannot be adjusted.

To submit a Good Cause Claim on MyCampus:

1. Go to the 'Student Centre' and select *My Good Cause* from the Academics menu.

2. Select the relevant course(s).

3. Complete the report in MyCampus (there is provision for particularly sensitive information to be provided separately, outwith the system, but a claim report must still be entered into MyCampus).

4. Add supporting evidence by uploading documents. (Scanners are available on level 3 of the University Library.) It is the responsibility of the student to keep all original documentation and submit it to the Lab Head on request.

If you encounter any difficulties with this process please contact the Lab Head immediately to let them know you have a problem with your Good Cause Claim.

What will happen to your Good Cause Claim

The Lab Head will ensure that your claim is considered and this will be in accordance with the section of the Code of Assessment that covers incomplete assessment and good cause (paragraphs 16.45 to 16.53). The outcome of your claim will be posted into the Approval Information section on your Good Cause Claim in MyCampus. If it is accepted that your assessment was affected by good cause, the work in question will be set aside.
See also the Senate Office Absence Policy:
http://www.gla.ac.uk/services/senateoffice/policies/studentsupport/absencepolicy/

7 Assessment of PHYS4009

7.1 Assessment weightings

PHYS4009 is a 20-credit course. The overall grade for this course is made up of the following components:

Component	Weighting
3 Experiments	3 x 20 %
1 IT Module	20 %
1 Lab Report	20 %

Each component will be graded on the University's 22-point scale, scaled by the appropriate weighting factor, and then added to give an overall course grade, also on the 22-point scale.

7.2 The 22-point scale

The University's 22-point scale grades student work from A (Excellent) through to G (Very Poor) or H (no attempt). Within each band there are subdivisions; Table 7.1 shows these broad bands, the sub-bands, and the primary verbal descriptors that explain what they mean.

Table 7.1: The 22-point scale

SCHEDULE A

All Courses				Primary verbal descriptors for attainment of Intended Learning Outcomes	Honours Class	BDS, BVMS, MBChB
Primary Grade	Gloss	Secondary Band*	Aggregation Score			
A	Excellent	A1 A2 A3 A4 A5	22 21 20 19 18	Exemplary range and depth of attainment of intended learning outcomes, secured by discriminating command of a comprehensive range of relevant materials and analyses, and by deployment of considered judgement relating to key issues, concepts and procedures	First	Honours
B	Very Good	B1 B2 B3	17 16 15	Conclusive attainment of virtually all intended learning outcomes, clearly grounded on a close familiarity with a wide range of supporting evidence, constructively utilised to reveal appreciable depth of understanding	Upper Second	Commendation
C	Good	C1 C2 C3	14 13 12	Clear attainment of most of the intended learning outcomes, some more securely grasped than others, resting on a circumscribed range of evidence and displaying a variable depth of understanding	Lower Second	Pass
D	Satis-factory†	D1 D2 D3	11 10 9	Acceptable attainment of intended learning outcomes, displaying a qualified familiarity with a minimally sufficient range of relevant materials, and a grasp of the analytical issues and concepts which is generally reasonable, albeit insecure	Third	
E	Weak	E1 E2 E3	8 7 6	Attainment deficient in respect of specific intended learning outcomes, with mixed evidence as to the depth of knowledge and weak deployment of arguments or deficient manipulations	Fail	Fail
F	Poor	F1 F2 F3	5 4 3	Attainment of intended learning outcomes appreciably deficient in critical respects, lacking secure basis in relevant factual and analytical dimensions		
G	Very Poor	G1 G2	2 1	Attainment of intended learning outcomes markedly deficient in respect of nearly all intended learning outcomes, with irrelevant use of materials and incomplete and flawed explanation		
H			0	No convincing evidence of attainment of intended learning outcomes, such treatment of the subject as is in evidence being directionless and fragmentary		

CR	CREDIT REFUSED	Failure to comply, in the absence of good cause, with the published requirements of the course or programme; and/or a serious breach of regulations

* The Secondary Band indicates the degree to which the work possesses the quality of the corresponding descriptor.

† This gloss is used because it is the lowest grade normally associated with the attainment of an undergraduate award. Postgraduate students should be aware, however, that an average of at least Grade C in taught courses is required for progress to the dissertation at masters level, and students should consult the appropriate degree regulations and course handbooks for the grade they may require to progress to specific awards.

Each of the different pieces of assessment you will tackle have specific criteria, and those criteria have descriptors that align with the 22-point scale. The details of how follow.

7.3 Assessment of the Experiments

Each Block has four days associated with it – the first three are designed for carrying out the experiment; the fourth is when you will be assessed.

- For each Experiment, EVERY student MUST submit (as a pdf file) a copy of their lab record/book by 5 p.m. the day before your interview.

- Those interviews will be held in person or through Zoom, with students booking interview slots through Moodle. These will be no longer than 45 minutes.

- Students will be interviewed in their pairs, with pairs of demonstrators asking them questions about their work.

- If your pair has Good Cause for needing an extension to these standard deadlines, you must contact the lab head as soon as they realise there will be a problem. The lab head will then determine whether it is reasonable to arrange a later submission and interview date, or whether it is better to simply cover the work with a Good Cause Claim and let you move on to your next task.

- During your interviews, you are free to refer to your lab books, as appropriate, for example pointing out key results or important points in the analysis. You will be asked some questions by the markers – some of these may be more technical and related to the details of your experiment or the analysis, and some of these may be more related to the fundamental physics underlying your experiment.

- We do not expect all students to be experts in all areas of the experiment, however we do expect all students to be familiar with the basics, and have a good understanding of the results obtained, and the methods used.

- The marking criteria that you will be assessed against are provided below – you are strongly advised to read this and pay attention to the marking criteria listed.

- Your markers will record their marks and feedback in Moodle against these criteria. The feedback you receive is designed to be positive and helpful so that you can improve performance in the future, as well as with a final overall mark on the 22-point scale.

- At the end of the meeting you will be asked if you understand your grade and feedback, and whether you accept it. (Note: this is not the same as "like" your grade.) If you find your result unacceptable, your work will be filed as provisional. The pair must then contact the Lab Head (within no more than 24 hours) and they will review your performance. The Lab Head will speak to the students and the markers, then make a judgement on the final grade awarded. The 24-hour limit is a hard deadline. This is to make sure the lab head has sufficient time to complete their review before your next assessment event. See Section 7.8 for more on this.

Remember: although your experiment will be carried out in a pair, each member of the pair must keep an independent record of their work in their own lab book. Whilst we would expect all students to achieve the same grade for an experiment, the quality of these individual lab books plays a part in the final grade, and so it is not impossible that one team member could get a significantly different mark from the others.

7.3.1 Assessment criteria for the experiments

Table 7.2 outlines the criteria that demonstrators will use when assessing your submitted lab book and interview. Table 7.3 then sets out how the grade you will receive for each of these criteria maps to the 22 point scale.

Table 7.2: Lab record marking criteria for practical experiments

Assessed at/via	Category	Criteria
Lab book	Record keeping	▪ Has each student kept a proper record of the practical work? ▪ Is it clear how the measurements were taken? ▪ Are the readings written down in the notebooks of both students? ▪ Are there suitable headings and units? ▪ Are the graphs and tables labelled? ▪ Is there a conclusions section? ▪ Have the measurements been analysed? ▪ Is it clear how the calculations were performed and where the data is from? ▪ Have errors been appropriately accounted for?
Lab book	Standard	▪ Was the work involved in the experiment carried out to the appropriate standard, taking into account any equipment malfunctions experienced? ▪ Were the results in the expected range?
Lab book	Conclusion	▪ Are appropriate conclusions drawn? ▪ Are these supported by the results? ▪ Is a comparison made with accepted values? ▪ Is there a discussion of sources of error (systematic and random) and their effect on the result?
Interview	Oral presentation	▪ Did the students speak clearly and concisely? ▪ Were the students able to explain the basis/background of the experiment and/or underlying physics? ▪ Did the students convey and understand the main results? ▪ Did the students demonstrate knowledge of the principles of the experiment and the use of the apparatus at the level required in the experiment?

Table 7.3: Descriptors mapped to the 22-point scale

	Lab book			Interview
	Record keeping	Standard	Conclusions	Oral interview
Excellent A1 22 A2 21 A3 20 A4 19 A5 18	Exemplary record keeping with all results well recorded, enough explanation at all points and the methodology properly detailed. Fully correct analysis with all working shown, graphs plotted and all expected error analysis performed	The work was carried out to an excellent standard, with results that could not be reasonably improved upon	Clear conclusion drawing together the main points of the work into a concise and clear statement.	Exceptionally clear, concise. Well structured. Covered all key points. Gave excellent answers to questions on the experiment, the analysis and the underlying physics
Very Good B1 17 B2 16 B3 15	Very good record with just minor areas in which the standard of record keeping falls short of the highest expectations (e.g. units missing). Very good analysis. Perhaps minor faults such as missing steps in calculations, or a poorly labelled graph.	The work was carried out very well. Whilst improvements could have been made, they would not have affected the overall outcomes	A very good conclusion, perhaps just missing some minor points or being excessively long or slightly short.	Very clear. Perhaps some small deficiencies in structure, content, oral delivery, or deviations from time allowed. Answer questions very well. Perhaps signs of less in-depth knowledge.
Good C1 14 C2 13 C3 12	A competent description of the work and all main readings recorded. Perhaps some important details missing or too concise. Good work. Still competent and still reaches good results. But more key points missing.	A good level of work was demonstrated, with reasonable results obtained.	A reasonable conclusion but perhaps missing some important points or not discussing the meaning of the results.	Mostly clear. Perhaps small deficiencies in more than one area or a more significant deficiency in one area. Gave good answers to questions, or a mixture of some very good and some not quite so good.
Satisfactory D1 11 D2 10 D3 9	A rather basic and minimal description of the work. Just about enough for a third party to work from if they had some additional description elsewhere. Minimally sufficient analysis, but missing many desired features such as full error analysis or all steps in calculations.	The standard was satisfactory, with results within the acceptable range, albeit with room for improvement.	A basic restatement of some of the key results but with little reference to the meaning or the accuracy or precision of the work.	A significant number of deficiencies, most likely including unclear oral delivery or lack of planning. Answered questions at a satisfactory level without showing any deep understanding of the subject.
Weak E1 8 E2 7 E3 6	Significant pieces of information missing which would make the work hard to repeat or analyse by a third party. Serious deficiencies such as significant errors in the analysis or enough missing steps that it cannot be followed or checked	Whilst some of the work was at the right standard, sections were weak and results out of line with accepted norms.	A rather weak conclusion lacking in key detail or logical structure.	Major deficiencies, probably in multiple areas, suggesting that the student has not gained a firm grasp of what the experiment is about. Demonstrated serious gaps or errors in understanding or could not answer basic questions.
Poor F1 5 F2 4 F3 3	Little content of any significant value. Major gaps in what is recorded. Impossible to analyse or repeat the work based on reading this. Rather lacking in any proper analysis of results. Just the barest attempt to do any analysis or calculation	The work was not carried out at an appropriate level; results were out of line with accepted norms.	Little in the way of concluding remarks and little evidence the student had drawn any conclusions from their work.	Little coherent content, with poor planning and little demonstration that the student has a clear overview of their work. Showed serious errors in understanding or significant gaps in knowledge.
Very Poor (G) No attainment (H) G1 2 G2 1 H 0	Little or no content whatsoever. No significant analysis of the raw results.	The work was not carried out far below the appropriate level; results were very poor, far out of line with accepted norms.	No significant conclusion.	Basically no oral summary of any significant value, or totally unintelligible. No evidence of understanding of the details of the experiment or the physics.

7.4 Assessment of the IT module

As with the other laboratories the IT module spans four days with the last day set aside for marking. Any demonstrator can mark your work, and this should be done by the end of the fourth day of the module, unless you have submitted a good cause claim. The same rule applies, that marking sessions should be booked in advance and stuck to, and that all absences should be reported to the marker and the lab head as soon as possible. As you go through the lab you should check with demonstrators that you are reaching the required standard for your work. In particular, you should aim to write up the first exercise and show it to a demonstrator during the first week in order to receive formative feedback.

The IT module has equal weight with a single experiment and the same principles of assessment are applied, modified to suit the nature of IT work. The result is a mark on the 22-point scale. Further details of the requirements for assessment are found in the handout for the IT module, along with requirements for record keeping.

Your IT Module Block has four days associated with it, and as with the experiments the first three are designed for carrying out the set tasks with the fourth being the day you are assessed. The main difference here is that students attempt the work of the IT module on their own, and are interviewed on their own.

- Students should submit a Jupyter/iPython notebook for each question, containing code, results and figures AND the markdown cells explaining what you did and why. These should be exported to pdf for submission via Moodle. The deadline for this submission if 5pm the day before the interviews. If you have trouble exporting the notebook, contact the IT Lab Lead the same day.

- Those interviews will be held in person or through Zoom, with students booking interview slots through Moodle. These will be no longer than 30 minutes.

- Students will be interviewed individually, with one demonstrator asking them questions about their work.

- If you have Good Cause for needing an extension to these standard deadlines, you must contact the IT Module Lead as soon as they realise there will be a problem. The Lead will then determine whether it is reasonable to arrange a later submission and interview date, or whether it is better to simply cover the work with a Good Cause Claim and let you move on to your next task.

- During the interview you should expect to review the code using Jupyter, so that the demonstrator can check that it runs if they choose to. You should be sure to arrive slightly ahead of your booked marking slot to make sure you have Jupyter up and running before contacting a demonstrator.

- If you have kept written notes during the lab, you can also refer to these during the interview. However anything important should be described in the notebook itself.

- The marking criteria that you will be assessed against are provided below – you are strongly advised to read this and pay attention to the marking criteria listed.

- Your marker will record their marks and feedback in Moodle against these criteria. The feedback you receive is designed to be positive and helpful so that you can improve performance in the future, as well as with a final overall mark on the 22-point scale.

- At the end of the meeting you will be asked if you understand your grade and feedback, and whether you accept it. (Note this is not the same as "like" your grade.). If you find your result unacceptable, your work will be filed as provisional. You must then contact the lab head (within no more than 24 hours) and they will review your performance. The Lab Head will speak to the students and the marker, then make a judgement on the final grade awarded. The 24 hour limit is a hard deadline. This is to make sure the Lab Head has sufficient time to complete their review before your next assessment event. See Section 7.8 for more on this.

7.4.1 Assessment criteria for IT Module

Table 7.4 outlines the criteria that demonstrators will use when assessing your submitted work and interview. Table 7.5 then sets out how the grade you will receive for each of these criteria maps to the 22-point scale

Table 7.4: Lab record marking criteria for IT module

Category	Criteria
Record keeping and presentation of results	▪ Has the student kept a proper record of their work? ▪ Is the record keeping well organised? ▪ Are all graphs of results and tables of data labelled, understandable, and generally of publication quality? ▪ Are the main outcomes presented clearly? ▪ Are the results and evidence of the design and development process recorded?
Coding standards and correctness	▪ Do the programs do what is asked, and do the results look reasonable? ▪ Do the students make good use of more advanced language features (e.g. loops and functions)? ▪ Is the code easy to read, with good variable names, and good use of comments and whitespace? ▪ Are steps taken (such as breaking complicated tasks down into parts and testing them) to ensure the code works as intended?
Knowledge & understanding	▪ Can the student connect “things in the program” to the problem being solved? ▪ Has the student shown they know how find and use appropriate library functions? ▪ Has the student shown that they used help resources and search tools appropriately?
Oral presentation	▪ Did the students speak clearly and concisely? ▪ Were they able to explain their program logic? ▪ Could they discuss the context and the rationale behind their method choices?

Table 7.5: Descriptors mapped to the 22-point scale

	Record keeping and presentation of results	Coding standard and correctness	Knowledge & understanding	Oral Presentation
Excellent A1 22 A2 21 A3 20 A4 19 A5 18	Markdown cells used to document program design and student thinking throughout. Code is well-organised in cells alongside explanations. Results for all main questions. Graphics are good quality, and properly labelled. Non-graphical results are presented with discussion	Program is built logically and and uses loops and functions where appropriate. Code is formatted neatly. Comments are helpful but not excessive. Avoids dangerous constructs and copy-pasted blocks. Evidence of testing	Clear explanations of the link between the code and the physics problems. Integrates ideas from extra problems & own thinking.	Exceptionally clear, concise. Well structured. Covered all key points. Good timekeeping
Very Good B1 17 B2 16 B3 15	The design and results are documented, although some design decisions not explained. Code and report structure match well. Results for all main questions. Graphics are mostly of good size and quality, with labels. Non graphical results are highlighted in the report	Program is written logically and usually uses loops and functions correctly. Code is mostly well formatted, with good commenting. No obviously dangerous constructs such as using variables from the wrong place.	Code blocks used semantically, as clear steps in a process. Can make the connection to the extra problems.	Very clear. Perhaps some small deficiencies in structure, content, oral delivery, or deviations from time allowed.
Good C1 14 C2 13 C3 12	The results and intention are described in the workbook. Code is easy enough to follow. Results for most main questions. Some graphs may need improvement. Numerical results are identifiable in the code output	Program is logically laid out but is mostly linear. It produces correct results, and for the right reasons. Runs from scratch without problems. Formatting may need improvement. Comments exist but are not very helpful	Can explain the algorithms, but not why they are suitable for the problem. Evidence of some thinking beyond the main questions.	Mostly clear. Perhaps small deficiencies in more than one area or a more significant deficiency in one area.
Satisfactory D1 11 D2 10 D3 9	Workbook addresses the problems but requires some interpretation by the reader. Only the most important steps in code are mentioned. Most results are output for main questions. Graphs need improving (e.g. labels). Non graphical results output as bare numbers	Central results and algorithms are qualitatively or approximately correct. Code doesn't show much familiarity with standard tools and methods. Program "only works if …" Formatting could be improved. Few comments	Uses the appropriate algorithms but may not understand what they do. Can't make connections to the extra parts.	A significant number of deficiencies, most likely including unclear oral delivery or lack of planning.
Weak E1 8 E2 7 E3 6	Some relevant text in workbook, but does not really explain what is being done. Relies heavily on the reader understanding the code itself. Several results missing from output. Plots may be unclear and need further explanation to make sense. Numerical results missing or need code changes to be output.	Program does not produce the main results correctly and could not reasonably be expected to. Code does not have a clear structure. Code is only occasionally formatted or commented.	Algorithms are not understood and are applied inefficiently, or perhaps inappropriately. Does not even consider extras	Major deficiencies, probably in multiple areas, suggesting that the student has not gained a firm grasp of what the experiment is about.
Poor F1 5 F2 4 F3 3	Very little documentation of what is being done or what the reader should pay attention to. Results and plots are clearly incomplete. Many numerical results missing	Much of the workbook does not run at all or behaves very differently from what the reader would expect from reading the markdown cells. Code formatting is arbitrary and confusing. Almost no comments	Algorithms are not appropriate to the task. Connection to the problem is unclear.	Little coherent content, with poor planning and little demonstration that the student has a clear overview of their work.
Very Poor (G) No attainment (H) G1 2 G2 1 H 0	No explanations outside of the code itself. Descriptions are cryptic or non-existent. Few results or plots and what exists cannot be understood.	Almost nothing can be run without errors Code formatting and commenting is actively unhelpful.	It is not even clear what the code was supposed to do.	Basically no oral summary of any significant value, or totally unintelligible.

7.5 Assessment criteria for lab reports

The final piece of assessment for PHYS4009 is a formally written laboratory report, based on one of the experiments that you worked on. Every student will be required to write their own, individual, report.

Reports should be prepared in the style of an article for a scientific journal, specifically using the templates that the IOP have prepared and which you can download at

https://publishingsupport.iopscience.iop.org/questions/templates-and-guidelines-for-proceedings-papers/

(Choice of Latex or Word is up to the author.)

There should be just one variation from the above template. All reports will be marked anonymously to ensure that any conscious or unconscious bias (whether on the basis of nationality, gender, or anything else) is avoided. For this reason, **your name should not appear on the report**. Instead, you should use your GUID.

Your submitted work should be a complete, self-standing report of the experiment, focusing on the science that is discovered or theory that is confirmed, rather than simply the mechanics of how the experiment was done. The report should not need to refer to the laboratory script in any way but should, where necessary, refer to scientific publications or textbooks. The report marker may not be familiar with the experiment you are describing, so you must make sure that all the information necessary to understand your work is provided in your report.

It is essential that a proper logical structure is followed starting with an *Introduction*. The precise labelling and ordering of sections after this may vary but the following components are often found in papers: *Experimental Method, Theory, Results, Data Analysis, Discussion.* The report must conclude with a *Conclusions* section, which is normally followed by some *References*. An *Abstract* should be provided at the start, which is a short text summary of the whole paper, including the key measurements and conclusions.

Students are advised to refer to any reputable international journal in physics for good examples of how to write a research paper (for example, there are suitable publications from Institute of Physics Publishing).

A strict page limit will be applied, just as if your paper was being considered for a conference proceedings, and in this case it will be **8 pages**. Any material after 8 pages will not be read and you will only receive marks for the first 8 pages.

Notes and suggestions:

- You need not put in every result or a complete table of all measurements but can choose to put in only part of the results to illustrate the main progress made in your experiment.
- You should put in the mathematical derivations and error analysis that are essential, but this can be in abbreviated form, with only selected steps and not every detail shown, as long as the working and derivation is clear.
- Graphs and Figures should be appropriately sized so that the contents are clearly legible, even if printed in black and white. Text in Figures should be large enough to be legible (preferably > 8 point size).
- You will not be penalized if the report is shorter than the allowed 8 pages but will be marked on the content that you have provided.

All reports are marked by academic demonstrators in the absence of the student. Students should note the marking criteria to which they are assessed since this will help them in the preparation. As for all other assessed work, the assessment will be carried out against the 22-point scale, using the verbal descriptors provided in the standard version of Schedule A. Table 7.6 outlines the criteria; Table 7.6 shows how these map on to the 22-point scale.

The deadline for submission of the report is:

1600 on Friday of Week 1, Semester 2: 12th January 2024

Requests for extension to this deadline on the basis of Good Cause should be requested through the University's Good Cause system. An email should also be sent to the lab head.

The reports should be submitted electronically as a PDF file of up to 16 MB file size via Moodle. The precise link will be sent at the beginning of Week 1 in Semester 2.

Submitted files must have a name in the following format:

GUID_ExperimentName_REPORT.pdf

The "ExperimentName" to use is the short form title that can be found in the table of experiments in Appendix X.

There will be a lecture on how scientific papers are read by a busy scientist, and consequently on how one should write one for the maximum impact. Seeing as the laboratory report is in the form of a scientific paper, everything you need to know and implement in order to get the best possible assessment of your report will be covered. This will be held on **Tuesday 7th November at 16:00 on campus**.

7.5.1 Assessment criteria for the lab report

Table 7.6 outlines the criteria that demonstrators will use when assessing your submitted work. Table 7.7 then sets out how the grade you will receive for each of these criteria maps to the 22-point scale

Table 7.6: Lab report marking criteria for lab report

Category	Criteria
Presentation, grammar, style and structure	▪ Is the report neatly word processed with clear labelled diagrams and appropriate figure captions? ▪ Is the English correct? ▪ Is the report structured and are all the parts tied into the whole?
Abstract, introduction, theory, apparatus and method	▪ Is there an appropriate abstract? ▪ Does the introduction explain what is being done and why? ▪ Are the relevant theoretical results quoted? ▪ Are the principles and key features of the apparatus described with suitable diagrams? ▪ Are the important features of the measurements described and irrelevant detail left out?
Results, errors and interpretation	▪ Are the results presented clearly with suitable graphs? ▪ Is the principle of calculations presented? ▪ Is there a discussion of the meaning, significance and interpretation of the results? ▪ Has an attempt been made to compare the results with accepted values? ▪ Have the possible sources of error been considered?
Summary and conclusions	▪ Are the results of the experiment summarised? ▪ Are sensible conclusions drawn? ▪ Are the conclusions supported by the results obtained? ▪ Has the student commented on whether the objectives have been achieved? ▪ Is there a reasonable attempt to pull all the parts together?

Table 7.7: Descriptors mapped to the 22-point scale

	Presentation, grammar, style & structure	Abstract, introduction, theory, apparatus & method	Results, errors & interpretation	Summary & conclusions
Excellent A1 22 A2 21 A3 20 A4 19 A5 18	Great presentation. Clear structure. Excellent English, both technically (grammar etc.) and stylistically. Uses template very well.	Great summary in the abstract. The Introduction introduces the topic very well. And the theory and methods sections are comprehensive.	Excellent description of the results, including properly describing any figures, and all required calculations with errors. Comprehensive discussion.	Great summary, reiterating all key points of results and discussion, including on errors and their origins.
Very Good B1 17 B2 16 B3 15	Very good presentation, structure and English. Perhaps one or two minor deficiencies (e.g. typos, layout, text too small on graphs, imperfect figure captions).	Very good start to the report. Just one or two smaller problems, perhaps abstract too long or missing key points. Or introduction misses key steps. Or methods omits an important point.	Very good results and discussion. Perhaps one or two minor shortcomings (e.g. too brief descriptions, missing analysis, errors not fully detailed, discussion missing key points).	Very good summary. Perhaps one or two identifiable weaknesses (e.g. slightly longwinded, missing a key point).
Good C1 14 C2 13 C3 12	Good presentation. Several smaller deficiencies as noted previously or one larger problem (e.g. illegible graph, bad structure or layout).	A good start to the report. A few smaller problems or one larger one, which makes these introductory sections a little harder to follow than would be ideal.	Good results and analysis. But several smaller weaknesses or one larger problem (e.g. not discussing a Figure in the text, missing errors).	Good summary. Most key stuff present. Perhaps several smaller things or one larger thing missing or faulty.
Satisfactory D1 11 D2 10 D3 9	Presentation just about okay. But a lot of things that could be improved. The report is less attractive and less easy to follow as a result.	A minimally okay start, but there will be several shortcomings and this will not be the clearest start to a report, nor the most informative to someone coming to the topic afresh.	The sections are present and the results are there. Some analysis and discussion is present. But only the bare minimum, and the student really ought to have done more.	Summary is present and mostly does sum the report up. But not so clearly written and may miss significant points.
Weak E1 8 E2 7 E3 6	Big problems in presentation, structure or language. Does not look good to the reader, and is not easy to read.	The start misses enough information, or makes big jumps and doesn't build a logical sequence of steps in the argument such that this isn't good enough to really understand what the report is all about.	Large omissions (e.g. important results missing, no text describing a result, no mathematical working or whatever is appropriate to that experiment). This makes them hard to follow.	A weak summary that misses major points and is poorly structured, perhaps too short or rather too long.
Poor F1 5 F2 4 F3 3	Presentation is seriously messy, language is full of errors, structure is poor, and the layout is not well planned.	The start is poorly written and doesn't really help an interested reader to go from a general knowledge of physics to understanding enough to appreciate the work done by the student.	Lacking in any good quality presentation of results or discussion thereof. Perhaps some content, but not presented in any way that makes it easy for the reader to learn from.	A poor summary that does not make a large amount of sense.
Very Poor (G) No attainment (H) G1 2 G2 1 H 0	Little or no sign of any plan in the content and very difficult to make sense of the report because of the poor presentation.	Little or no content whatsoever, or little or none of any relevance to the topic.	Little or no content or relevant content in the results and discussion sections	Little or no summary, or one that contains little or no relevant content.

7.6 Penalties for late submission

To quote from the policy:

> "The University has agreed to introduce consistency in the penalties applied to penalties on students for late submission of coursework, and this has been warmly supported by the SRC. Following consultation, the following formula has been agreed: Work should be penalised at the rate of 2 Schedule A 'aggregation points' for each working day (or part day) by which it was submitted after the published deadline. This formula may be applied to a maximum of five working days; work submitted more than five days late should be awarded Grade H."

In the context of the current lab, this means that for each working day after the deadline for the submission of the work for assessment (which is defined here as either arrangement with a marker for an oral assessment on your lab record in your lab book, or the fixed deadline for the submission of laboratory reports at the end of the semester), you will receive a deduction of 2 grade points on the 22 point scale from your assessed mark.

7.7 Plagiarism

Plagiarism is defined as the submission or presentation of work, in any form, which is not one's own, without acknowledgement of the sources. The University's degrees and other academic awards are given in recognition of the candidate's personal achievement. All suspected cases of plagiarism will be handled in accordance with the University Plagiarism Statement, which can be found at http://senate.gla.ac.uk/academic/plagiarism.html

In the context of the Physics 3 Laboratory, the above policy is not intended to stop you discussing your laboratory work with other students - in fact we encourage this. You must not, however, directly copy anyone else's lab records or report (although it is understood that lab partners will be working from the same results). For avoidance of doubt, copying your lab partner's laboratory record or report is not acceptable and will be treated as plagiarism.

7.8 Appeals

When your assessment interview is complete, you should have a clear understanding of why you achieved the grade you did; whether this is through the written feedback you are given, or the verbal feedback, it is important that you understand your grade. If you think your work has been incorrectly assessed, and are unsatisfied with your grade, then you can appeal directly to the Lab Head. The Lab Head will listen to the arguments from both the students and the original markers before deciding the final mark.

The main bases for any appeal are as follows:

- The marker(s) did not follow the marking procedure set out in this document correctly.
- The feedback provided did not match the marks awarded.
- Comments were made or the interview was conducted in a way which is inconsistent with the Code of Professional Conduct.

The Lab Head may seek opinions from other markers, or ask a different marker to reassess the work. ***Any appeal must be made immediately following the assessment by email, and no later than 24 hours after the initial assessment***. The Lab head will respond to your request for an Appeal as soon as possible thereafter.

7.9 Submission of Work for Moderation and Examiners Meetings

The moderated marks and lab records will be presented to the external examiner at the Honours Examiners Meeting; these will be retained until six months after a student finally graduates. This is to allow the material to be considered in any appeal processes following decisions about the award of degrees. Students wishing to reclaim their work should arrange to collect it from Mr Trainer in the January after graduation. Work not collected within 12 months of graduation will be disposed of.

APPENDIX A: “A day in the life of the Experimental Labs”

During Semester 1 of 2022-23 all students will carry out three practical experiments, chosen from the Materials, Nuclear, Optics and RF lab sections which are arrayed around rooms 420, 423, 424 and 425 of the Kelvin Building.

This section outlines how we see the lab days of the experiments going. This is not intended as a prescriptive guide – every single experiment is different, and hence every single lab day will be different. Rather, this will give you an idea of how we see this lab running.

This document splits the plan into sections, one for each of the 4 lab days that you have assigned to each experiment.

Day 1

This is the day you begin your new experiment.

- You should arrive at the lab promptly at 1100. The demonstrators and technician will make sure you find your assigned experiment station.

- Your demonstrator will start this first session with a brief introduction to your experiment. Make sure to pay particular attention to any health and safety guidance you are given.

- Once you have settled into their station, they should
    - Aim to spend 10-15 minutes discussing how you are going to tackle the experiment.
    - Set yourselves goals for the day – who is going to do what? How far through the experiment do you want to get? (Your demonstrators will be able to give you some guidance here on what is "normal" for your experiment.)

- Attendance at the lab will be taken during the first hour.

- You will be able to call on the demonstrators on duty for help.

- Aim to have a final, wrap up on-line chat around 1645. This will allow everyone to see where you've got to, discuss anything you might need to do between Day 1 and Day 2.

- And remember to stop for lunch at some point! You should aim to spend ~5 hours work in the lab out of the 6 scheduled.

All students must leave the lab by 1700.

Day 2

The structure will be broadly the similar to Day 1, with the same support.

- As before, start the day by planning what you want to achieve that day – set yourself manageable targets.

- Again, at the end of the day, aim to have a wrap up meeting. Make sure that everyone has full sets of any experimental data taken so far.

All students must leave the lab by 1700.

Day 3

- Start the day again with a 10-15 minute meeting to plan this final experiment day.

- Remember – by the end of today you should have completed all the tasks. Make sure that however you plan this day, you can have a reasonable expectation of succeeding.

- Try to have a final meeting around 1630 – make sure everyone has everything they need to complete their lab records.

- You must also book your interview slot for Day 4 before you leave.

- Whilst you have 24 hours from the end of any 3 until submission, you should try to have your lab records as complete as possible before you end Day 3. The Wednesday should ideally only be used for creating the pdf version of your lab book for submission, and perhaps minor tinkering to your conclusions.

All students must leave the lab by 1700.

Day 4

This is the day you will be assessed for your work.

- Make sure you know when and where your interview is, or where the link for it is if you are being interviewed through Zoom.

- Once you have completed your interview, your pair should decide which experiment you wish to do next.
    - Remember that we want you to tackle as many different subject areas as possible. Check lab scripts on Moodle before deciding.

- Experiment selection will be through a Moodle Choice, the link for which will be added to Moodle the day after your interview.
    - Choice is first-come-first-served, so we would recommend having at two or three experiments on your list of choices, so that if you can't get your first choice, you have alternatives.

APPENDIX B: “A day in the life of the IT Module” - TBC

All students will carry out the IT exercises in one Block of the experiment rota. This operates slightly differently, since physical access to the equipment is not required to do the exercise.

Before you begin

Make sure you know how to access the School’s Jupyter server. This is the same as last year, so should hopefully be familiar. If you are off campus, you first need to connect to the AnyConnect VPN in Off_Campus_Use mode. Then you can connect to the Jupyter server with your browser. There are instructions for this on Moodle. If you are working from a public location in the university, the VPN might not be necessary, but it should not get in the way.

Days 1-3

This are the days you are doing the exercise.

- In the IT lab you work individually, so there is no rotation, and everyone should be ‘present’ each day via Zoom connection and MS Teams

- The lead demonstrator will give a brief introduction just after 11:00, letting you know of any special issues.

- You must connect to the Zoom meeting at least once during the 11:00 – 17:00 period.
    - This is how we record your ‘attendance’. The actual record is done by downloading the zoom logs so make sure your login name is unambiguously you.
    - The Jupyter servers are available anytime. If you prefer to work on a different schedule that is up to you, but you still need to connect in the regular hours to record attendance.

- After that you can work in the breakout rooms, or off-line. The breakout rooms are set up to give you a place to discuss the algorithms and approaches with your team, but it is up to you whether you use them.

- Remember that discussion is different from working together; these are still individual exercises.

- There are three exercises, that you can find in /exercises/p3/itlab/ You should go through them in order. It should take roughly 1 day each, although the first is intended to be a little bit shorter.

- Actual computing work is highlighted with green headers.
  - These are the main focus of the exercise, and you should make sure you do the things they ask for.
- Preparatory exercises are highlighted with yellow headers.
  - These are generally questions for you to think about and are not strictly necessary. However, they are intended to help develop your understanding of the problem. They also give you an opportunity to show understanding and skills which *are* assessed.

- Online help from the demonstrators on duty is available during the regular lab hours.
  - To access help, make a request on the IT Channel of the MS Teams.
  - The demonstrator may be able to answer your query directly through the Teams chat, or they may ask you to join a Zoom or Teams meeting in order to share you screen.
  - Don't use the zoom chat to ask for a demonstrator. It is *extremely* unreliable when people are moving between breakout rooms. It might work if you are lucky, but you should assume that it won't.
  - If it gets busy the demonstrators may not be able to respond immediately, please be patient. Most queries take about 15 minutes to solve.
  - There will normally be two or three demonstrators on duty, although some times there will be fewer (lunch breaks, for example).
  - There should normally be at least one demonstrator online. If this is not possible, they will put a message to this effect in the IT Channel.

- Remember to stop for lunch at some point! You should aim to spend ~5 hours work in the lab out of the 6 scheduled.

The zoom session and demonstrator support will finish at 1700.

Before day 4

These are the things you need to do before Day 4 (usually on Day 3)

- Book your interview slot for Day 4

- Make sure to export a copy of your logbook and upload it for marking. This ensures the demonstrator has something to look at, even if there are network problems on the Thursday.

Day 4

This is the day you will be assessed for your work. The details are a bit different from the other labs

- The zoom session for marking is the same as used during the other three days of the IT lab. There are four people being marked in parallel, so you'll be asked to join a breakout room for the marking.
    - Make sure you are in the main meeting room ahead of your interview. You should aim to log in no later than 5 minutes before your interview is due to start.
    - If the demonstrator is not visible in the main room they are most likely still in an interview with the previous student. If they haven't contacted you by 5 minutes after the interview was supposed to take place, the best way to reach them is on the MS Teams Chat