

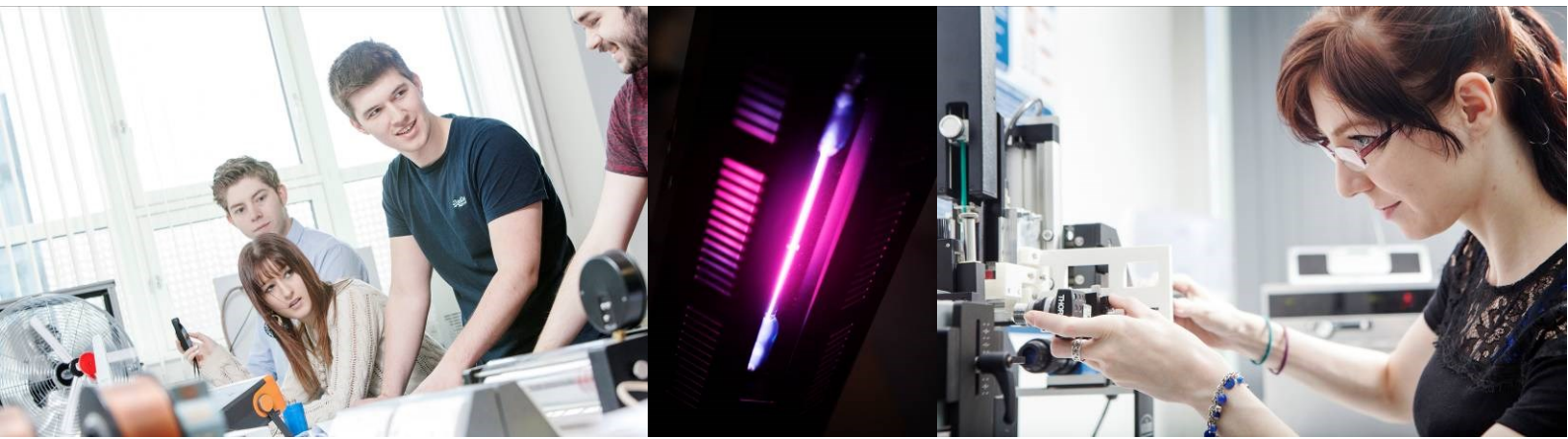


Department of Physics and Electrical Engineering

MPhys (Hons) Physics

MPhys (Hons) Physics with Astrophysics

Programme Handbook 2015-16



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1 Welcome from the Programme Leader

Welcome to Physics at Northumbria University!

Physics is all about understanding the world around us; from sub-atomic particles to stars and galaxies. With this understanding you will be in an excellent position to progress your career and have plenty of interesting options available to you. At Northumbria, we are proud to have physics degrees which are highly innovative and aligned with our research strengths in condensed matter, quantum devices, soft and nano-materials and astrophysics. Our programmes are also recognised by the Institute of Physics (IOP) which is the professional body that represents physicists in the UK. Students at Northumbria can join the IOP for free and we strongly encourage you to do so.

Our programmes are taught using a rich variety of methods that give you the opportunity to learn and develop key skills. Academic staff are here to support you throughout your degree programme as well as all of our researchers and postgraduate students. Please just ask if you have questions.

Experimental work is an important part of our programmes and you will have many opportunities to use our undergraduate physics laboratory and new Research Projects Laboratory (part of a £6.7m investment from the government). These facilities complement our existing labs where you will also learn valuable skills such as computer programming. On that note, the skills of a physicist are in demand and you have made a great choice in studying physics. Not only are physics graduates paid more on average compared to graduates of other subjects but they also have a very wide range of career options.

I very much hope that you make the most of the opportunity to study physics at Northumbria University and wish you all the best for your studies.

Dr Neil S Beattie
Programme Leader

2 Welcome from the Head of Department

I would like to welcome you to the Department of Physics and Electrical Engineering. I would like you all to get as much from your time here at Northumbria University as possible. Your programme of study will be your platform to launch into the world of work, further higher study or research activities. All of the staff in the Department are here to actively engage in teaching you and support you in your studies, however we cannot do the work for you. In some terms you need to think of your time at the university as similar to gym membership – you will only get out of it what you put in to it!

Within the Department many of the staff are actively engaged in research activities as this is essential for us to work at the cutting edge of our disciplines and inform the teaching programmes. A

few examples of our research include, renewable energy and power systems, electric vehicles, materials science, astroparticle physics, communications and soft matter.

We have a large number of facilities that are available for you to use throughout your time here, and I actively encourage you to practise your skills in the laboratories and get as much from your experience as you can. Whenever labs are vacant please feel free to use the facilities to further your study and maybe develop your own projects. A number of student spaces are available for you to work in on your own or in groups including “The Zone” and the new “Think Physics Forum area”

Enjoy every minute of your time here.

Dr Richard Binns
Head of department for Physics and Electrical Engineering

3 About this handbook

This handbook is designed to provide a guide to your programme of study at Northumbria.

It does not provide all of the information that you will need although it attempts to tell you where to find most of that information. The latest version of much of the further information that you need is to be found in a comprehensive and definitive form on the Northumbria website. A key page is titled ‘New Students’ <http://www.northumbria.ac.uk/browse/newstud/>.

4 Who’s Who and Communication?

4.1 Who to go to for help

You will meet a broad range of academic, administrative and technical staff throughout your studies. The majority of staff will be drawn from the various subject areas within the Department. However, we also draw upon subject specialisms outside the Department and external consultants, industrialists and advisors.

Staff from the Department and from the wider university (such as the University Library, IT Services and Student Support and Wellbeing Services) are here to help you get the most out of your Programme. In this section, we introduce you to some of the key people who will support you in the Department.

Faculty Office

Office Location: Ellison building room B-block B201

CATHERINE HAMBLEY is the Programme Support Co-ordinator for the Department of Physics and Electrical Engineering

Office hours: 8.30 am – 5 pm Monday to Thursday, 8.30 – 4.30 pm on a Friday

This is a dedicated point of help for students. It should be your first point of contact for all queries.

NOTE: this is where all assignments should be submitted

Programme Leader

Dr Neil Beattie

Office Location: Ellison Building Room E306

Email: neil.beattie@northumbria.ac.uk

Telephone: 0191 227 4592

Your Programme Leader is the academic leader for your Programme and is responsible for managing the programme on a day to day basis, working with other Department and University staff – academic, administrative and technical – as needed. Your Programme Leader is committed to helping you get the most out of the Programme and, where relevant, will liaise with your Module Tutors and other relevant staff to make sure that they are aware of your needs and of how you are doing.

IF YOU HAVE ANY SORT OF PROBLEM, FEEL FREE TO CONTACT THE PROGRAMME LEADER

First Year Tutor

Dr Guillaume Zoppi

Office Location: Ellison Building Room E306

Email: guillaume.zoppi@northumbria.ac.uk

Telephone: 0191 243 7013

Second Year Tutor and Placement Tutor

Dr Rodrigo Ledesma Aguilar

Office Location: Ellison Building Room E306

Email: rodrigo.ledesma@northumbria.ac.uk

Telephone: 0191 227 3868

Third Year Tutor

Dr Neil Beattie

Office Location: Ellison Building Room E306

Email: neil.beattie@northumbria.ac.uk

Telephone: 0191 227 4592

Your Programme Leader is the academic leader for your Programme and is responsible for managing the programme on a day to day basis, working with other Department and University staff – academic, administrative and technical – as needed. Your Programme Leader is committed to helping you get the most out of the Programme and, where relevant, will liaise with your Module

Tutors and other relevant staff to make sure that they are aware of your needs and of how you are doing.

IF YOU HAVE ANY SORT OF PROBLEM, FEEL FREE TO CONTACT THE PROGRAMME LEADER

Module Tutor

For each module of study, you will have a designated Module Tutor. The Module Tutor is responsible for the organization of the module and supporting your learning and assessment on that module. In the first instance, discuss any matters relating to the module with Module Tutor.

4.2 Communication

Contacting your Programme Leader

Academic staff may teach on many modules and programmes. In addition they may have other roles and responsibilities which take them from their office. Thus it is advisable to make an appointment if you wish to see a member of staff. You can do this via email or you may visit their office. Occasionally you may be able to have an immediate appointment, but please do not be disappointed if you are asked to return at a mutually convenient time.

Please contact staff to cancel if you are unable to attend an arranged appointment.

Email

Email is used extensively throughout the University and is a very effective method of communication between students and staff. You will be automatically allocated an email address by the University once you have enrolled. Do remember that the Northumbria email address is the one that should be used when contacting University and Department staff. It is also the one that is used by staff to make contact with you, so do make sure that you check it regularly, particularly if you also use a personal email account. Please be aware that staff may not reply to your email immediately due to their other duties and activities.

You are strongly encouraged to check your University email every day.

eLearning Portal

The eLearning Portal (eLP) is a very important resource for students. You will find specific information related to the modules you are taking, such as copies of lecture and seminar handouts, assignment briefings, instructions, and announcements, e.g., Your Programme Leader uses the eLP to pass on information concerning programme matters. It is therefore important that you check the eLP regularly – at least daily – for new announcements and new material.

Plasma Screens

The Department owns a number of plasma screens in Pandon and Ellison Building. These are also used to display announcements, events and opportunities such as visits from potential placement providers.

Programme Notice Board

An important point of contact for staff with students is the Programme Notice Board. This could be for timetable changes, assessment information or personal messages. **YOU MUST CHECK THE NOTICEBOARDS REGULARLY.** It is particularly important to check the notices at the start of the

semester when timetable changes are more likely and towards the assessment period when important information will be displayed.

Please let us know as soon as possible if you have any kind of problem. This can be academic or personal. For personal problems, it will be handled in strict confidence and we may encourage you to seek support from Student Wellbeing.

5 Programme Information

Here you will find specific information on your programme of study. There is a national requirement that all university programmes of study have a publicly available Programme Specification and this section is based on that programme specification. The full and definitive version of the programme specification can be found at <http://www.northumbria.ac.uk/programmespecs/>

5.1 Programme Aims

The overall aim of this programme is to provide students with knowledge and understanding of core concepts in physics and the ability to tackle a wide variety of problems using a physics-based approach. The skills and knowledge attained during the programme will prepare students for postgraduate employment or further study.

Core concepts in physics follow directly from the Core of Physics which forms part of The Physics Degree published by the Institute of Physics. Fundamental elements such as mathematics, mechanics, quantum physics and electromagnetism are addressed mainly at levels 4 and 5 in the programme. Level 6 content stems from research strengths within the Faculty of Engineering and Environment and includes condensed matter, advanced photovoltaics, optical communications and smart materials. Level 7 content is designed to strengthen the students' mathematical abilities beyond the Core of Physics and will address advanced topics in physics such as advanced quantum mechanics, advanced mechanics, condensed matter and statistical physics. Additionally, level 7 provides students with the opportunity to perform a significant piece of independent research on an open-ended, frontier problem in physics in a research project. This project will be supervised by an academic member of staff and will engage students with the wider postgraduate community within the Faculty.

A key philosophy of the programme is the application of physics principles and a physics approach to current global challenges such as population growth and sustainable energy. In addition to facilitating the innovation required to address these challenges, this will increase students' employability in an ever-demanding market.

5.2 Attendance

It is essential that you attend all classes. Registers are taken electronically in class and you must bring your smartcard to class.

There is a clear correlation between students that attend classes and students that do well in assessment – it's not rocket science!

If you are unable to attend then you should let the Programme Leader know. **You must attend all assessments or you will automatically receive a module mark of zero.** If you have a genuine reason for not attending an assessment (e.g. illness, bereavement) then you must (1) obtain evidence and (2) complete a **personal extenuating circumstances (PEC) form** which is available from the Faculty Office or online.

NOTE: YOU MUST BE ABLE TO PHYSICALLY COME TO THE UNIVERSITY AT ANY POINT DURING THE ASSESSMENT PERIODS (see section 5).

5.3 Programme Learning Outcomes

MPhys (H) PHYSICS

Knowledge and Understanding

- A1. Describe and explain key Physics principles
- A2. Apply mathematics to describe the physical world
- A3. Discuss historic, current and future contexts of Physics principles underpinning science, engineering and technology
- A4. Characterise the role of physicists in promoting sustainability
- A5. Demonstrate professional and ethical values in conducting Physics investigations
- A6. Appraise the multi-disciplinary contexts in which Physics can be applied and identify appropriate physical principles
- A7. Differentiate between a range of experimental, mathematical and computational techniques applicable to current research in physics

Intellectual Skills

- B1. Apply quantitative analysis to a problem for physical insight
- B2. Undertake physical modelling and apply hypothesis testing as appropriate
- B3. Solve open-ended problems
- B4. Use computational techniques in the analysis of, and solutions to, physical problems

- B5. Apply order-of-magnitude estimation and approximation to establish initial solutions and quantify uncertainty
- B6. Critically evaluate experimental data and compare with theory to derive appropriate conclusions
- B7. Translate physical problems into mathematical statements and use advanced mathematical techniques to solve them

Practical Skills

- C1. Appreciate experimental uncertainty and account for systematic and random errors
- C2. Plan and implement experimental investigations using standard and specialist laboratory equipment
- C3. Review and critically analyse technical literature and other information sources
- C4. Develop and implement computing algorithms
- C5. Demonstrate competent use of specialist equipment and experimental techniques or theoretical modelling techniques and familiarity with computer programming

Transferable/Key Skills

- D1. Present technical information to a wide audience
- D2. Organise and structure information for the preparation and production of investigative reports
- D3. Work effectively both individually and as part of a team
- D4. Manage time and resources efficiently using an organised approach
- D5. Work with an awareness of health and safety regulations and perform a risk assessment
- D6. Manage own learning and perform independent original research

MPhys (H) PHYSICS WITH ASTROPHYSICS

Knowledge and Understanding

- A1. Describe and explain key Physics principles with emphasis on Astrophysics
- A2. Apply mathematics to describe the physical world and wider Universe
- A3. Discuss the historic, current and future contexts of Physics principles underpinning science, engineering and technology
- A4. Characterise the role of physicists in promoting sustainability
- A5. Demonstrate professional and ethical values in conducting Physics investigations
- A6. Appraise the multi-disciplinary contexts in which Physics can be applied and identify appropriate physical principles
- A7. Differentiate between a range of experimental, mathematical and computational techniques applicable to current research in physics

Intellectual Skills

- B1. Apply quantitative analysis to a problem for physical insight
- B2. Undertake physical modelling and apply hypothesis testing as appropriate
- B3. Solve open-ended problems
- B4. Use computational techniques in the analysis of, and solutions to, physical and astrophysical problems
- B5. Apply order-of-magnitude estimation and approximation to establish initial solutions and quantify uncertainty
- B6. Critically evaluate experimental data and compare with theory to derive appropriate conclusions
- B7. Translate physical problems into mathematical statements and use advanced mathematical techniques to solve them

Practical Skills

- C1. Appreciate experimental uncertainty and account for systematic and random errors

- C2. Plan and implement experimental investigations using standard and specialist laboratory equipment
- C3. Review and critically analyse technical literature and other information sources
- C4. Develop and implement computing algorithms
- C5. Demonstrate competent use of specialist equipment and experimental techniques or theoretical modelling techniques and familiarity with computer programming

Transferable/Key Skills

- D1. Present technical information to a wide audience
- D2. Organise and structure information for the preparation and production of investigative reports
- D3. Work effectively both individually and as part of a team
- D4. Manage time and resources efficiently using an organised approach
- D5. Work with an awareness of health and safety regulations and perform a risk assessment
- D6. Manage own learning and perform independent original research

5.4 Programme Structure

Physics:

<http://www.northumbria.ac.uk/?view=CourseDetail&code=uusimy1&page=modules>

Physics with Astrophysics:

<http://www.northumbria.ac.uk/?view=CourseDetail&code=uusimy3imx&page=modules>

5.5 Learning Teaching and Assessment Strategy

The modules are delivered by a combination of formal lectures and activities such as seminars and tutorials, laboratory/workshop activities, and computer-based exercises. For each module you will be provided with an outline of the subject matter to be covered in the lecture programme. The laboratory/workshop activities and design projects will involve group activities within which you will be expected to make your own individual contributions and these will be assessed. It is essential that you apply yourself conscientiously to all of these learning activities.

In addition to the formal teaching activities you will be required to study parts of modules by means of directed learning i.e. you are expected to refer to the set texts for study in your own time and

reading lists are provided. You will also be assisted to develop your skills in independent learning, in order to optimise your study time. Because of the limited time allocated to each module it is essential that you develop study methods to ensure that you are able to meet the deadlines for submission of assignments and other programme work. The important thing is that you take responsibility for your own learning, but with assistance being provided by the lecturing staff.

The contact hours reduce as the programme progresses. There is extensive small group teaching during the first year. You are expected to develop independent study skills as the programme progresses, with the final year providing you with an opportunity to demonstrate your analytical and general physics skills. The MPhys in Physics and Physics with Astrophysics programmes have four 'levels' of study:-

Level 4 is first year work and you will be expected to use the set text books to support the lecture notes, and you will be provided with seminar work in each subject. The year sets the foundations of your Programme, but does not count towards the classification of your degree.

Level 5 is second year work, and you will be expected to demonstrate additional self learning skills e.g. Formal lab reports require you to put the particular theory in context with its general applications by some library research. Tutorial support will be given for the main subjects.

Level 6 is the third year of work and you are expected to demonstrate full independent learning skills. You are expected to study with minimal formal support in this final stage of your development but tutorial time is provided to support the lectures.

Level 7 is the final year and you will be expected to demonstrate self-learning capacities in advanced physics and mathematical concepts, along with the ability to undertake an open-ended research project.

5.6 Feedback

Students are encouraged to provide feedback to the Department and this is done through a number of mechanisms, both formally and informally.

Formally

Programme Committee Meeting. Two elected student representatives are invited to attend the Programme Committee Meetings to represent the student body. These occur once per semester and it is a forum for discussing and improving the programme with input from other sources as well as students and staff, such as external examiners, professional institutions and external validating bodies.

Module Evaluation Questionnaire. The module tutor is responsible for obtaining feedback from all students via this proforma. It gives the students the opportunity to comment on the particular module, with respect to its delivery, content, suitability of assessment etc. Feeds in to the Annual Review of the Programmes.

Informally

Teaching Evaluation Questionnaire. All members of academic staff are required to obtain feedback on their teaching. This is confidential but designed to improve individual teaching practice.

Laboratory/Group sessions. Valuable feedback can also be obtained during these small group sessions, where students are encouraged to discuss any areas they may have a problem with.

5.7 Placements

The MPhys programmes provide the option of doing a paid year in industry where your studies will be 'sandwiched' around a year-long work placement. Undertaking a work placement can offer you plenty of real benefits for progressing into your chosen career:

- Practical experience in the industry you wish to work in;
- Improved job opportunities;
- Experience of teamwork and development of interpersonal skills;
- Awareness of current developments in the sector;
- More placement students go on to achieve higher grades and better degrees;
- Chance of a firm offer of employment;
- Year's paid experience.

We help you to secure your placement in a number of ways. Firstly because of our reputation, our partnerships with employers and the success of our graduates, we have an incredibly strong and international industry network. Our students have benefited from our links with household names such as CERN, Siemens, GSK, National Instruments, and many more.

Secondly, your programme team and the Faculty's Placements Team will work with you to find a suitable company and will also help you develop your CV and provide you with advice and guidance for interviews. During your placement you will receive ongoing support from the Placements Team to ensure that the experience is as beneficial as possible.

Work placements are an invaluable opportunity to gain a real insight into the industry you want to work in. More than that, they strengthen your CV and provide you with your own priceless network of industry contacts. To find out more visit the Placements Team in Pandon Building, Room G07 or email ee.placements@northumbria.ac.uk.

5.8 External Examiner(s)

The external examiner for the Physics and Physics with Astrophysics programmes is Professor Lee Thompson from the University of Sheffield.

6 Programme and Assessment Schedule

See End of Document

For term dates see:

<http://www.northumbria.ac.uk/sd/central/ar/spa/dates/coursedates2015/>

Note: You must be available to come to the University campus at any point during the assessment weeks. These are:

Mon 4th Jan to Fri 15th Jan (2 weeks)

Tues 3^d May to Fri 20th May (3 weeks)



Faculty of Engineering and Environment

STUDENT CODE OF PRACTICE FOR SAFE WORKING

SEPTEMBER 2009

Student Declaration

You are reminded that you have signed the University enrolment form which requires you to comply with all Safety Instructions that you may be given during your course.

General Information

- As the improvement of safety measures is an ongoing process, revisions of this Code of Practice will be made from time to time. The current version is published on the Department Website. The version is identified by an Issue date of February 2002.
- The University has a duty to provide a safe working environment for you. However **you must play your part by always thinking ahead** and by following the instructions given in this Code.
- You need only familiarise yourself with the sections of this document that are relevant to your Programme and year.
- For the sake of brevity, the reasoning underlying the rules is not explained, although in most cases will be obvious. You should, however, satisfy yourself that the rules make sense and if there is any matter you are unclear about do not hesitate to ask your immediate supervisor or tutor.
- Any additional instructions given by your supervisor or tutor must be followed.
- All accidents must be reported in the University Accident Report Book. Refer to **First Aid Instructions Notice** for details.

Notices Posted in the Department

Note the location and general contents of the following notices:

- **Fire Safety Procedures** dealing with:- evacuation and alarm procedures.
- **First Aid Instructions** dealing with:- location of first-aid boxes, details of designated first-aiders, procedure in the event of serious injury or illness, accident reporting procedure.

These notices are displayed near the exit of all lecture rooms, laboratories and workshops and near the ends of corridors.

You will also find a copy of this **Code of Practice** in all laboratories and workshops. Additionally, a placard on **“Electric Shock Treatment”** is displayed in workshops and the Electrical Power Laboratories.

Notices dealing with other hazards, e.g. safe disposal of “sharps”, are displayed in appropriate areas.

Activities Prohibited in the Department

You must not:

- Consume food or drink except in the areas provided.
- Engage in horseplay.
- Smoke.
- Use laboratory or workshop facilities without permission and supervision except where open-access is provided.
- Use laboratory or workshop facilities to repair privately owned equipment or appliances.
- Open up or remove the covers from mains-powered equipment.
- Dismantle a mains plug to replace a fuse or disconnect any of the leads or for any other reason.

General Requirements

- As the storage space in some laboratories is limited, all coats and bags should be left in allocated areas or lockers.
- Keep all gangways and all exits clear of obstructions such as bags so that evacuation of personnel can be made in any emergency.
- Report any defects in equipment to your supervisor or tutor.
- If you consider a given practice to be unsafe you must immediately inform the person concerned. If agreement cannot be reached, delay the practice and inform the Head of Department in writing of the matter within five working days. The person referred to could be your supervisor, tutor or another student.
- Soldering irons must only be used in conjunction with a suitable stand and must not be left unattended when switched on.
- Do not inhale the fumes from resin-cored solder.
- Upon completion of work, all equipment must be switched off, disconnected from the supplies or unplugged from the mains, unless you have been given specific instructions to the contrary.

Rotating Machinery and Robotics

Typical risk areas:- Electrical Power and Robotics Laboratories, Workshops.

Moving and Rotating Machinery

- Check that all guards or covers are **secure and in place**.
- Remember that the **stroboscopic effect** of fluorescent lighting may cause shaft-ends, etc., which are rotating at **high** speed, to appear to be stationary or rotating at low speed.
- Do not use any equipment until its operation has been demonstrated to you by a responsible member of staff.
- Replace all machine guards before operating the machine.

- Be able INSTANTLY to locate the emergency stop button for any machine you use. Make it a reflex action.
- Be prepared to switch off any other machine in your immediate area of work should an emergency arise.
- Abrasive wheels may only be fitted and balanced by a certified person.
- Maintain your concentration ALL the time the machine is in motion.
- Never leave your machine unattended while it is in motion.
- Contact measurement must NEVER be attempted on a machine which is in motion.
- Take care not to distract or startle other machine operators.
- Switch off the machine to prevent movement whilst changing cutting tools or workpieces.
- Tighten all tool-holding and work-holding devices before machining.
- REMEMBER – REMOVE THE CHUCK KEY!
- Stand clear of all moving parts while machining.
- Never clean away swarf with your hands. Always use the rake provided.
- Direct and control coolant flow so that it drains into the sump tray at all times.

BEFORE ENTERING ANY WORKSHOP OR LABORATORY (NOT IT LABS)

- Keep hair short or under a cap – it can become tangled in drills or rotating parts.
- Remove hanging items of clothing such as sleeves with loose cuffs, ties or jewelry when necessary. These can cause serious injury when caught accidentally.
- Wear snug fitting overalls.
- Wear safety goggles when eyes are exposed to flying particles, or to welding flash.
- Wear safety gloves when hands are exposed to heat, sharp objects, dangerous chemicals, etc.
- Appropriate clothing must be worn.

Robotics

- Do not enter the marked exclusion zone of any robot when the robot is being operated.
- During the operation of any robot, someone must be within easy reach of the emergency stop switch.
- Items may be **placed** on a moving conveyor but never place your hand on the moving part of the conveyor or in the space between the guard rail and the edge of the moving conveyor.

Projects Involving Practical Work

- Check with the project supervisor a **suitable location and time slot** for the practical work to be carried out.
- Unsupervised project work involving any voltages in excess of 50V r.m.s. is not permitted. Suitable arrangements for any work with exposed voltages greater than 50 V r.m.s. must be agreed with your supervisor.
- Wherever possible, the Project hardware should be designed to operate from standard laboratory d.c. power supplies, i.e. **not be directly mains powered**.
- **However, if the project supervisor specifies that the circuit be directly mains powered, the following procedures are essential:-**
- Use only a double-wound mains transformer i.e. **not** an auto-transformer.
- Use an encapsulated transformer, if available.
- Ensure all screen/core earthing connections of the mains transformer are completed.
- Use 2 or 3 core cable only for the mains power connection, **not** an edge cone.
- Ensure ample spacing between the live, neutral and earth (if present) connecting points.
- Use only through-hole soldering for the mains connecting leads.
- Check that the current and voltage ratings of any leads that you propose to use are adequate.
- Minimise the length of mains voltage tracks.
- Give the mains-voltage tracks ample spacing from the transformer secondary tracks.
- Liberally coat all mains-voltage tracks and live terminals of the completed p.c.b. with a suitable insulating material such as silicone sealant.
- Be particularly alert to the hazard of dangerous potentials present upon device heatsinks.
- Use only enclosures of insulating material.
- Use a strain—relief fitting at the cable-enclosure entry point.
- Ensure by suitable design that cooling of semiconductor devices is adequate, taking into account the restrictive effect of the enclosure.
- Any proposal to interface computer input or output ports to power or instrumentation circuits must be fully discussed with your project supervisor before proceeding. In particular, the arrangements for electrical isolation must be approved by the project supervisor.
- Request the project supervisor to examine the completed circuit-board/cable/mains plug and, if satisfactory, to certify **in the student logbook(s) that the circuit is safe for unsupervised work with the mains-power connected and the enclosure opened**.
- If you use rechargeable batteries with very low internal resistance such as lead-acid or nickel-cadmium to power your circuit, **the following points must be observed:-**
- Use a suitable rated protective device (fuse or circuit-breaker) to limit the current flowing in the event of a circuit malfunction.
- Ensure as far as possible that a short-circuit cannot occur without passing the current through the protective device.
- Employ non-reversible battery leads.

- **Do not use high-current battery charging without a timer or other cut-off arrangement.**
- Always make sure that your rig cannot be accidentally energised by others.
- Never interfere with or alter another student's rig.
- Do not borrow any equipment from another student's rig without prior permission.
- Investigate any malfunction thoroughly before proceeding.
- Do not leave your rig unattended when energised unless you have good reason.
- Fix a "Do not touch" notice if a rig is left running.

Electronic Design and Manufacture Laboratories

Printed Circuit Manufacturing Facility

- Technical support staff (only) manufacture PCB's.

Surface Mount Placement Equipment

- Do not place your hands over the work-table.

Reflow soldering equipment

- Do not touch the moving conveyor or put your hands inside the oven at any time.

Electrical Power Laboratory C003

- Section 6 on Rotating Machinery and Robotics must be followed.
- Observe the safety operating procedures as laid out in the relevant laboratory instruction sheets. These procedures are required when the work involves voltages exceeding 50V r.m.s. and are summarised below:-
- **Shrouded safety leads must be used.**
- Make sure you are familiar with the position of the supply isolating switches and emergency trip buttons where provided.
- Check carefully that **all** supply isolating switches are in the **off** position before starting to connect up.
- Check the voltage and current ratings of equipment **before use** and do not exceed these ratings.
- Ensure that the earthing leads are **in place** for the load banks, Variacs, synchronizing units, etc.
- Oscilloscopes must only be connected to power circuits via appropriate voltage and current **transposers**.
- Ask the supervisor or tutor to check your initial circuit and all circuit revisions before you switch on the power.

- During the work, **all** students in each group must agree to switching on the power every time this is done.
- Where suitable, “**soft-start**” the equipment using a Variac i.e. increase the supply voltage **gradually from zero** so that any fault produces limited effects. Return Variacs to the zero position after use.
- Take particular **care** not to accidentally separate leads carrying highly inductive current e.g. leads in the **field** circuit of a d.c. machine.
- Do not handle high-value capacitors rated at more than 50V without first carefully discharging through a suitable resistor and checking for negligible terminal voltage.
- If you are allowed a refreshment break, **do not re-energise** the equipment before the supervisor or tutor returns.
- As a general point of good working practice, develop the habit of only touching the controls with one hand, ensure that your other hand is not touching any metallic object whatsoever.
- **Ensure all sources of supply are switched OFF before you alter or dismantle the circuit.**
- Remove the leads by pulling on the plastic connectors **not the leads**.
- Take care not to stand on the shrouded safety leads as the shrouds will be damaged.

Mechanics, Fluids and Thermodynamics Laboratories (E003, C002, C006)

- Section 6 on Moving and Rotating Machinery and Robotics must be followed.
- In these laboratories, there are additional hazards associated with pressure systems, compressed gases, dust, fumes, smoke, heat, flammable liquids, chemicals and high velocity air flows. No student is allowed to work in these laboratories without supervision except project students after proper training.
- Wear protective gloves when handling materials (e.g. mercury, manometer fluid) which are harmful to human body.
- Wear eye protection when handling compressed air equipment. Keep clear of compressor as it comes on automatically when pressure drops.
- Compressors and pumps can produce considerable noise. Ear protection should be used.
- Steps and ladders must be used only on level ground. Ladders must be restrained at bottom when in use.
- When engines are running in the test cell, exhaust fans should be switched on.
- Wear leather gloves when touching hot objects (e.g. thermocouple calibration furnace).

Use of Radioactive Sources

- You may use a source only after being given permission.
- The sources must always be transported in their containers.
- Always use only one source at a time; return one before using another.
- Sources must not be handled except with tongs or similar holding tool.
- Never look directly at the open face of a source or point it at anyone.
- Never tamper with a source. If one appears damaged, report this immediately.
- Do not use a source in an experiment close to anyone who is not involved in the experiment.

- When a number of students are carrying out experiments, arrange as much space as possible between yourself and the other students.
- Do not rush when using sources, but work steadily to reduce the time a source is out of its container to a minimum.
- Wash your hands thoroughly when you have finished using sources.

Use of Lasers

Nature of Risks

Laser light can cause serious damage to the eye and, since this is often irreparable, the University working practices should be closely adhered to when using lasers. Some lasers can cause burning of the skin but this will usually heal. These working practices given below are derived from BS EN60825:1994 which is a European standard currently in force.

Designated Areas

The laser designated areas are the following rooms in Pandon Building: 209, 209A, 210, 210A, 211, 212, 215, 218. Lasers must not be used outside these areas without permission from the Laser Safety Officer. Lasers that are dedicated to specific experiments must not be removed from the experimental set up.

Laser Classification

- Lasers are classified according to a safety classification given in the above standard.
- Lasers of classification Class 3A and below will not cause permanent damage to the eye but should be used with caution.
- Students who intend to use lasers above Class 3A are required to attend a laser safety training course and be instructed in their operation. You will then be issued with a risk assessment form for each laser you are going to use. Finally, you will be required to sign a form indicating that you have had this training and have understood the working procedures.

General Working Practices

Students who use lasers of classification below Class 3A **must adopt the following points of working**

practice:-

- Under no circumstances must intra-beam viewing (staring into the beam) occur.
- Always ensure that the beam is terminated.
- Always make sure you know where the beam is going before switching on the laser or opening a shutter.
- Avoid stray reflections of the beam.
- Always wear the goggles or glasses (spectacles) where provided.
- If you intend to put your hand into the beam make sure you are not wearing jewellery which could reflect the beam.
- Avoid beam paths that are at eye-level.
- Do not fool about with lasers.
- If you notice any unsafe practice, follow the procedure described in Section 5 “General Requirements” and in addition report it to the Laser Safety Officer as soon as possible.

Microwave Equipment

The advice of the supervisor should be sought before using any equipment.

BSc (H) PHYSICS/PHYSICS WITH ASTROPHYSICS - Provisional Assessment Schedule 2015/2016

	Induction	1	2	3	4	5	6	7	8	9	10	11	12	Exam	Exam	Exam					
Year 1																					
EN0410 Electrical and Electronic Principles														Test					Laboratory Assessment 40%		
EN0414 Research, Analysis and Presentation						AI							AS						Exam 60%		
EN0415 Experiment and Discovery				AI		F		F		F									50% Laboratory Report		
MS0409 Dynamics																AS			100% Completion of logbook		
MS0412 Particles, Waves and the Big Bang														Test					Exam 100%		
MS262 Calculus														Test					Test 50% Exam 50%		
																			Test 20% Exam 80%		
Year 2																					
EN0581 Theory, Computation and Experiment			AI											AS		AI	F		AS	F	Lab Test 50% Computational Assignment 50%
EN0582 Quantum Universe													AI				AS				Exam 70%
EN0583 Semiconductor Physics							AI									AS	F				Assignment 30% Exam 70%
EN0584 Thermal and Nuclear Energy																	AI		AS		Assignment 30% Group Presentation 30% Exam 70%
MS0508 Advanced Mathematics for Physics														Test							Exam 70%
MS0509 Space-Time and Electromagnetism														Test							Test 30% Exam 70%
																					Test 30% Exam 70%
AI = Assignment Issued AS = Assignment Submitted Green Highlight = Exam or Test Grey = Break F = Feedback																					
Year 3 (PHYSICS)																					
EN0630 Optical Comms System Design (O)			AI											AS							Lab Report 20% Exam 80%
EN0631 Instrumentation and Control of Dynamical Systems (C)																					Exam ??% Planning document 20% Report 80%
EN0640 Individual Physics Project (C)			AI																AS		Exam 100%
EN0641 Quantum Devices (C)																					Exam 70%
EN0642 Advanced Photovoltaics (C)														AS							Literature Review 30% Exam 70%
MS0602 Dynamical Systems (C)														Test							Test 30% Exam 70%
AI = Assignment Issued AS = Assignment Submitted Green Highlight = Exam or Test Grey = Break F = Feedback																					
Year 3 (PHYSICS with ASTROPHYSICS)																					
EN0630 Optical Comms System Design (O)			AI											AS							Lab Report 20% Exam 80%
EN0640 Individual Physics Project (C)			AI																AS		Exam 70%
EN0641 Quantum Devices (C)																					Exam 100%
MS0602 Dynamical Systems (O)														Test							Test 30% Exam 70%
MS0610 Cosmology and Stellar Evolution (C)																					Assignment 30% Exam 70%
MS0611 Solar Physics (C)			AI													AS					Assignment 30% Exam 70%
AI = Assignment Issued AS = Assignment Submitted Green Highlight = Exam or Test Grey = Break F = Feedback																					

NOTE THAT THE ABOVE SCHEDULE IS SUBJECT TO CHANGE. YOU MUST BE AT THE UNIVERSITY DURING THE ASSESSMENT WEEKS IN JANUARY AND MAY. PLEASE SEE THE UNIVERSITY WEBSITE FOR DATES

BSc (H) PHYSICS/PHYSICS WITH ASTROPHYSICS - Provisional Assessment Schedule 2015/2016

	14/09/2015	21/09/2015	28/09/2015	05/10/2015	12/10/2015	19/10/2015	26/10/2015	02/11/2015	09/11/2015	16/11/2015	23/11/2015	30/11/2015	07/12/2015	14/12/2015	21/12/2015	28/12/2015	04/01/2016	11/01/2016	18/01/2016	25/01/2016	01/02/2016	08/02/2016	15/02/2016	22/02/2016	29/02/2016	07/03/2016	14/03/2016	21/03/2016	28/03/2016	04/04/2016	11/04/2016	18/04/2016	25/04/2016	02/05/2016	09/05/2016	16/05/2016					
	Induction	1	2	3	4	5	6	7	8	9	10	11	12	Winter Break	Winter Break	Winter Break	Assessment / Feedback	Assessment / Feedback	1	2	3	4	5	6	7	8	9	Spring Break	Spring Break	Spring Break	10	11	12	Exam	Exam	Exam					
Year 1																																									
EN0410 Electrical and Electronic Principles																		Test				F													Exam		F	Laboratory Assessment 40%	Exam 60%		
EN0414 Research, Analysis and Presentation					AI						AS						F		AI							AS							F					F	Laboratory Report 50%	Presentation 50%	
EN0415 Experiment and Discovery				AI		F		F		F		F								F		F		F		F					AS							F	Laboratory Report 100%	Completion of logbook	
MS0409 Dynamics																																				Exam		F	Exam 100%		
MS0412 Particles, Waves and the Big Bang																	Test																			Exam		F	Test 50%	Exam 50%	
MS262 Calculus										Test																										Exam		F	Test 20%	Exam 80%	
Year 2																																									
EN0581 Theory, Computation and Experiment			AI															AS		AI	F						AS							F					F	Lab Test 50%	Computational Assignment 50%
EN0582 Quantum Universe								AI			AS						F																			Exam		F	Assignment 30%	Exam 70%	
EN0583 Semiconductor Physics						AI														AS	F														Exam		F	Assignment 30%	Exam 70%		
EN0584 Thermal and Nuclear Energy						AI				AS							F																		Exam		F	Group Presentation 30%	Exam 70%		
MS0508 Advanced Mathematics for Physics																		Test				F													Exam		F	Test 30%	Exam 70%		
MS0509 Space-Time and Electromagnetism																		Test				F													Exam		F	Test 30%	Exam 70%		

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Health and Safety Guidelines in the Faculty of Engineering and Environment

University of Northumbria at Newcastle

1. General

- (1) The guidelines are proposed to ensure health and safety at work for students and staff in the Department. They comply with the University Health and Safety Policy and Procedures.
- (2) While the operational responsibility of health and safety in the Department lies with the Dean of Faculty aided by the Department Health and Safety Group, every staff member has the responsibility to identify hazards, control risks and report accidents in his/her working area.
- (3) The Department Health and Safety Group will hold meetings at least twice a year to review health and safety issues, and to promote health and safety awareness in the Department.

2. Health and Safety in Teaching

- (1) The Department will view health and safety education as an integrated part of all programmes that will benefit the students in their future career.
- (2) All students will receive, from Department Administration, the Faculty of Engineering and Environment Student Code of Practice for Safe Working (Code of Practice) in their first registration week. This document, which is constantly available in the Department Office and published on the Department Website, describes the general rules for safe working in different areas of the Department.
- (3) Organised by programme leaders, foundation and first year students will be given a dedicated lecture within the first two teaching weeks to review the Code of Practice. Students of direct entry to 2nd or 3rd year studies or short training programmes will receive, during the induction week, an instruction from programme leaders to study the Code of Practice.
- (4) Students will be given appropriate specific instructions in use of particular laboratories and equipment by appropriately qualified members of staff before using the facilities.
- (5) Before introducing any experimental procedure, staff members must fully consider the health and safety aspects and appropriate procedures should be taken to minimise the risk.
- (6) All teaching laboratories and workshops are subject to regular risk assessment by authorised technical staff members. Equipment will be safety tested according to technical specifications. Assessment records will be kept by the Department Health and Safety Group for review.
- (7) Final year and M.Sc. projects are subject to risk assessment before starting. An assessment form will be filled in by the student and signed by the supervisor.
- (8) Safety education will be part of every industrial visit made by the students.

3. Health and Safety in Research

- (1) Depending on the nature of work, research centres/groups in the Department may adapt their local detailed code of practice in accordance with the overall University Health and Safety Policy and Procedures. The adapted code of practice is to be agreed by the Department Health and Safety Group.
- (2) When a new test rig is set up, it is the responsibility of the research supervision team to foresee the associated risks and ensure protection, existing or added, against all realistic hazards.
- (3) Visitors to laboratories will be escorted. The host/hostess is responsible for the visitor's safety.
- (4) Research students and assistants will be given the Department of Engineering Student Code of Practice by the supervision team. Research students and assistants should observe the relevant parts of the Code of Practice during their practical work.

4. Continuous Monitoring

- (1) Accident, damage and identified risk should be immediately reported to the Technician Team Leader or Dean of Faculty. Report forms are provided to all laboratories and workshops.
- (2) The Department Health and Safety Group will keep and display a record of all accidents.

5. Contact Information

Contact Person of Department Health and Safety Group: Bill Gibson, Ext. 3976

University Health and Safety Adviser: Lesley Salkeld, Ext. 3718

Library

The libraries at City Campus and Coach Lane provide access to a wide range of print and electronic resources including over half a million print books, over 700,000 eBooks and more than 50,000 electronic journals. More details can be found on the University Library website:

<http://library.northumbria.ac.uk/home>

City Campus Library (number 14 on City Campus map) is housed near the Student Union building (number 30 on City Campus map).

Coach Lane Library is situated on the East Side of the Campus, in F Block (number 16 on Coach Lane Campus map).

City Campus library is open 24/7 during term time and from 9am to midnight during vacation times. Coach Lane library is open 7am until midnight (Monday to Friday), 9am until midnight (Saturday and Sunday). Opening hours are prominently displayed in the foyers of the library buildings, any changes are advertised on the Library website and on social media. Opening hours vary during bank holidays and are subject to change, so please check before you travel.

You will need to keep your smartcard with you to gain access to and leave the libraries. Your Smartcard is a universal card which not only gives access to the Libraries and other University buildings, but it also allows you to print, copy, scan, borrow books and make cashless payments.

The Library Catalogue can be accessed on and off-campus through the University Library website and the dedicated catalogue computers on each floor of both Libraries. The catalogue can be used to search for books and eBooks located in the University Library. It is quick and easy to use and will give you the information you need to locate the material on the shelves or read online. eBooks can be read on and off-campus, anytime, anywhere. NORA can be used to search for, and retrieve, up-to-date scholarly materials including articles, reports and statistics that are relevant to your studies. You can browse through all the online resources relating to your subject in one place including databases, journals and websites.

Students are entitled to borrow up to 15 items at any one time. Items can be issued using the self-issue machines on the ground floor of City and Coach Lane Libraries. You can renew your library books online through the MyLibrary section of MyNorthumbria or via the Library Catalogue.

Northumbria students can use other libraries such as the Robinson Library at Newcastle University and Newcastle City Library using the SCONUL access scheme. For more information see the Library SCONUL information page: <http://library.northumbria.ac.uk/sconul-holiday>

The Northumbria Skills Programme is a comprehensive skills programme designed to develop the key skills you need to succeed at university and beyond provided by the Library. It runs throughout the year and provides classroom style skills sessions on many topics including academic writing skills, giving accomplished presentations, and referencing your work correctly, as well as regular drop in

surgeries. Some sessions are bookable; simply consult the timetable on the Northumbria Skills Programme website: <http://library.northumbria.ac.uk/skillsdev-nsp>

Skills Plus is the Library's collection of online learning materials, with a focus on digital literacy and study skills that can be accessed on and off-campus. Using these resources is an excellent way to develop your skills through a range of online tutorials with quizzes, video demonstrations and printable help guides. <http://nuweb2.northumbria.ac.uk/library/skillsplus/topics.html?l3-0>

If you need help or advice, on or off campus, you can contact Ask4Help. The Ask4Help service provides you with help and support to access a range of University services including Library, Disability Support, Student Finance and Careers. The quickest way to find answers to some of the most popular questions asked by students is to look at Ask4help online. You can also contact us by phone and speak to a member of our dedicated enquiry team or email us your questions.

www.northumbria.ac.uk/ask4help

ask4help@northumbria.ac.uk

0191 227 4646

Northumbria Students' Union (NSU)

Northumbria Students' Union (NSU) is here to make sure you have the best experience possible. NSU is one of the largest and most exciting Unions in the country and that's all because of YOU. We represent you, the student, on all levels, on the issues students are concerned about; receiving a great academic experience, being very employable when you graduate, being safe on campus and in the city and having a fantastic time while a student.

NSU is run by students for students. You can have your say in what NSU does and how it is run, by contacting your [Sabbatical Officers](#) or by coming along to [Student Council](#)

MEMBERSHIP: As a student of Northumbria University you are automatically a member of the Students' Union. We also sell NUS Extra Card from the Students' Union at both [Coach Lane](#) and [City Campus](#) giving you discounts in shops and online, but you don't need one to use any of our services.

DIVERSE: Your Students' Union is a place which brings together students from all walks of life, all parts of the country and the world and many different cultures. NSU provides lots of opportunities for you to [Get Involved](#), make lasting friendships, increase employability and have FUN!

INDEPENDENT: NSU is independent of the University, with its own staff, services and decision-making structure. Run by students for students, providing the best services and opportunities for students we push for change from the University to deliver for students. Find out more at our [You](#)

[Said, SU Did](#) page. If you need advice about academic appeals or other issues, we can help. Check out the [Advice Page](#).

VALUE: Your NSU offers the best value for money, and everything you spend goes straight back into the Students' Union to fund all the activities that we run for you.

If you would like more information check out the website www.mynsu.co.uk or come and see us at our [offices](#) in City, Coach Lane and London.