

*Mechanical and Aerospace Engineering*



# Postgraduate Student Handbook 2018/19

**Faculty of Engineering  
MSc, PG Diploma and PG Certificate in**

**Renewable Energy Systems and the Environment**



The contents of this booklet are as far as possible up to date and accurate at the date of publication.

Changes and restrictions are made from time to time and the University reserves the right to add to, amend, or withdraw courses and facilities, to restrict student numbers and to make any other alterations as it may deem desirable and necessary. Changes are published by incorporation in the University Regulations.

It is the responsibility of each individual student to become familiar with University Regulations which apply to them, and in particular with any changes made to their Course Regulations in their later years of attendance:

<https://www.strath.ac.uk/sees/educationenhancement/qualityassurance/universityregulations/>

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# **Sustainable Engineering: Renewable Energy Systems and the Environment**

## **INTRODUCTION**

### **Renewable Energy Systems and the Environment**

Now in its twenty-fourth year, the course is part of the Sustainable Engineering postgraduate training provision. In today's society there is a growing awareness that the quality of life must be balanced by the need for conservation of world resources, especially energy, and the protection of the environment. Society therefore needs professionals who understand this balance and seek to harness energy resources in an environmentally friendly manner.

On the course you will learn about the different energy resources: renewable, fossil and nuclear, and the systems employed to harness and make use of these resources such as geothermal, wind, hydro and photovoltaic systems, combined heat and power schemes, heat pumps, solar thermal capture devices, high efficiency plant, advanced materials, advanced buildings, storage systems, adaptive control systems, the importance of end users and controls. You will also learn about the impact energy has on the environment and the ways in which this impact can be reduced. In particular, you will come to understand the technical relationships between Renewable Energy Systems and the Environment and feel confident about using modern computer-based methods to address the complexities that underpin these relationships.

The programme consists of instructional classes covering key energy themes (normally first semester); group projects tackling topical and demanding issues, site visits to see renewable and sustainable energy systems in practice (second semester), followed by an individual project, possibly with industrial attachment, leading to the submission of a dissertation. Teaching methods include: lectures, discussions, group working, informal crits, site visits, debating, and computer-aided learning.

The course leads, at its final level, to an MSc degree by instruction while offering Diploma and Certificate qualifications for students completing selected parts, either on a full- or part-time basis. There are three course parts, progressive in their rigour, corresponding to these three possible qualifications. The course has been accredited by the Energy Institute, the Institution of Mechanical Engineers and the Royal Aeronautical Society and deemed to satisfy further learning requirements for progressing to Chartered Engineer status.

### **Part A: Instructional Classes**

All 5 specialist modules and several generic modules are offered in the first semester, with other generic modules offered in the second semester. The specialist classes address the principles, concepts and issues which underpin all Renewable Energy Systems. The objective is to inform students about the different generation, supply and utilisation technologies and to prepare those who will progress to Part B. Details of specialist classes can be found in Part A of this document, while details of generic classes can be found in the separate Sustainable Engineering Course handbook. Successful completion of six instructional modules (with a correct mix of classes, see later) will lead to the award of a Postgraduate Certificate.

### **Part B: Group Project**

In the second semester students undertake a design project (valued at 40 credits) in addition to completing the remaining credits from part A taught modules. While the approved projects will change over time, they will typically involve the evolution of an energy system from inception to completion, including an assessment of its cost effectiveness and environmental impact. For example, this might involve the evaluation of a renewable energy design, the quantification of the impact of advanced facades with generation, insulation, shading properties and smart controls on an energy efficient building, or the analysis of field data from an energy installation to form and validate a model. Industry attachment is encouraged, often the project will be undertaken within a real industrial context. On successful completion of Part B (the 40-credit group project plus a total of 80 credits from taught modules), students can either graduate with a Postgraduate Diploma or continue down the MSc route.

### **Part C: Dissertation**

In this part of the course, students undertake supervised, individual project work which typically entails an in-depth study of an issue (or set of issues) possibly identified from the Part B activities.

**Awards**

The pass mark for MSc, PGDip and PGCert is 50%. Students obtaining a credit-weighted average of at least 60% in the other components of the course will be eligible for the award of MSc with Merit. Students obtaining a credit-weighted average of at least 70% will be eligible for the award of MSc with Distinction.

Students obtaining marks in the 40-50% band in individual modules can get compensation for a maximum of two taught modules, subject to an overall average above 55% in the Part A modules.

## Contact Information

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We hope you do not encounter any problems during your study, however, please do not hesitate to contact the administrative team at [mae-pg@strath.ac.uk](mailto:mae-pg@strath.ac.uk)

## Student Support Services

There are numerous support services within the University and these are detailed in the University Student Handbook which is available to all new students through the University's [Advice and Support Team](#). The student handbook will provide you with valuable and important information at the start of your course and during your study period, and can be accessed at: [Strathlife – The Student Journey handbook](#)

Information and student forms are also available on the Student Experience and Enhancement Services website at: <http://www.strath.ac.uk/sees>

### **IMPORTANT:**

**Please familiarize yourself with the University and course handbooks. You may also wish to refer to the relevant University and Course Regulations for postgraduate study:**

<https://www.strath.ac.uk/sees/educationenhancement/qualityassurance/universityregulations/>

**THE ONUS IS ON THE STUDENT TO READ ALL UNIVERSITY COMMUNICATIONS. FAILURE TO DO SO COULD POSSIBLY HAVE AN IMPACT ON YOUR STUDIES, IF YOU HAVE NOT READ INFORMATION PARTICULARLY RELATED TO [POLICIES AND PROCEDURES](#).**

## Practical Library Session

It is essential to know how to use and exploit the various resources of information on offer by the University Library. If you wish to attend a practical lab session, these will be held on

**Wednesday 26 September 2-4 pm held in [Curran Building](#), CU522**  
**Thursday 27 September 10-12 noon held in [Curran Building](#) CU321 A&B**

There is no requirement to register for these sessions, but it is highly recommended, if you wish any further information, please contact the Faculty Librarian: [Sally Bell](#)

For further information on the library, please visit [Library Tours](#)

## Myplace (Learning Resource)

The University's virtual learning environment (VLE) is called [MyPlace](#). It is accessed using your student DS username and password.

Myplace delivers online resources and activities designed to enhance learning. The pages may include assessments, online discussion learning materials (e.g lecture slides) and class news. All the classes that you are registered for will automatically appear on MyPlace once your class registrars make them available to you.

For information on other University learning resources, please visit the [Library](#) webpage

## Student Affairs

General University regulations are published on the University website.

Students should also be aware of the information available regarding "[Policies and Procedures](#)", which is available on the Student Experience and Enhancement Services website.

### **Academic Dishonesty:**

The University regards academic dishonesty as a serious offence. Allegations of academic dishonesty will be fairly assessed and appropriate action will then be taken. An allegation that has been dismissed as a disciplinary offence may still incur an academic penalty for poor scholarship.

The University is aware that there are a variety of temptations for students to engage in academically doubtful or dishonest activities during formal examinations, or in relation to assignments, practical work, dissertations or thesis preparation. In setting assessed assignments of whatever form, all teaching staff actively consider how to minimise the opportunities for students to cheat. Promoting a general climate of academic integrity within the student body is important.

Please read the "[Academic Dishonesty Guide](#)" for Examples of Academic Dishonesty

### **Absence and Voluntary Suspension:**

Further full information on Absence and Voluntary Suspension, please visit the Student Experience and Enhancement Services webpage:

<http://www.strath.ac.uk/sees/studentpolicies/policies/attendance/absenceandvoluntarysuspension/>.

### **Examinations:**

Students who fail to present themselves for an examination at the time and place published will be deemed to have forfeited that opportunity to sit the examination; except that in cases of absence through illness or other sufficient cause the Board of Examiners will take into consideration documentary evidence in assessing a candidate's position.

Students must sit all terminal tests and examinations unless prevented by illness, in which case a medical certificate must be produced.

Further guidance on Examinations is available: <http://www.strath.ac.uk/exams/examfaqs/>

### **Academic Appeals:**

Please refer to the [Appeals Procedure](#), before submitting an appeal to the Faculty Office - Engineering

### **Personal Circumstances:**

It is important that you familiarise yourself with the University's full [Personal Circumstances Procedure](#)

We wish to draw your attention to a few particular points relating to Personal circumstances:

You should back up your work, and this should not be on a memory stick or external hard drive only, as these possibly could be stolen, perhaps with the laptop. Therefore we strongly advise students to use an online storage system which provide appropriate protection of data. The University provides an optional storage service called **One Drive** which is available to students.

Full details of how to access, this can be found at:

<https://www.strath.ac.uk/ithelpdesk/helptopics/email/office365/>

### **Reminder:**

The University Personal Circumstances and Academic Appeals Procedure do **NOT** accept computer failure and lack of back up as grounds for discounting attempts or appealing:

### **Circumstances that will NOT be considered:**

Students should note that the Faculty's Personal Circumstances Board will not consider circumstances which



students are expected to cope with as part of a properly managed workload, or would not normally have a significant impact on academic performance. Boards will also normally disregard circumstances which the student could reasonably have avoided, where the student could have taken measures to reduce their impact, or are no different from the circumstances facing a significant number of other students. The following are examples of circumstances which would **not** normally be considered:

- Inadequate planning to cope with last-minute delays and missing deadlines because of computer difficulties, or transport difficulties;
- Losing work not backed up, failure of a single data source;

**IMPORTANT:**

The above Student Affairs Information is a brief guide to some of the important Policies and Procedures information, which will assist you during your study at Strathclyde.

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<https://www.strath.ac.uk/sees/educationenhancement/qualityassurance/universityregulations/>

**THE ONUS IS ON THE STUDENT TO READ ALL UNIVERSITY COMMUNICATIONS. FAILURE TO DO SO COULD POSSIBLY HAVE AN IMPACT ON YOUR STUDIES, IF YOU HAVE NOT READ INFORMATION PARTICULARLY RELATED TO [POLICIES AND PROCEDURES](#).**

## **Student Staff Liaison Committee**

Feedback will be provided by staff, this may be during class time, in the form of marks, written comments or verbal assessment. You may also wish to email the Class Registrar or Course Director for feedback.

Students also have the opportunity to feedback their comments to staff. At the start of the academic year, the department will contact students to ask for 2 students, to volunteer to sit on the Student-Staff Liaison Committee (SSLC), which normally sits twice a year, once in each semester. The meetings will be minuted, and actions noted.

For further information please refer, to [Student Representation guidance](#).

## Requests to sit Examinations off-campus

### Your attention is drawn especially to the following:

All students are expected to attend for examination at the University of Strathclyde on the dates and times scheduled, including mid-semester assessments (such as class tests). Only EXCEPTIONALLY will permission be given for students to sit examinations out-with the University.

Events such as holidays, family gatherings, or other personal appointments do not constitute exceptional reasons for exam purposes. In addition, sporting commitments will only be considered for students who are officially registered on the Elite Athlete Programme.

Permission will **NOT** be granted by the Department in the following cases:

- if a student wishes to leave the University during/prior to the end of an examination period
- where a student has a resit examination (all students must attend resits in Glasgow in person)

**NOTE – arrangements to travel overseas must not be made until you know that you have passed all classes for the current academic year.** Students who choose to make travel arrangements (such as purchasing non-flexible/changeable airline tickets) prior to receiving official results at the end of the academic year, must return to the University of Strathclyde in Glasgow for the resit diet to carry out examinations on campus for any failed classes.

Where necessary and where provisionally agreed in principle by the PG Course Director, requests to take an examination at a BONA FIDE institution other than this University (normally one of our overseas exchange institution partners or a British Council Office) should be formally made in writing via the Exam Co-ordinator.

This request must be made no later than SIX WEEKS prior to the start of the examination diet. Once permission, in principle, has been granted you must thereafter arrange for written communication to be sent by an authorised person at the proposed examination site confirming that the institute is prepared to act for the University of Strathclyde in this matter and giving a contact name, telephone number, e-mail address and full postal address. **NB: Post box addresses are not suitable as exam papers will be transported by courier.** This written communication must reach your Year Adviser no later than FOUR WEEKS prior to the start of the examination diet. Your request and the statement from the “authorised person” mentioned above are then sent by the departmental Examination Co-ordinator to the Director of Professional Services from whom formal approval must be obtained. **Examination papers cannot be sent abroad unless the above procedure has been followed.**

For all MAE classes with codes beginning “16” and “ME” the MAE Examination Co-ordinator is:

Donna Fairley, [donna.fairley@strath.ac.uk](mailto:donna.fairley@strath.ac.uk)

Names of Examination Co-ordinators for other Departments may be obtained from the ‘Students’ section on the Disability Service webpage <http://www.strath.ac.uk/disabilityservice/> or from the relevant Department.

You should also note that you will be liable for all expenses incurred and fees charged (if any) by the overseas institution.

## Part A - Module Descriptors

All students shall undertake an approved curriculum as follows:

- For the Postgraduate Certificate - no fewer than 60 credits including the 10 credit compulsory class and 20 credits of Faculty-wide Optional Classes and 30 credits of classes chosen from the appropriate individual pathway.
- For the Postgraduate Diploma - no fewer than 120 credits including the 10 credit compulsory class, a 40 credit group project and at least 20 credits of Faculty-wide Optional classes and at least 30 credits of classes from the appropriate individual pathway
- For the degree of MSc only - no fewer than 180 credits including Individual Project (60 credits)

### Individual pathway Compulsory Classes:

ME 927 (SEM1)	<a href="#">Energy Resources and Policy</a>
ME 928 (SEM1)	<a href="#">Energy Systems Analysis</a>
ME 929 (SEM1)	<a href="#">Electrical Power Systems</a>
ME 930 (SEM1)	<a href="#">Energy Modelling and Monitoring</a>

Information on the following Generic Modules are available in the Sustainable Engineering handbook or by browsing the [University class catalogue](#):

### Compulsory Class:

AB 975 (SEM 1)	Sustainability
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### Faculty-wide Optional Classes:

EV 939 (SEM2)	Environmental Impact Assessment
EF 927 (SEM1)	Design Management
EF 939 (SEM2)	Financial Engineering
EF 931 (SEM1)	Project Management
EF 932 (SEM2)	Risk Management
ME 527 (SEM2)	Engineering Optimisation

MAE Level 5 and Postgraduate Module descriptors are available to view at:

<http://www.strath.ac.uk/engineering/mechanicalaerospaceengineering/student-information/>  
**Please refer to Undergraduate MDFs for Level 5 classes**

### Important:

1. It is possible to take up to 20 credits from classes outwith those listed above, with the approval of the Programme Adviser of Studies, [paul.tuohy@strath.ac.uk](mailto:paul.tuohy@strath.ac.uk)
2. Students are expected to finalise their curriculum as soon as possible at the start of semester, changes beyond the 3<sup>rd</sup> week of semester are strongly advised against.
3. The recommended balance of credits between semester 1 / 2 is 50 / 70, 60/60 may also be accepted.

University timetables: [www.strath.ac.uk/timetables](http://www.strath.ac.uk/timetables) will provide information on date/times/location of classes. **Please check prior to attending the class for any changes.** Please familiarise yourself with the [Location of Buildings](#), prior to attending a class/lecture.

**Note:**

Examinations for Semester One modules will be held within the Semester One examination period:  
**3 December to 14 December 2018**

**Past exam papers (hard and electronic copies) may be found in the University Library.**

## Part B: Group Project

Part B commences on **Monday 14 January 2019 at 1400 hours** (venue to be confirmed). In this part of the course, projects are constructed in a student led process for groups of typically four to six individuals. Each project involves the critical evaluation and/or evolution of an energy/environmental system, including a technical appraisal and, where appropriate, an assessment of its cost effectiveness and environmental impact.

For full details of examples of Group Projects, please visit:

<http://www.strath.ac.uk/esru/degrees/renewablenrg/renewableenergygroupprojectwebsites/>

The expectation is that each group will:

- progress the project independently facilitated by the course tutors and in collaboration with an associated industrialist or focussed on a current industry challenge.
  - present themselves for project crits on Thursdays between **2.00pm and 5.00pm** (venue to be confirmed). on the following dates:

Crit	Date	Tutor
2	24 January	PT
3	31 January	PT
4	7 February	PT
5	14 February	PT
6	21 February	PT

Crit	Date	Tutor
7	28 February	PT
8	7 March	PT
9	14 March	PT
10	21 March	PT
11	28 March	ALL

- submit a web-based final project report which includes a succinct statement on the main technical, economic and environmental findings and the learning and technical outcomes.
- Make a final presentation of the project during the University's Knowledge Exchange week, Monday 29 April – Friday 3 May 2019, to an audience of industrialists and tutors.  
**Date to be confirmed in Semester 2.**

As a complement to the Part B projects, field trips will be undertaken. Visits usually take place on Wednesdays. Participation is compulsory. **Dates and venues to be confirmed at start of semester 2.**

<b>SITE VISITS</b> [Please note these dates are provisional]		
Date	Visit	Comment
27 February	New Lanark and SSE Hydro	Hydro, micro-hydro, water source heat pumps
6 March	GSK Irvine	GSK biomass, wind, storage and chip
13 March	Fintry+AD	Eco-village, PV, Solar HW, Biomass, Air Source Heat Pump, Elec Vehicles, building upgrades, AD CHP Plant, biomass DH.
20 March	West Whitlawburn Housing and Whitelees Wind Farm	Biomass district heating and large scale windfarm, domestic energy efficiency.
27 March	Hydrogen Office and Offshore Wind Catapult	Large scale Offshore Wind, Small scale Wind/PV, Hydrogen Electrolysis, Hydrogen Storage, H2 Vehicles, Fuel Cell, Heat Pump.

Projects must have a high technical content and include a significant amount of quantitative analysis, simulation or experimental work

The following provide examples of project templates which help illustrate the group project activity:

## Example Project One: Clean Fuel Technologies

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**Objectives:** Acting as a small consultancy/development partnership the group will prepare a brief for a large public transport company to consider alternative fuels to replace diesel.

**Outline:** This subject emulates the project carried out in Reading for the Council bus company, and takes into account previous experience in Italy. The subjects to be considered by members of the team working in partnership include:

- Experience using biofuels in Italy (e.g. esters of rape seed oil)
- European Commission policy on alternative fuels
- Relationship to "set aside" land policy for agriculture
- Technical aspects of the fuels and their use
- Pollution aspects and their costs
- Costs, including taxes
- UK Government policy
- Relationship with developing countries

**Procedure:** The team would make two presentations to a transport company. The final report would be circulated to one or more companies. The team would include members able to cover details of engineering, environmental impact, transport and marketing. The work would be structured under a team leader for individual responsibilities within the group.

**Programme:** A possible activity plan:

Week	Tasks
1 - 2	Formulation of the project and allocation of responsibilities and tasks. Initial site visits.
3 - 5	Initial reports and in-house discussion. More details on site.
6	First presentation to the associated company.
7 - 10	In-depth investigation and individual report presentation.
11	Assembly of final report.
12	Final project presentation.

**Outcome:** Feasibility report for the bus company and two presentations to the company.

## Example Project Two: Commercial Viability of Landfill Gas (LFG)

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**Objectives:** To examine the various factors that determine the economic and resource viability of landfill gas (LFG) and to scope the potential multi-purpose use as a source of energy in Scotland.

**Outline:** Organic wastes decay in landfills under anaerobic conditions, producing a mixture of primarily methane and carbon dioxide. Methane is a potent "Greenhouse Gas" and emissions from landfills can also be a significant environmental risk. However, once the environmental impacts of LFG are controlled, its methane content makes it a useful source of renewable energy. Using the gas offers significant environmental benefits over flaring it off or simply venting it to the atmosphere. Strengthening environmental protection legislation is mandating effective gas control measures at most landfills. Energy recovery, if perceived as an economically viable prospect, can complement the prime objective of gas control.

**Procedure:** The team will:

- establish a database of Scottish landfill sites.
- assess the potential landfill gas resource in Scotland.
- consider the impact of current and future environmental legislation.
- consider sustainable development strategy and LFG utilisation, particularly in rural areas.
- examine the potential applications, markets and economic potential of LFG.
- investigate the economics, investment and infrastructure requirements of various utilisation scenarios.
- identify those areas which are more suitable for the deployment of particular utilisation scenarios.
- investigate the perceived constraints or barriers to investment and commercialisation of LFG as an energy source.

**Programme:** A possible activity plan:

Week	Tasks
1 - 2	Establish sites data base.
3 - 5	Resource assessment aspects.
6	First presentation to collaborators.
7 - 8	Utilisation options, applications and potential markets.
9 - 10	Sustainable development and implementation issues.
11	Draft final report, second presentation.
12	Final project presentation.

**Outcome:** A report to illuminate and clarify the commercialisation issues and the interactions of the various participants (waste operators, developers and potential customers). In this manner, the study will develop a method for matching potential market applications with the most suitable sites and their chances for a successful development.



## Example Project Three: Renewable Energy, Bottom-Up

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**Objective:** To evaluate national energy policy, but from the experience of individual installations and programmes.

**Outline:** It is well known that the major difficulties facing a company developing renewable energy, relate to institutional and local factors, and not to grand policy. For instance raising finance is a very immediate difficulty; obtaining planning permission is a local problem that varies from area to area; installation and maintenance of equipment require the skills of local companies whose abilities vary greatly; many practical matters are not foreseen at national level, but only come to light with working experience.

**Procedure:** The team will:

- consider UK policy and experience of renewables from a governmental point of view.
- plan which renewables schemes to consider in detail, e.g. some of those developed in Scotland and Northern England that can be visited.
- divide the work for detailed investigation of named projects, subject to cooperation from the operators and owners.
- make site visits and individual cooperation with the operators.
- report on particular schemes.
- analyse common and special factors.
- identify relationship to national policies.
- conclude and recommend.

**Programme:** A possible activity plan:

Week	Tasks
1 - 2	Specification of the task; literature review.
3 - 5	Detailed plan and trial visits.
6	First presentation to collaborators.
7 - 10	Detailed site/company reports.
11	Draft final report; second presentation to collaborators.
12	Final report.

**Outcome:** The aim is to publish the results as a web-based information resource.

## Example Project Four: Energy Conscious Building Design

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**Objectives:** To impart an understanding of the principles underlying the design and operation of energy efficient buildings and to encourage the development of skills in the application of advanced simulation within a design context.

**Outline:** This project will entail a review of best practice in terms of each building design parameter (construction, layout, etc.), the utilisation of available energy (passive solar, group heating, etc.) and system control. Sources consulted will include the Energy Efficiency Office, the Energy Design Advisory Service, the Building Research Establishment and the Energy Technology Support Unit in the UK; and the programmes of the Commission of the European Community, especially DGXII and DGXVII.

**Procedure:** The various options available for energy saving will be identified and placed within a suitable 'taxonomy'. Dynamic energy modelling techniques will then be used to assess the energy savings and environmental impact of the different design options and environmental control regimes. In particular the project will focus on advanced energy saving technologies such as adaptive envelopes, 'smart' controllers, simulation based energy management systems, passive solar features and energy use metering. The feasibility of the integration of photovoltaic panels into the building fabric could also form a component of the project.

**Programme:** A possible activity plan:

Week	Tasks
1	Team formation, development of project brief, preliminary task assignment.
2 - 3	Best practice review and industrial visits.
4	Technical planning, detailed task assignment.
5 – 10	Energy/environmental appraisal by computer simulation.
11	Economic evaluation.
12	Submission of group report and poster.

**Outcome:** The elaboration of a methodological approach to energy conscious building design based on simulation. The methodology will offer a procedure whereby designers can differentiate between available options and select near optimum combinations. A particular building design will be evolved to demonstrate the methodology in use.

## Example Project Five: Transmission of Renewable Energy

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**Objectives:** To identify where the "best" sources of renewable energies may be found. To examine technically the feasible solutions which would enable the energy gained to be transmitted to the users.

**Outline:** In general the sources of renewable energy are far away from the high concentration of users, e.g. areas of high winds or waves are not normally near densely populated cities. As a result, the cost of transmitting the acquired energy becomes uneconomic unless attractive solutions are available. The study will explore the usable potential of renewable energy and consider ways in which it might be maximised in the future.

**Procedure:** The project begins by identifying locations of renewable energy sources in Europe with a view to assessing the spare capacity available on existing transmission systems. Case studies will be used to examine the range of options and the economic/environmental issues.

**Programme:** A possible activity plan:

Week	Tasks
1 - 2	Preparation for project work. Definition of objectives and preparation of work schedule.
3 - 4	Literature review and selection of case studies.
5 - 8	Data collection and analysis, review of technologies for energy transmission and storage.
9 - 10	General conclusions extracted from case studies with projections for the future.
11	Assembly of final report.
12	Final report and presentation preparation.

**Outcome:** At the micro level: a practical assessment of the limitations on exploitation of Renewable Energy Systems in the short to medium term, in a form appropriate for use by regional planning authorities.

At the macro level: an assessment of existing systems to determine spare capacity and availability, and an identification of the best option for future European development.

## Example Project Six: Energy from Waste

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**Objectives:** To examine and evaluate EfW systems, principally multi-fuel/MSW incineration technology, as representative of the BPEO in the context of an integrated and sustainable waste management strategy, encompassing waste minimisation, recycling, energy recovery and landfill.

**Outline:** The Government's policy on sustainable waste management is clearly intended to increase the proportion of waste managed by the disposal options towards the top of the 'Waste Hierarchy'. Further, > 85% of MSW is currently being landfilled, despite the fact that under NFFO tranches 1 and 2 municipal waste to energy represented 82% of contract awards. However, to date the vast majority of these projects have never been implemented.

**Procedure:** The team will: Review UK waste management strategy and policy developments relating to EfW. Investigate recent EfW case histories. Detail an EfW integrated scheme in terms of the various design, control and technology aspects found in a typical MSW incineration plant with energy recovery facilities. Explore the environmental issues, advantages and impacts likely resultant from an EfW scheme, i.e. air pollution, principally dioxins, and ash residue treatment and disposal. Particularly in the light of pollution control and new UK emission limits. Further, consider human health and safety aspects of surrounding population. Consider the role and influence of the planning authority. Consider the economics, investment and infrastructure requirements along with any Government 'Level playing field' policy, i.e. the tax treatment of incinerator residues, etc., likely to act as a barrier or affect implementation. Assess the local issues and factors likely to be responsible for the 'critical mass' necessary for or influencing the implementation of any EfW facility.

**Programme:** A possible activity plan:

Week	Tasks
1 - 2	Literature review of EfW technology
3 - 5	Investigate case histories
6	First presentation to collaborators
7 - 8	Environmental impact/pollution issues
9 - 10	Implementation issues
11	Draft final report, second presentation
12	Project presentation and report/poster submission.

**Outcome:** An informed report on EfW technology, environmental impact, implementation factors and the likely future role in a sustainable waste management strategy.

## Example Project Seven: Disposing of Decommissioned Offshore Oil Platforms in the North Sea

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**Objectives:** To examine decommissioning and disposal procedures currently adopted by the oil industry and determine the associated environmental impacts resulting from these methods.

**Outline:** This project aims to:

- identify a small number of feasible methods which could be used in disposing of decommissioned offshore oil platforms in an environmentally friendly way.
- technologically examine one key issue or problem which has to be overcome or solved if the groups preferred method is to become a feasible solution.
- outline a procedure for the implementation of the chosen method for a given concept which has been adopted in platform design.

**Procedure:** It is recommended that some of the following steps should be taken:

- Acquire an understanding of the problems involved.
- Examine the various options on offer.
- Critically review these options.
- Select a preferred option and give the reason for your choice.
- Consider the key issues relating to the options and identify one technological problem requiring attention.
- Investigate the problem.
- Make visits, discuss the problem, think out solutions, evaluate them etc.
- Prepare a contents list for the report.
- Write the report using the contents list as a guide.

**Programme:** The following twelve week programme is suggested:

Week	Tasks
1	Project specification and literature review.
2 - 3	Identification of options with advantages and disadvantages.
4 - 6	Analysis of key issues for preferred option.
7	Review, presentation of initial ideas and evaluation
8 - 10	Refine analysis.
11 - 12	Reporting and final presentation.

**Outcome:** An informed report on platform decommissioning procedures and the resulting environmental impacts from these methods, concluding with a report on future decommissioning procedures that minimise environmental damage.

## Example Project Eight: Decentralised Integration of Wind Energy with Desalination Plant

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**Objectives:** To study the architectural and control options which exist when designing an integrated wind driven desalination plant and to identify the optimum solutions.

**Outline:** In many parts of the world fresh water is scarce and reliance is placed on desalinated brackish or sea water. Desalination is energy intensive, and creation of new water plants inevitably means parallel creation of new energy supplies. Given recent environmental awareness, renewable energies such as wind are often considered in this context. For new water plant remote from a strong grid, local, decentralised energy production is an alternative to grid creation or reinforcement. This gives rise to a major problem - desalination processes tend to be designed to give constant power demand whereas wind can only supply power in a random manner. Special approaches must be taken in designing architecture and control strategies to overcome this mismatch. Three desalination techniques are suited to wind energy: reverse osmosis (mechanical), electrodialysis (electrical/mechanical) and vapour compression (thermal/ mechanical). It is not clear which combination offers best overall advantage.

**Procedure:** The project team will:

- identify the operational characteristics of different desalination plant (for a team of four it is suggested that one member specialises in electrodialysis, one in vapour compression and two in reverse osmosis)
- identify the scope for varying the gross power demand of the plant either by modularisation or 'acceleration/deceleration'
- define performance indices for a combined wind-desalination system (e.g. water quality, overall efficiency, cost etc.) against which assessments can be made
- define a specification for a target plant in terms of required water production profile and quality limits
- model and refine different architecture and control strategies to obtain the 'best' systems based on each of the three desalination processes, this being done by time domain modelling using a year's worth of one hourly wind speeds as the basic input.

**Programme:** The following twelve week programme is suggested:

Week	Tasks
1	Project planning and task allocation, definition of target specification.
2 - 3	Definition of operational constraints/characteristics of desalination plant.
4	Planning of computer programming strategy.
5 - 7	Testing of models.
8 - 10	Ongoing refinement and assessment of systems.
11 - 12	Reporting and final presentation.

**Outcome:** The outcome will be a report highlighting the key technical, economic and operational considerations which must be taken into account when designing a decentralised, integrated wind driven desalination plant. The report will define the best architectural and control solutions for three desalination technologies and will make relative comparisons between the

## PART C: EF900 Individual Project

Students are encouraged to come up with their own ideas for a possible research project based on their experiences of the course and aligned with their future career aspirations. There will be a meeting in March (date and venue to be confirmed), at which project selection will be discussed and students will be asked to submit a draft proposal by the end of semester 2.

In this part of the course students undertake an individual research project in which a selected topic is studied in depth, sometimes in an industrial setting. This involves students carrying out a comprehensive literature review, defining realistic objectives, devising a method of approach, systematically carrying out the work and submitting a dissertation in electronic format as a pdf file as directed by the Programme Advisor of Studies. Dissertations from recent years may be found on the web at:

<http://www.strath.ac.uk/esru/degrees/renewablenrg/reseindividualtheses/>

**PLEASE NOTE:** the undertaking of the student project of 60 credits, to qualify for the award of MSc, requires approximately 600 hours of study. Therefore, it is important to note that you should be fully committed to your project during this period. Any request for an extension will only be granted by the Personal Circumstances Board for recognised personal circumstances (refer to the [University's Personal Circumstances Procedure](#)). **For example, other work commitments will not normally be considered an adequate reason.**

In order to graduate at the ceremony in November, the final version of your dissertation must be submitted to your project supervisor **NO LATER THAN FRIDAY 23 AUGUST 2019 (a first draft should be submitted to your project supervisor by Friday 9 AUGUST, which will provide time for feedback).**

**It is important to note that this is a STRICT DEADLINE for successful completion of the MSc course. Bear in mind, however, that it is necessary to register to graduate prior to completion of the dissertation.**

### Part-time Students

The normal duration for a Part-time (PT) student on the MSc programme is 36 months. Meaning 60 credits should be completed per year. PT students can choose to start the project in their second year of study in line with the full-time cohort meaning May (June graduation) or they can wait until the new academic session starting in September (November graduation)

### PG Diploma Students

Students who are enrolled in the PG Diploma course, who meet the requirements and wish to be moved to the MSc course can request that a transfer be considered at the June Board of Examiners. They can still choose a project however this will be at risk and will not be confirmed until after the Board of Examiners. Students should inform [mae-pg@strath.ac.uk](mailto:mae-pg@strath.ac.uk) and [paul.tuohy@strath.ac.uk](mailto:paul.tuohy@strath.ac.uk) of which option they wish to choose:

- Students can wait until the board of examiners results before commencing their project; meaning they would commence in early June and submit mid-September which would result in a June graduation in the following year.
- Students can commence their project 'at risk' in May and if the board of examiners agree on the PG-MSc transfer, they can continue and graduate in November.

**Information and application procedure for Graduation is available at:**

<http://www.strath.ac.uk/studywithus/graduation/>

## **PENALTIES FOR LATE SUBMISSION OF PROJECT:**

Please ensure that the project is submitted by the deadline as confirmed above – **23 August**. Students will be notified by the Programme Advisor of Studies at the commencement of the project, of a deadline for a first draft to be submitted to your project supervisor. Students missing deadlines may forfeit all the marks associated with the final submission element of the project.

The following points should be noted:

- The Programme Advisor of Studies will remind students of the deadlines and terms of submission at the start of project
- If the student adhered to earlier deadlines for draft submissions which comprised part of the final mark, those marks will be retained
- The procedure for final submission must be followed (for example via MyPlace). Draft submissions will not be considered as the final version, and therefore will not be marked accordingly
- If a project is submitted late, it will be marked as normal and the late submission noted. It can then be considered by the Faculty's Personal Circumstances Board, if personal circumstances have been lodged, and a recommendation made to the Board of Examiners.
- The department will, in the event, of late submission affecting the entire cohort, make a logical and local decision

Please note this does not apply to coursework submitted as part of the assessment for a 10 or 20 credit taught module. In this case, the department will apply local rules on penalties for late submissions.



# **Appendix 1**

## **Departmental Occupational Health and Safety Arrangements**

Emergency telephone numbers (internal) - Extension 2222 or 3333

Emergency telephone number (external) 9/999 Fire/Police/Ambulance

### **1. Safety Organisation**

Health and safety within the Department is organised in accordance with the University Safety Code (Section 6.6 of the University Calendar) which should be studied by all members of staff. All members of staff will be issued with a copy of these Regulations and are required to sign a declaration stating that the Regulations have been read and understood. Supervisory staff should ensure that the attention of students is drawn to the provisions of the Safety Code and Departmental Safety Regulations.

The Head of the Department has ultimate responsibility for all health and safety matters.

Health and safety management is undertaken by the Departmental Safety Convener.

An Area Safety Committee has been formed to monitor health and safety issues within specific areas. The identities of current post-holders and their areas of responsibility can be obtained from Central Services or from the Departmental Safety Convener.

General information on any health and safety matter should be directed to the Departmental Safety Convener in the first instance.

The University's Safety Services Unit can be contacted on Ext 2726.

### **2. Departmental Safety Committee**

A Departmental Safety Committee has been appointed consisting of at least three persons representative of the main groups of staff working in each area and include, where appropriate, at least one student. The Departmental Safety Convener convenes the meetings of the Departmental Safety Committee and acts on its behalf as necessary.

### **3. Fire**

In the event of a General Fire Alarm the procedure is set out in the Fire Regulations posted at every floor of the James Weir Building and any other building you may occupy. Read these carefully and check from time to time for any changes which may be made.

- Fire drills will be held at least once per semester.
- Know the meaning of the audible fire alarms.
- Know every escape route in the building.
- Exit by a different route at each drill.
- Note locations of fire extinguishers - all are clearly marked.

In the event of a fire being discovered:-

- Leave the room, close the door and raise the alarm by activating the nearest "break-glass" fire alarm call point and informing the security wardens (Ext 2222 or 3333).
- If it is safe to do so, use an appropriate fire extinguisher to attack the fire. Do not use water where electrical equipment or flammable liquids are involved.
- In the case of laboratory fires, if it is safe to do so, switch off all electrical and fuel supplies to the equipment involved or, if necessary, to the entire laboratory.
- Do not store combustible materials on or near electric heaters.
- Do not accumulate waste material.

- Keep litter bins covered.
- Keep fire exits clear of obstructions

#### 4. Accident or Illness

Emergency Telephone Numbers - Extension 2222 or 3333

- If possible give immediate assistance to the patient. General First-Aid Guidance notes are contained in all First-Aid boxes. A First Aid box may be found in all of the Departmental Laboratories.
- Get help of colleagues.
- Telephone 2222 or 3333 giving own name and department, exact location (building, floor, room number) and nature of incident.
- Say if a doctor is required.
- Do not move the patient from reported position (unless obviously necessary to avoid further injury) until the arrival of the ambulance services.
- The patient should be accompanied to the hospital by a colleague.

#### 5. Reporting of Accidents and Dangerous Occurrences

All accidents and dangerous occurrences, however apparently trivial, should be reported to the member of staff in charge or to the technician in charge of the laboratory. **The Departmental Safety Convener** should also be informed.

An official Accident or Occurrence Report Form S.1 should be completed for all accidents and dangerous occurrences and sent to the University Safety Officer via the **The Departmental Safety Convener**. Should an incident result in hospital attendance, the Safety Office should be informed by phone as soon as possible.

#### 6. COSHH

Under the Control of Substances Hazardous to Health Regulations 1988 (COSHH), it is incumbent upon anyone involved in the use of hazardous materials to ensure that a safe working practice is agreed upon. No work is permitted until a **RISK ASSESSMENT FORM (S20/S21)** has been completed. Copies of each assessment must be lodged with the Safety Convener.

All staff and relevant students should be acquainted with the Regulations.

Copies of the approved Guidance handbook on COSHH may be obtained from the Safety Convener or the University Safety Office.

Failure to comply with the Regulations may result in that area of activity being shut down BY LAW.

#### 7. Hazardous Operations

Work should not proceed unless a Risk Assessment has been issued and signed.

Suitable protective clothing must be worn for all potentially dangerous operations (e.g. grinding/welding) supplies of which are available from the technician in charge of the laboratory.

All areas in which special hazards exist (e.g. lasers) are clearly marked and entry to these regions is restricted to those personnel having permission to work in them. Refer to the Protection of Eyes Regulations 1974.

All hazardous materials and glassware should only be transported or carried in properly designed safety containers. Winchester should be carried only in proper holders, not in the hand. Passenger lifts should not be used unless special precautions are taken.

#### 8. Permits to Work

All persons, other than trained workshop staff, who wish to use machine tools, hand held tools or welding equipment, etc must have a Permit to Work signed by the Head of Department or his appointed Deputy and an appropriate Academic Supervisor. Permits will only be granted to persons who can show evidence of satisfactory training and relevant experience. Permit holders must liaise with the Laboratory Superintendent before using any equipment. Permit application forms can be obtained from the Departmental Safety Convener.

## **9. General Laboratory/Workshop Procedure**

- Protective clothing and safety glasses must be worn at all times.
- Coat racks or lockers are provided and should be used for outdoor clothing (coats, scarves, etc.).
- Food and drink is not permitted in laboratories or workshops.
- Always use machine guards where provided.
- Clean tools and machines after use and deposit all scrap material in the bins provided.
- Keep litter bins covered.
- Observe and obey No Smoking signs.
- Observe and obey all warning signs.
- Horseplay is forbidden.
- When operating equipment in the laboratories, at least two people should be present. One of these should be a technician or a member of the academic staff. Where working alone is essential, the completion of a Risk Assessment must be performed and endorsed by the Laboratory Superintendent or Academic Supervisor prior to the commencement of such work.
- Avoid loose clothing, long hair and badly fitting footwear.
- Keep all chemicals in suitable storage (see under COSHH).
- Switch off all gas cylinders, water, gas and other taps when not in use.
- Keep labs and workshops tidy.
- Keep floors clean and free of oil and grease deposits.
- Do not obstruct passages, doorways or other thoroughfares.
- Keep clear of overhead lifting-gear.
- Lifting tackle should only be used by trained personnel under the overall supervision of the technician in charge and in accordance with appropriate regulations. Replace all guard rails which may have been removed to facilitate the movement of equipment.
- Do not overload electrical power points.
- Trip hazards, such as trailing cables must not run across working areas.

### **9.1 Office Areas**

- Office areas should be kept clean and tidy and free of trailing electrical cables.
- Cables should be inspected regularly and replaced if the insulation shows signs of wear.
- Materials should not be stored on top of filing cabinets or cupboards particularly near eye level.

- Filing cabinets should be filled from the bottom to ensure stability and drawers kept closed.
- Solvents should only be used in well ventilated areas and kept clear of heat sources.

#### **10. Access to Buildings outwith Normal Hours**

See Access to University Premises (Appendix 2) and page 14 of this Handbook.

#### **11. Supervision of Postgraduate and Project Students**

Supervisors should establish a mode of working with their students such that the supervisor is aware of and agrees to, each element of work, that safe working practices are agreed and where appropriate set down on paper and that regular, active, supervision is established.

#### **12. Visitors to Laboratories**

Visitors to the laboratories who are not accompanied by a member of staff should report to the relevant Laboratory Superintendent.

Maintenance staff should report to the relevant Laboratory Superintendent before commencing work in any laboratory area.

Children under the age of 14 are not normally permitted to enter laboratories or workshops. (See Appendix 2 of this Handbook).

#### **13. Electricity at Work Regulations 1989**

All offices, storerooms, workshops and laboratories, of whatever kind, within the Department must comply with these Regulations.

It should be noted that the University's Estates Management Department is responsible for all electrical services in the University, e.g. isolators, sockets and other such fixed equipment and no one may break into the electrical system for any reason without the authorisation of the University Electrical Engineer. Persons involved in the use of, and/or responsible for the use of electrical equipment, must read the Regulations and the University's own handbook entitled "Local Rules for Electrical Safety" (November 1991), a copy of which may be obtained from the Departmental Safety Convener. Work on 'live' equipment is prohibited unless in the most exceptional circumstances; before any such work is undertaken permission in writing must be granted by the Departmental Safety Convener.

#### **14. General Electrical Safety**

Open-bar electric fires and non-automatic kettles are not allowed in the University.

Multi-way distribution boards with 13 amp shuttered outlets may be used from a socket provided the total load does not exceed 13 amps and they are designed to BS1363. Adaptors are not permitted.

Plugs must be fitted by, and new equipment inspected by, a competent person, before being taken into service, normally by arrangement with the relevant Laboratory Superintendent. A record of the equipment must be kept (see 15 below). The Departmental Safety Convener may approve members of staff bringing in their own personal electrical equipment (except those banned items shown above), however, such items must also be included in the Departmental inventory of electrical equipment and appropriately inspected and tested (see 15 below).

All staff have individual responsibility to report obviously faulty equipment, e.g. broken plug tops, damaged cables, etc. to their supervisor or directly to the relevant Laboratory Superintendent. Equipment thought to be defective should not be used and must be reported immediately to the relevant Laboratory Superintendent. Such equipment should be removed from service until compliance with Section 15 is established. Users of equipment should regularly inspect for damage to casings, cables and plugs etc. and for loose screws.

Where specific hazards exist in laboratory/workshop areas they will be clearly marked at the direction of the relevant Laboratory Superintendent.

All persons wishing to use new or existing equipment in laboratory areas must liaise with the relevant Laboratory Superintendent before commencing work.

#### **15. Inspection and Testing of Electrical Apparatus**

All electrical apparatus is required to be inspected and tested at certain intervals. Portable electrical equipment should not be used unless it possesses an approved PAT label.

All fixed installations are the responsibility of the University Electrical Engineer.

All other equipment which can be plugged into a socket, including extension cables, etc. (and can also include battery operated equipment) is the responsibility of the Head of Department.

The Regulations require records to be kept of the maintenance, inspection and testing of all equipment in some detail for the duration of its working life. These records will be maintained centrally by the Departmental Safety Convener. Advice should be sought from the relevant Laboratory Superintendent prior to the introduction of any new electrical equipment.

## 16. Control of Noise at Work Regulations 2005

Loud noise at work can damage hearing therefore, measures have to be put in place to prevent or reduce risks from exposure to noise at work. It can also be a safety hazard at work, interfering with communication and making warnings harder to hear.

The Regulations require the employer to assess the risks to your employees from noise at work; take action to reduce the noise exposure that produces those risks; provide your employees with hearing protection if you cannot reduce the noise exposure enough by using other methods; make sure the legal limits on noise exposure are not exceeded; provide your employees with information, instruction and training; carry out health surveillance where there is a risk to health.

The Noise at Work Regulations 1989 have been revised and the new 2005 updated legislation comes into force on 6th April 2006 (with the exception of the music and entertainment sectors where the Regulations come into force on 6th April 2008).

1. The new Regulations require employers to take specific action at certain action values (previously called action levels). These relate to:

⌚ the levels of noise employees are exposed to averaged over a working day or week (e.g. use of weekly exposure would be appropriate in situations where noise exposures varied markedly from day to day e.g. gardening staff using power tools on two days of the week); and

⌚ the maximum noise (peak sound pressure – noises due to impacts e.g. hammering, pneumatic impact tools) to which employees are exposed in a working day.

Noise levels are measured in decibels (dB) and the following new values are:

### a. **Lower exposure action values:**

⌚ daily or weekly exposure of **80dB** (previously 85dB);

⌚ peak sound pressure of **135dB**.

### b. **Upper exposure action values:**

⌚ daily or weekly exposure of **85dB**;

⌚ peak sound pressure of **137dB**.

**Exposure limit values:** (these are levels of noise exposure which must not be exceeded)

daily or weekly exposure of **87dB**, peak sound pressure of **140dB**. These exposure limit

values take account of any reduction in exposure provided by hearing protection ie personal protective equipment.

2. There is a new specific requirement to provide **health surveillance** where there is a risk to health.

Hearing protection must now be made available where there is exposure above the new lower exposure action value (80dB).

Hearing protection must be worn and a programme of control measures (see below) implemented where there is exposure above the new upper exposure action value (85dB).

Noise assessments will require to be reviewed to take into account the changes in the action levels. (See below).

Health surveillance must be provided for all individuals, staff or students where there is a risk to health from exposure to noise e.g. employees who are likely to be regularly exposed above the upper exposure action values, or are at risk for any reason, e.g. they already suffer from hearing loss or are particularly sensitive to damage. More information on health surveillance is available from the University's Occupational Health Service. If you have any concerns regarding occupational noise induced hearing loss or tinnitus (ringing or buzzing in the ears) please contact the Occupational Health Service on extension (JA) 4824 or email [occupationalhealth@strath.ac.uk](mailto:occupationalhealth@strath.ac.uk).

The implementation of these Regulations can be quite complex and advice should be obtained from the Safety Officer by anyone affected by them.

#### **17. Buildings and Equipment**

Building structural faults should be brought to the attention of the University's Estates Management Department.

The safety and installation of electrical equipment and the clearance of electrical faults up to the normal 13 Amp socket outlets are the responsibility of the University's Electrical Engineer who is based in Estates Management.

#### **18. Radiation Hazards**

Radiation Hazards are the responsibility of the Area Radiation Protection Supervisors. The identities and locations of current post-holders can be obtained from your Departmental Safety Convener.

#### **19. Compressed Gas Safety**

Only persons within the Department who have been specifically trained may transport, attach or detach gas cylinders from equipment. These persons will follow the University Guidance on Compressed Gas Safety (15<sup>th</sup> December 2009).

## Appendix 2

### Access to University Premises - John Anderson Campus

- 6.7.1 The University Court has approved the following regulations to control access to premises belonging to or in the occupation of the University in order to balance the need for access on the one hand and considerations of general and personal safety (of users), security (of property), and economy (in light, fuel and security staff) on the other.
- 6.7.2 The normal hours of access to departmental accommodation are as follows:
- |                       |  |
|-----------------------|--|
| Monday-Friday         |  |
| Andersonian Library   | (as stated in Regulation 3.5 of the University Calendar)                                   |
| Computer Centre       | 0800-2200  |
|                       | Sports Centre (as stated in the Regulations of the Centre for Sport and Physical Activity) |
| All other departments | 0800-1800  |
- 6.7.3 Some University buildings may be open beyond 1800 hours. Nevertheless, the normal hours of access for departmental accommodation is 0800-1800 hours. Every other time is considered outwith normal working hours.
- 6.7.4 Saturdays, Sundays and public holidays are considered to be outwith normal hours of access.
- 6.7.5 Academic, senior administrative and academic related staff are granted automatic rights of access outwith normal hours of access (please see the above) to communal accommodation and departmental accommodation within the area with which they are identified.
- 6.7.6 Estates Management personnel are granted automatic rights of access outwith normal hours of access (please see above) to communal accommodation and departmental accommodation, normally by prior arrangement with the Head of Department or other departmental staff responsible for the departmental accommodation. However, obviously, in an emergency, for example, flood, Estates Management staff may have to enter departmental accommodation without prior notification. It is, therefore, imperative that any hazardous operations or particularly hazardous material which by necessity is left on open benches be appropriately labelled.
- 6.7.7 Computer Centre staff are granted automatic rights of access outwith normal hours of access to all areas where that department has computer and communications equipment.
- 6.7.8 University Safety Services personnel are granted automatic right of access to all University accommodation at all times.
- 6.7.9 Research fellows, research assistants, individual postgraduate students and members of the technical, secretarial, clerical and manual staff may be granted rights of access to communal accommodation and departmental accommodation outwith normal hours of access. Buildings may be open until 2200 hours but permission (for those who require it) to enter departmental accommodation is required from the Head of Department or their deputy. Individual undergraduate students may also be granted such rights of access through the same procedure. The levels of access available are as follows:

- (1) Unlimited Access
  - (i) An unlimited authorisation access card (RED) must be issued by the department and signed by the Head of Department or their deputy and the person being granted access.
  - (ii) The department and those areas specified within it which have been authorised for entry must be stated on the card.
  - (iii) The card may be valid for up to one year from issue. However, the expiry date must be shown on the card.
  - (iv) The card is only valid if used in conjunction with an unexpired student/staff identity card or other photographic identification.
  - (v) The card is issued on the understanding that the cardholder has read and understood that part of the appropriate Departmental Safety Regulations pertaining to out of hours working.
  - (vi) Unlimited access should only be granted when considered essential by the Head of Department.
  - (vii) Requests for red cards for lab access must be accompanied by a risk assessment (S20 form) and a red card request form (see pages 12 and 13) signed by the project supervisor.

ANY BREACH OF REGULATIONS WILL RESULT IN IMMEDIATE CANCELLATION OF OUT OF HOURS ACCESS AND DISCIPLINARY PROCEEDINGS.

#### Computer Centre Access

6.7.10 RED card access needs a countersignature by Computer Centre staff as well as Head of Department signature.

### **Temporary Rights of Access**

6.7.11 The Head of a Department or, in their absence, a deputy previously authorised by the Head of Department may, exceptionally, grant temporary rights of access to departmental accommodation, including laboratories and workshops, outwith normal hours of access for a maximum period of one year at a time to a named visitor of not less than 16 years of age in respect of an individual person deemed by the Head of Department on their own responsibility to be suitable.

6.7.12 Some departmental equipment may only, by statute, be used by persons over 18 years of age. The Head of Department must ensure the visitor granted access is fully aware of all appropriate University/Departmental Safety Regulations and Procedures including evacuation.

6.7.13 The name of the visitor granted access and a note of the duration of the access granted must be lodged with Security Control.

6.7.14 Members of staff and students who would normally need RED CARD access are exempt from this requirement when attending social functions authorised by the Head of Department, in departmental rest areas, for example, common rooms, tea rooms, etc. This exemption is only valid until 2200 hours. If it is expected that the function will continue after this time, special permission must be granted by the Chief Operating Officer. Please see Regulation 6.7.15.

6.7.15 The Chief Operating Officer may, exceptionally, grant temporary rights of access to persons other than those granted rights of access under previous Regulations for the purpose of attending specific meetings, examinations or other functions on University premises. When temporary rights of access are so granted Security Control must be notified.

6.7.16 Departmental Safety Regulations must make adequate provision for the health and safety of all persons using departmental premises outwith normal hours of access as defined in the Regulations above.

6.7.17 All persons granted rights of access who use premises outwith normal hours must inform Security Control of their intention to enter, remain in or leave the premises in order that the security staff may arrange for them to be granted access to or exit from the building concerned. They must also record their presence on the premises either by telephoning Security Control or by signing the log book at Security Control (or, in the case of the Royal College, the James Weir or Thomas Graham Building, the log book held at the James Weir Building, Montrose Street entrance) before they enter the premises. All University staff must carry a University staff identity card or other photographic identification. Students must carry a current student identification card plus the appropriate departmental authorisation (for example, BLUE or RED card). Persons using premises outwith normal hours of access may be refused entry or requested to leave by a member of the Security or University Safety Services staff if they cannot show proof of identity.

6.7.18 Security staff must check periodically the safety of individuals recorded as being on the premises outwith normal hours of access.

6.7.19 Persons using premises outwith normal hours of access must have access to a telephone in order to contact Security Control in the event of an emergency.

6.7.20 Operations outwith normal working hours which have been assessed and identified as having a particular risk associated with them must have appropriate control measures in place to handle the foreseeable consequences of the work.

6.7.21 Abuse of the system may result in confiscation of the access card and identity card by Security or Safety Services personnel.

### **Children - Special Access**

6.7.22 Children (persons under the age of 16) are permitted to enter the office accommodation and sports and recreational facilities of the University during the normal hours of access. Access to University premises is only permitted if accompanied by a parent or other responsible adult. Outwith normal working hours, children may be allowed access to office accommodation only; they must be accompanied by the parent or legal guardian who must directly supervise the child.

6.7.23 Children are not permitted to enter laboratories or workshops or other accommodation whose sole means of access is by way of a laboratory or workshop unless for the purpose of attending a supervised course, demonstration or exhibition in which case all sources of potential hazard will have been removed or rendered safe by other means.

### **Pet Animals**

6.7.24 Pet animals of any nature may only be brought on to University premises under extraordinary circumstances. A Head of Department, on advice from a Departmental Safety Convener, may exceptionally authorise access to department premises in which case the animal must be kept under the direct supervision of the owner or other responsible person. A guide dog accompanying a blind person will normally be permitted unrestricted access to University premises but the nature of equipment in certain areas may make it necessary to deny access to such guide dogs.



# Mechanical and Aerospace Engineering

## Request for a Red Card for After Hours Work

(6pm -10pm Mon-Fri;  
9am-5pm Sat/Sun & Holidays)

James Weir Building.

Please complete the following and make **two copies of the signed document**. The Safety Convener will retain the original. A copy must be retained by the supervisor and one kept by yourself for reference.

---

A: Is the Red card (permission for out-of-hours work) being issued to allow the researcher to conduct non-hazardous work and/or paper work i.e. office work?

B: Is the Red card (permission for out-of-hours work) being issued to allow the continuation of practical work in laboratories? A Risk Assessment must also be provided with the Red Card application that outlines measures that will be implemented to ensure out-of-hours work will be conducted safely.

Date .....

Name .....

Supervisor(s) .....

Area(s) of the building to which access is requested (Floors and or labs)  
.....

**For all persons requesting access for activities associated with A only (no partner required)**

In return for permission to be in the building after hours, I agree to register my presence with Security on every occasion that I work out of normal hours (6pm -10pm Mon-Fri; or 9-5 Sat/Sun or when the Univ. is officially closed)

Signature .....

**For all persons requesting access for activities associated with B.**

**NOTE: All those requiring laboratory work should complete this section.**

In return for permission to be in the building after hours, I agree to register my presence with Security on every occasion that I work out of normal hours (6pm -10pm Mon-Fri; 9-5 Sat/Sun or when the Univ. is officially closed)

**It is understood that I can only work when I have a partner who is prepared to remain in the building until my activity has been completed.** The onus is on me to ensure that this person has been identified prior to 6pm weekdays and 6pm Fri for Sat & Sun work or for days when the Univ. is to be officially closed.

The programme of work to be conducted will be discussed in advance and approved by my supervisor or his nominee prior to its commencement.

Signature .....

**Supervisors**

It is my wish that the above be provided with permission to work out of normal hrs. Where the researcher has requested access to continue practical work, the programme will have been approved in advance. I understand that I have a duty of care (defined in the area safety regulations Sec. 9) to the researchers under my direction working after hours.

Signature .....

**The department will not be held responsible for any accident or incident which occurs should you deviate from the above. Should you be found within the building working alone after hours on activities covered by section B your permission to work out of normal hours will be withdrawn.**