

**Northumbria University
Faculty of Engineering and Environment**

**BEng (Hons) Electrical and Electronic
Engineering**

Student Handbook 2015 C 2016



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1 About this handbook

This handbook is designed to provide a guide to your programme of study at Northumbria. It should be read alongside the University and Faculty Student Handbooks which contain more general information about being a student at Northumbria within the Department of Physics and Electrical Engineering, Faculty of Engineering and Environment.

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/> (this is also available by clicking on 'New Students' on the University home page).

2 Welcome from the Head of Department of Physics and Electrical and Electronic Engineering

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 supporting 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 key for us to teach ourselves new material and work at the cutting edge of our disciplines. A few examples of our research include, Photovoltaics, Wind energy, Power systems, Electric Vehicles, Visible light communications, Signal processing, hydrophobic surfaces, smart materials, through to astrophysics research in high energy neutrino detection.

We have a large number of facilities that are available for you to use throughout your time here, and I actively encourage you to practice 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.

Richard Binns

Head of Department for Physics and Electrical Engineering

3 Welcome from the Programme Leader

Welcome to BEng (Honours) Electrical and Electronic Engineering. This is a well established, well respected programme which is accredited by the professional body the Institution of Engineering and Technology (IET). I hope you enjoy your year(s) of study on this very rewarding programme of study.

Dr Hoa Le Minh

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 at Department and subject area level.

Faculty Office

Office Location: B201 (second floor), Ellison building

Email: eb.ceisstudentsupport@northumbria.ac.uk

Telephone: 0191 243 7379

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.

All assignments are submitted in room B201 (second floor), Ellison building

Programme Leader

Dr Hoa Le Minh

Office Location: Ellison Building, room E405

Email: hoa.lehminh@northumbria.ac.uk

Telephone: 0191 227 3901

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 Faculty 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.

Programme Administrator

Your Programme Administrator holds all the key information regarding your programme. This is the person who manages such processes as enrolment, option choice, day to day correspondence, confirmation of attendance letters, marks entry, etc. They can be contacted via the Ellison Building (B202) Faculty Office.

Year Tutor

Year 1

Dr Guillaume Zoppi

Office Location: Ellison Building, room E306

Email: guillaume.zoppi@northumbria.ac.uk

Telephone: 0191 227 7013

Year 2

Dr Michael Elsdon

Office Location: Ellison Building, room E406

Email: michael.elsdon@northumbria.ac.uk

Telephone: 0191 227 7289

Final Year

Dr. Hoa Le Minh

Office Location: Ellison Building, room E405

Email: hoa.lehminh@northumbria.ac.uk

Telephone: 0191 227 3901

Your Year Tutor is a member of the academic staff and is responsible for students on this particular year of the course. They work closely with the programme leader and programme administrator to support you on your programme.

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 supports your learning and assessment on that module.

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 them. You can do this via email or you can just turn up at their office. Occasionally you may be able to have an immediate appointment, but don't be disappointed if you are asked to return at a mutually convenient time. Please contact staff to cancel if you are unable to make the 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 Faculty 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.

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. There is also a module – Student Support – which acts as an electronic notice board for a wide range of information that students need during the academic

year. It is therefore important that you check the eLP regularly – at least daily – for new announcements and new material.

Plasma Screens

The Faculty 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 NOTE: *IT IS REALLY IMPORTANT THAT IF YOU HAVE AN ISSUE YOU CONTACT US AS SOON AS POSSIBLE – WE ARE HERE TO HELP*

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 main aims of the programme are to

- Produce graduates of Electrical and Electronic Engineering with the necessary skills and attributes to take roles within industry as Professional Engineers, and provide the educational basis to facilitate progression to Chartered Status.
- Produce graduates who can apply fundamental principles and techniques to produce creative and innovative solutions to engineering problems.
- Equip students with an awareness of engineering in the wider economic, social and environment content.
- Offer a challenging programme, which is current, relevant and informed by staff research, consultancy and professional experience.

- Provide wide opportunities for access, consistent with Professional Body requirements.

5.2 Programme Learning Outcomes

a) Knowledge and Understanding

1. Knowledge and understanding of scientific principles underpinning the electrical engineering discipline **(UKspec US1, E1)**
2. Understanding of the historic, current and future contexts of scientific principles and technologies, and how they are changing **(UKspec US1)**
3. Knowledge and understanding of mathematical principles underpinning the electrical engineering discipline **(UKspec US2)**
4. Knowledge of commercial, economic and management techniques used to achieve engineering objectives **(UKspec S1, S2)**
5. Understanding of the requirement for engineering activities to promote sustainable development **(UKspec S3)**
6. Understanding of the need for a high level of professional and ethical conduct in engineering **(UKspec S5)**
7. Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, technology developments, etc) **(UKspec P3)**

(b) Intellectual Skills

1. Ability to analyse and create solutions to engineering problems in a creative and innovative manner **(UKspec US2)**
2. Ability to apply engineering principles in the analysis of engineering processes **(UKspec E1)**
3. Ability to identify, classify and describe performance of systems and components using scientific principles, analytical methods and modelling techniques **(UKspec E2)**
4. Awareness of the framework of relevant legal requirements governing engineering activities, including personnel, health, safety and risk (including environmental risk) issues **(UK spec S4)**
5. Ability to apply quantitative methods and computer software relevant to electrical engineering to solve problems **(UKspec E3)**
6. Ability to apply and integrate knowledge and understanding from different disciplines to engineering **(UKspec US3)**

7. Awareness of nature of intellectual property and contractual issues **(UKspec P5)**
8. Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety **(UKspec D1)**

c) Practical Skills

1. Knowledge of characteristics of particular materials, equipment, processes or products **(UKspec P1)**
2. Design suitable experimental arrangements using appropriate tools to measure selected parameter values and critically evaluate experimental data **(UKspec P2)**
3. Understanding the use of technical literature and other information sources **(UKspec P4)**
4. Understanding of appropriate codes of practice and industry standards **(UKspec P6)**
5. Awareness of quality issues **(UKspec P7)**
6. Ability to work with technical uncertainty **(UKspec P8)**
7. Ensure fitness for purpose for all aspects of the problem including production, operation, maintenance and disposal **(UKspec D5)**

d) Transferable/Key Skills

1. Manage the design process and evaluate outcomes **(UKspec D6)**
2. Identify and manage cost drivers **(UKspec C7)**
3. Use creativity to establish innovative solution **(UKspec D4)**
4. Understand customer and user needs and the importance of considerations such as aesthetics **(UKspec D2)**
5. Effective use of IT tools
6. Ability to convey information by written report and oral presentation
7. Manage time and resources efficiently
8. Work effectively both individually and as a member of a team

5.3 Programme Structure

Year 1						
S1	EN0410	EN0408	EN0409 Digital	EN0414	MS0265	EN0411
S2	Electronic Principles	Computer Programming	Electronics & Communications	Research Analysis and Presentation	Engineering Mathematics	Fundamentals of Energy Systems
Year 2						
S1	CG0037	EN0580	EN0564	EN0565	EN0566	EN0567
S2	Advanced Engineering Mathematics	Engineering Product Development	Analogue Electronics & Instrumentation	Programming & Digital Systems	Communication Systems	Power, Machines & Renewable Energy
Year 3						
Optional Placement Year						
Year 4						
S1	EN0624	EN0625	EN0626	Pathway modules – choose one pathway from those shown below		
S2	Individual Engineering Project	Design and Manufacturing Analysis	Digital Signal Processing Systems			

In Year 4 select one of the following pathways (each contains 20hcredit modules).

Electronics Pathway

EN0627 Embedded Systems
EN0628 Digital System Design and Implementation

Communications Pathway

EN0629 Wireless and RF Systems Design	EN0630 Optical Communication Systems Design
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Power Pathway

EN0310 Power Systems	EN0631 Industrial Instrumentation and Modern Control Systems
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5.4 Part Time Structure

Year 3			
S1	EN0566 Communication Systems	Option	EN0567 Power, Machines & Renewable Energy
S2			
Year 4			
S1	EN0564 Analogue Electronics & Instrumentation	CG0037 Advanced Engineering Mathematics	EN0565 Programming & Digital Systems
S2			
Year 5			
S1	EN0626 Digital Signal Processing Systems	Pathway modules – choose one pathway from those shown below	
S2			
Year 6			
S1	EN0624 Individual Engineering Project		EN0625 Design and Manufacturing Analysis

Option at year 3 is either
MS265 Engineering
Mathematics
OR
EN0580 Engineering Product
Development.
Students will be strongly
advised to take the
Mathematics option unless
they have a strong
Mathematics background

Year 5 Pathways. Students select **one** of the following pathways (each contains two 20 credit modules):

Electronics Pathway

EN0627 Embedded Systems
EN0628 Digital System Design and Implementation

Communications Pathway

EN0629 Wireless and RF Systems Design	EN0630 Optical Communication Systems Design
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Power Pathway

EN0310 Power Systems	EN0631 Industrial Instrumentation and Modern Control Systems
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5.5 Industrial Placements

Employers are looking for experience, as well as academic achievement in candidates and a 12 month placement is one of the best ways to gain such experience.

Most of our courses provide the option of doing a paid year in industry where your studies will be 'sandwiched' around a yearlong 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 working with household names such as CERN, Siemens, GSK, National Instruments and many more.

Secondly, your programme team and the Faculty's Placement 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 Placement 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.

5.6 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, design classes, and computerbased 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 standard teaching pattern is for Year Long Double Modules to be taught over two 15 week semesters with a three week examination period at the end. For first semester single Modules that involve an end of Module examination this will take place in weeks 13 and 14 of the semester. Other single semester Modules will be assessed continuously.

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 engineering skills. Most Programmes have three 'levels' of study:

Level 4 is first year work, where you will be taught in small groups, with regular Programme work and short laboratory reports to submit. You will be expected to use the set text books to support the lecture notes, and you will be provided with tutorial 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 Final Year studies, 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.

5.7 Feedback

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

Formally:

Staff/Student Liaison Committee meeting. The Programme Leader chairs the meeting which is also joined by the relevant year tutors. Students are required to elect a representative(s) from each year of the Programme, or more if required, representing their views at the meeting, which take place once per semester. This is a forum for the students' to comment on any issue relating to the running of the Programme. These meetings then feed in to the Programme Committee.

Programme Committee meeting. Three elected student representatives, from within the Staff/Student liaison committee members, 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, via Annual Review, 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. The results of this are posted in the module box within Blackboard along with any response from the module tutor.

Programme Evaluation Questionnaire. The Programme Leader is responsible for obtaining feedback from all students on the Programme and this information feeds in to the Annual Review of the Programmes.

Faculty Student Learning Experience (SSLE). One student from within the Faculty, who should be elected by the students, is required to attend the SSLE to ensure that the student body has an input in to the Quality Assurance and Enhancement 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.

The Faculty has an open door policy and students are encouraged to identify any problems they have at an early stage, via any mechanism, so that they can be dealt with promptly.

6 Programme and Assessment Schedule

Semester One		
Student enrolment	Thursday 10 September to Friday 2 October 2015	3 weeks and 2 days
Welcome/Induction Week	Monday 14 September to Friday 18 September 2015	1 week
Teaching Weeks	Monday 21 September to Friday 11 December 2015	12 weeks
December Congregation for courses completing after June Examination Boards	Monday 7 & Tuesday 8 December 2015	2 days
Winter Break	Monday 14 December 2015 to Friday 1 January 2016	3 weeks
Assessment Weeks	Monday 4 January to Friday 15 January 2016	2 weeks
Semester Two		
Teaching Weeks	Monday 18 January to Friday 18 March 2016	9 weeks
Spring Break	Monday 21 March to Friday 8 April 2016	3 weeks
Teaching Week	Monday 11 April to Friday 29 April 2016	3 weeks
Assessment	Tuesday 3 May to Friday 20 May 2016	3 weeks
Final year results published	Friday 24 June 2016	1 day
Summer Award Congregations (provisional)	Thursday 7 July to Wednesday 13 July 2016	1 week
Reassessment Period	Monday 22 August to Friday 26 August 2016	1 week

BENG Electrical and Electronic Engineering 1 Assessment Schedule

	Induction	1	2	3	4	5	6	7	8	9	10	11	12	Christmas	Christmas	Christmas	Assessment / Feedback week	Assessment / Feedback week	1	2	3	4	5	6	7	8	9	Easter	Easter	Easter	10	11	12	Exam	Exam	Exam		
	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			
Year 1																																						
EN0414 Research Analysis and Presentation											Assignment 1					F											Assignment 2											
EN0408 Computer Programming							Assignment 1									F																						
EN0409 Digital Electronics and Communications																F			Lab1	Lab2	Lab3					Lab4							F		E	F		
EN0410 Electrical Principles		Lab1	Lab2	Lab3	Lab4	Lab5	Lab6									F			Lab7	Lab8	Lab9	Lab10				Lab11	Lab1					E		F				
EN0411 Fundamentals of Energy Systems			Lab1			Lab2										F				Lab3		Lab4										F		E	F			
MS265 Engineering Mathematics																F																						
Year 2																																						
EN0580 Electrical Product Development							Assignment 1									F											Assignment 2											
EN0564 Analogue Electronics and		Lab1	Lab2	Lab3	Lab4	Lab5	Lab6									F			Lab7	Lab8													E	F				
EN0565 C Programming and Digital Systems																F																F		E	F			
EN0566 Communication Systems																F																	E	F				
EN0567 Power Machines and Renewables			Assignment 1													F																F		E	F			
CG0037 Advanced Engineering Maths																F																	E	F				
Year 3																																						
EN0310 Power Systems		Assignment 1																																E	F			
EN0631 Industrial Instrumentation and Modern							Assignment 1									F																	E	F				
EN0627 Embedded Systems																																				F		
EN0628 Digital System Design and Implementation																																		E	F			
EN0629 RF and Wireless System Design																																		E	F			
EN0630 Optical Communications System																																		E	F			
EN0625 Design and Manufacturing Analysis																																		E	F			
EN0626 Digital Signal Processing																																		E1	F			
EN0624 Individual Engineering Project			Project Planning					F																											E2	F		
Yellow Highlight = Assignment																																						
Blue Highlight = Lab																																						
Green Highlight = Exam																																						
Grey = Holiday																																						

7 Resources and Laboratories

Refer to supplementary document available on the eLearning Portal for information relating to laboratory resources.

8 Professional Bodies

The programme is accredited by the Institution of Engineering and Technology (IET) and has enjoyed continued accreditation for over 25 years. All students are encouraged to become student members of the IET upon ennoblement to the programme. Upon graduation, graduates can become members of the IET which is the first stage to becoming a chartered engineer.

9 Appendix

Special Instructions for Students on EngineeringJbased Courses

Laboratory Work

The Faculty has approximately fortyJfive laboratories, some of which contain fast moving, high voltage or inherently dangerous machinery and chemicals.

BEFORE ENTERING ANY WORKSHOP OR NONJIT LABORATORY, YOU MUST:

1. Keep your hair short or under a cap or hair3net to avoid the risk of accidental entanglement in drills or other rotating machine parts.
2. Remove any hanging items of clothing such as sleeves with loose cuffs, ties or jewelry when necessary. These can cause serious injury if accidentally caught in a machine.
3. Wear snug fitting overalls where required.
4. Wear safety goggles to avoid exposure to flying particles, or to welding flash.
5. Wear safety gloves when hands are exposed to heat, sharp objects, dangerous chemicals or other such hazards.
6. Wear appropriate clothing and safety equipment at all times.

Workshop Safety Training

The Faculty of Engineering & Environment Student Code of Practice for Safe Working requires all users of relevant workshop and/or laboratory facilities to attend a compulsory one day course provides instruction in basic safety, hand and power tool operations, correct work holding techniques and drilling, cutting and sawing equipment and operations.

STUDENTS WILL NOT BE ALLOWED TO USE WORKSHOP FACILITIES UNLESS/UNTIL THEY HAVE ATTENDED THIS SAFETY COURSE. IN ADDITION, NON3ATTENDANCE MAY RESULT IN A LOSS OF MARKS WITHIN MODULES INVOLVING LAB WORK AND THE USE OF WORKSHOP FACILITIES.

Attendance dates will be allocated to each student by the course leader for their programme. Again, students cannot commence use of lab and/or workshop facilities until the satisfactory completion of the relevant training.

Rotating Machinery and Robotics

Typical risk areas include Electrical Power and Robotics Laboratories and associated workshops.

Moving and Rotating Machinery

1. It is your responsibility to check that all guards or covers are secure and in place prior to using any tools or equipment.
2. Always 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.
3. Do not use any equipment until its operation has been demonstrated to you by a competent member of staff.
4. Replace all machine guards before operating the machine.
5. You must be capable of instantly locating the emergency stop button for any machine you use. This must become a reflex action.
6. Be prepared to switch off any other machine in your immediate area of work should an emergency arise.
7. Abrasive wheels may only be fitted and balanced by a certified person.
8. You must maintain your concentration at all times while a machine is in motion.
9. Never leave any machine unattended while it is in motion.
10. Contact measurement must NEVER be attempted on a machine which is in motion.
11. Take care not to distract or startle other machine operators.
12. Switch off the machine to prevent movement whilst changing cutting tools or work pieces.
13. Securely tighten all tool holding and work holding devices before machining.
14. **REMEMBER – REMOVE THE CHUCK KEY!**
15. Stand clear of all moving parts while machining.
16. Never clean away swarf with your hands. Always use the rake provided.
17. Direct and control coolant flow so that it drains into the sump tray at all times.

When Dealing with Robotics

1. Do not enter the marked exclusion zone of any robot when the robot is being operated.
2. During the operation of any robot, someone must always be within easy reach of the emergency stop switch.
3. 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

1. Check with the project supervisor to confirm a suitable location and time slot for the practical work to be carried out.
1. Unsupervised project work involving any voltages in excess of 50V r.m.s. is never permissible. Suitable arrangements for any work with exposed voltages greater than 50V r.m.s. must be agreed in advance with your supervisor and appropriate arrangements made.
 2. Wherever possible, the project hardware should be designed to operate from standard laboratory DC power supplies, i.e. should not be directly mains powered.
 3. However, if the project supervisor specifies that the circuit be directly mains powered, the following procedures are essential:
 4. Use only a double wound mains transformer i.e. not an auto transformer.
 5. Use an encapsulated transformer, if available.
 6. Ensure all screen/core earthing connections of the mains transformer are completed.
 7. Use 2 or 3 core cable only for the mains power connection, not an edge cone.
 8. Ensure ample spacing between the live, neutral and earth (if present) connecting points.
 9. Use only through hole soldering for the mains connecting leads.
 10. Check that the current and voltage ratings of any leads that you propose to use are adequate.
 11. Minimise the length of mains voltage tracks.
 12. Give the mains voltage tracks ample spacing from the transformer secondary tracks.
 13. Liberally coat all mains voltage tracks and live terminals of the completed PCB with a suitable insulating material such as silicone sealant.
14. Be particularly alert to the hazard of dangerous potentials present upon device heat sinks.
 15. Use only enclosures of insulating material.
 16. Use a strain relief fitting at the cable enclosure entry point.

17. Ensure by suitable design that semiconductor devices have adequate cooling, taking into account the restrictive effect of the enclosure.
18. 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.
 19. 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.
 20. 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:
 21. You must use a suitable rated protective device (fuse or circuit breaker) in order to limit the current flowing in the event of a circuit malfunction.
 22. Ensure to all reasonable standards that a short circuit cannot occur without passing the current through the protective device.
 23. Employ non-reversible battery leads.
 24. Never use high current battery charging without a timer or other cut-off arrangement.
25. Always make sure that your rig cannot be accidentally energised by others.
26. Never interfere with or alter another student's rig.
27. Do not borrow any equipment from another student's rig without prior permission.
28. Investigate any malfunction thoroughly before proceeding.
29. Do not leave your rig unattended when energised unless you have good reason.
30. Fix a "Do not touch" notice if a rig is left running.

Electronic Design and Manufacture Laboratories

Printed Circuit Manufacturing Facility

Only technical support staff manufacture PCB's.

Surface Mount Placement Equipment

Never place your hands over the worktable.

Reflow soldering equipment

Never touch the moving conveyor or put your hands inside the oven at any time.

Electrical Power Laboratories

Safety guidelines in the section on Rotating Machinery and Robotics must be followed.

1. 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:
 2. Shrouded safety leads must be used.
 3. Ensure that you are familiar with the position of the supply isolating switches and emergency trip buttons where provided.
 4. Check carefully that all supply isolating switches are in the off position before starting to connect up.
 5. Check the voltage and current ratings of equipment before use and do not exceed these ratings.
 6. Ensure that the earthing leads are in place for the load banks, Variacs, synchronizing units, etc.
 7. Oscilloscopes must only be connected to power circuits via appropriate voltage and current

transposers.

8. Ask the supervisor or tutor to check your initial circuit and all circuit revisions before you switch on the power.
9. During the work, all students in each group must agree to switching on the power every time this is done.
10. Where suitable, "soft3start" 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.
11. Take particular care not to accidentally separate leads carrying highly inductive current (e.g., leads in the field circuit of a DC machine).
12. Do not handle high3value capacitors rated at more than 50V without first carefully discharging through a suitable resistor and checking for negligible terminal voltage.
13. If you are allowed a refreshment break during any class session, you must not re3energise the lab/workshop equipment before the supervisor or tutor returns.
14. 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 never touching any metallic object whatsoever.
15. Ensure that all sources of electricity supply are switched OFF before you alter or dismantle the circuit.
16. Remove the leads by pulling on the plastic connectors, not the leads themselves.
17. Take care not to stand on the shrouded safety leads as the shrouds will be damaged.

Mechanics, Fluids and Thermodynamics Laboratories

1. Safety guidelines in the section on Rotating Machinery and Robotics must be followed.
2. 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, with the exception of project students who have received formal training.
3. Protective gloves must always be worn when handling hazardous materials (e.g., mercury, manometer fluid, etc.).
4. Eye protection must be worn when handling compressed air equipment. Keep clear of compressor as it comes on automatically when pressure drops.
5. Compressors, and pumps can produce considerable noise. Ear protection must be used in the vicinity of such equipment.
6. Steps and ladders must be used only on level ground. Ladders must be restrained at bottom when in use.
7. When engines are running in the test cell, exhaust fans must be switched on.
8. Suitable protective gloves must be worn when touching hot objects (e.g., the thermocouple calibration furnace).

Use of Radioactive Sources

1. You may never use a radioactive source without advance permission from a qualified member of staff.
2. Radioactive sources must always be transported in their proper containers.
3. Never use more than one radioactive source at a time; return one before using another.
4. Sources must not be handled except with tongs or similar holding tools.
5. Never look directly at the open face of a radioactive source or point it at anyone.
6. Never tamper with a radioactive source. If one appears damaged, report this immediately.
7. Never use a radioactive source in an experiment within the proximity of anyone who is not involved in the experiment.
8. When a number of students are carrying out experiments, arrange as much space as possible between yourself and the other students.
9. Do not rush when using sources, but work steadily to keep the time in which a radioactive source is out of its container to a minimum.
10. Wash your hands thoroughly when you have finished using radioactive sources.

Use of Lasers

Nature of Risks

Laser light can cause serious, potentially permanent damage to the eye and/or burning of skin. Safe working practices must be stringently adhered to when using lasers. These working practices given below are derived from BS EN60825:1994 which is a European standard currently in force.

Designated Areas

Lasers must never be used outside of their designated areas in labs and/or workshops without the express permission from the Laser Safety Officer. Lasers that are dedicated to specific experiments must not be removed from the experimental set up.

Laser Classification

1. Lasers are classified according to a safety classification given in the above standard.
2. Lasers of classification Class 3A and below will not cause permanent damage to the eye but must nevertheless be used with caution.
3. Students who intend to use lasers above Class 3A are required to attend a laser safety training course and be instructed in their operation. They will then be issued with a Risk Assessment form for each laser they intend to use. Finally, they will be required to sign a form confirming that they have received formal training as per the above and understand the working procedures.

General Working Practices

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

1. Under no circumstances must intra-beam viewing (staring into the beam) occur.
2. Always ensure that the beam is terminated.
3. Always make sure you know exactly where the beam is aimed before switching on the laser or opening a shutter.
4. Avoid stray reflections of the beam.
5. Always wear the goggles or glasses (spectacles) where provided.
6. If you intend to put your hand into the beam make sure you are not wearing watches or jewellery which could reflect the beam.
7. Avoid beam paths that are at eye-level.
8. Never engage in tomfoolery or otherwise misuse lasers.
9. If you notice any unsafe practice, you must follow the procedure described in the General Requirements section of this guide. In addition, this must be reported to the Laser Safety Officer immediately.

Microwave Equipment

The advice and consent of the supervisor must be sought before using any microwave equipment.

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.

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?13-0>

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.

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