GRADUATE SCHOOL OF ENGINEERING
MSc, PG Diploma and PG Certificate in
Power Plant Engineering
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Introduction
The University of Strathclyde has existed in various forms in Glasgow since 1796 and is recognised as one of the largest and most important institutions in the field of engineering education and research in the UK. Located in the centre of Glasgow - Scotland’s commercial and industrial capital - it caters for a population of around 15,000 Undergraduate and 7,000 Postgraduate students.

The Faculty of Engineering comprises 8 departments, covering all major engineering areas: Architecture, Biomedical Engineering, Chemical & Process Engineering, Civil & Environmental Engineering; Design, Manufacture & Engineering Management; Electronic & Electrical Engineering; Mechanical & Aerospace Engineering; and Naval Architecture & Marine Engineering. The Graduate School of Engineering has recently been formed to co-ordinate postgraduate training across the Faculty.

The MSc in Power Plant Engineering is a unique course set up following an initiative by Scottish Enterprise and the industry body the Industrial and Power Association, to develop accelerated training and postgraduate qualifications for staff already employed in the power generation sector, and to attract graduates wishing to work in the industry. The resulting Power Plant Engineering programme is the result of consultations with over twenty international companies involved in all aspects of power generation. Industrial companies also provide a significant input to the modules.

Engineering involves the creative process of turning knowledge of science and technology into products, services, and infrastructure that benefit society. The energy sector is currently undergoing major changes, providing significant technological challenges and offering excellent career prospects for well-qualified engineers. The role of engineering is crucial in developing efficient technologies that can help protect the environment while contributing to competitiveness and economic growth.

The Power Plant Engineering course offers flexible postgraduate training opportunities, and leads to awards at Postgraduate Certificate, Postgraduate Diploma and MSc levels. It is also possible to take individual modules for Continuing Professional Development purposes.

The course includes specialist and generic taught modules, and industry-relevant projects for those progressing to the MSc. Teaching methods include lectures, discussions, group work, informal reviews and computer-aided learning. The modules are a mixture of one-week intensive blocks and weekly lectures spread over a semester.

The programme comprises specialist and generic taught modules and a project. Each taught module is worth 10 PG credits. On successful completion of 6 taught modules, a Postgraduate Certificate is awarded to those who are not continuing further. Continuing students take a total of 12 taught modules (120 PG credits); in this case successful completion will result in the award of Postgraduate Diploma. Alternatively, such students can continue on to the MSc, which entails the production of a dissertation worth 60 credits, giving a total of the 180 PG credits necessary for the award of MSc.

Specialist Instructional Modules
These modules focus on different technical aspects encountered in modern power plant, addressing the principles, concepts and issues which underpin the design and operation of the various components.

Generic Instructional Modules
Students can select from a range of generic modules which are available to provide other skills which are considered necessary for professional engineers. Those on offer include Design Management, Project Management, Environmental Impact and Sustainability, Information Management, Financial Engineering; Risk Management, Environmental Business Strategy, Environmental Management Systems and Environmental Impact Assessment.

Individual Project
On successful completion of 12 taught modules, students choosing the MSc route undertake an industry-relevant project which entails the production of a dissertation. This project would typically be carried out within a company and would typically entail an in-depth study of an issue (or set of issues) identified and supported by industrial and academic supervisors.
Duration of Study
The minimum duration of this full-time MSc course is 12 months while the minimum duration for PG Diploma students is 9 months. Candidates may be awarded credits, and have their curriculum reduced accordingly, on the basis of passes obtained in a relevant programme of the University or another institution.

Admission
Applicants will normally possess a degree or a professional qualification which is deemed by the University to be equivalent. For those wishing to undertake parts of the course on a non-graduating basis, a first degree is not required.

Fees
Fees are common for all UK, EU and Overseas students. Students registering for the part-time MSc programme pay an annual course fee for 3 years. Fees for the current academic year 2013/14 are £4800 and are subject to inflationary increases each year. Modules can be taken on an individual basis for a cost of £1000 per module.

Funding
Students may be supported by member companies of the Industrial and Power Association. Some PSAS funding is available from SAAS subject to conditions.
Instructional Modules

Each module is valued at 10 PG credits. Some of the modules are offered as a block delivery, which involves a one-week course at the University. For the specialist technical modules, relevant course material will typically be distributed in advance of the modules which students will be expected to study before the one-week teaching week. Personal study and assessment will take place after this one-week teaching week. Other modules will take place spread over the twelve weeks in semester 1 or semester 2.

Assessment methods will vary between the individual modules, and may comprise examination or written assignments, or a mixture of the two. Details of the assignments will be given during the modules, and will also be available within the University of Strathclyde’s Virtual Learning Environment “Myplace” to which all registered students will have access.

Individual Project

Students taking the full MSc course undertake supervised, individual project work, with the award of MSc being made on the basis of an acceptable report/dissertation submission.

Assessment and Examinations

The pass mark for postgraduate assessment is 50% overall average, with no modules falling below 40% and having a maximum of two modules in the 40-50% band.

In the case of assignments, there will be a deduction of 5% per day for overdue assignment submissions.

Refer to the Course General Regulations for Resit Practice and Progress Procedure. For further information please refer to Regulations 19.1.25 – 19.1.33
Contact Information

<table>
<thead>
<tr>
<th>Department of Mechanical &amp; Aerospace Engineering</th>
<th>Technical</th>
<th>Administrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Strathclyde</td>
<td>Dr Matt Stickland</td>
<td>Ms Diane McArthur</td>
</tr>
<tr>
<td>James Weir Building</td>
<td>Course Director</td>
<td>PG Administrator</td>
</tr>
<tr>
<td>75 Montrose Street</td>
<td>T: +44 141 548 2842</td>
<td>T: +44 141 548 2846</td>
</tr>
<tr>
<td>Glasgow G1 1XJ</td>
<td>E: <a href="mailto:matt.stickland@strath.ac.uk">matt.stickland@strath.ac.uk</a></td>
<td>E: <a href="mailto:d.mcarthur@strath.ac.uk">d.mcarthur@strath.ac.uk</a></td>
</tr>
<tr>
<td>Scotland, UK</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Further information on the course can be obtained from the website at:

http://www.strath.ac.uk/mae/studyhere/postgraduatesstudies/ppt/

Student Support Services
We hope that your time on the course will be trouble-free but should you have problems of whatever nature there are numerous support services within the University.
For information regarding the course and available support services, please contact Diane McArthur in the Central Services of the department in the first instance.

PLEASE NOTE 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 GUIDELINES AND PROCEDURES.
19.47  
Department of Mechanical and Aerospace Engineering

Power Plant Engineering

MSc in Power Plant Engineering
Postgraduate Diploma in Power Plant Engineering
Postgraduate Certificate in Power Plant Engineering

Course Regulations
[These regulations are to be read in conjunction with Regulation 19.1]

Admission
19.47.1 Notwithstanding Regulation 19.1.1, applicants shall possess
(i) a degree (or in the case of direct entry to the degree of MSc, a first or second class Honours degree) from a United Kingdom university in Science or Engineering; or
(ii) a qualification deemed by the Course Director acting on behalf of Senate to be equivalent to (i) above.
In all cases, applicants whose first language is not English, shall be required to demonstrate an appropriate level of competence.

Duration of Study
19.47.2 Regulations 19.1.5 and 19.1.6 shall apply.

Mode of Study
19.47.3 The courses are available by part-time study only.

Curriculum
19.47.4 All students shall undertake an approved curriculum as follows:

for the Postgraduate Certificate – no fewer than 60 credits from the classes in Lists A and B
for the Postgraduate Diploma – no fewer than 120 credits, including no fewer than 80 from the classes in List A and no fewer than 30 from the classes in List B.
for the degree of MSc – no fewer than 180 credits, including the Project.

Classes
List A: Specialist Classes *
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Level</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME 917</td>
<td>Advanced Boiler Technologies 1</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>ME 918</td>
<td>Advanced Boiler Technologies 2</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>ME 919</td>
<td>Electrical Power Systems</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>ME 920</td>
<td>Materials for Power Plant</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>ME 921</td>
<td>Environmental Performance and Related Technologies</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>ME 922</td>
<td>Energy Resources and Policy</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>ME 923</td>
<td>Gas and Steam Turbines</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>ME 924</td>
<td>Power Plant Systems</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>ME 926</td>
<td>Nuclear Power Systems</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

List B: Faculty-wide Classes *
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Level</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF 927</td>
<td>Design Management</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>EF 930</td>
<td>Information Management</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>EF 932</td>
<td>Risk Management</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>EF 934</td>
<td>Financial Engineering</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>EF 935</td>
<td>Project Management</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>EF 928</td>
<td>Sustainability</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>
Exceptionally, such other classes totalling no more than 20 credits, as approved by the Course Director.

Students for the degree of MSc only:
EF 900 Project  5  60

Examination, Progress and Final Assessment

19.47.5 Regulations 19.1.25 – 19.1.33 shall apply.
19.47.6 The final assessment will be based on performance in the examinations, coursework, the project where undertaken and, if required, in an oral examination.

Award

19.47.7 Degree of MSc: In order to qualify for the award of the degree of MSc in Power Plant Engineering, a candidate must have performed to the satisfaction of the Board of Examiners and must normally have accumulated no fewer than 180 credits, of which 60 must have been awarded in respect of the project.

19.47.8 Postgraduate Diploma: In order to qualify for the award of the Postgraduate Diploma in Power Plant Engineering, a candidate must normally have accumulated no fewer than 120 credits from the taught classes of the course.

19.47.9 Postgraduate Certificate: In order to qualify for the award of the Postgraduate Certificate in Power Plant Engineering, a candidate must normally have accumulated no fewer than 60 credits from the taught classes of the course.
19.1 General Regulations for Postgraduate Awards by Instruction
[The following General Regulations should be read in conjunction with the
regulations governing specific courses]

Admission

19.1.1 Applicants shall normally:
(i) possess a degree (or in the case of direct entry to a Masters programme, a
first or second class honours degree) from a United Kingdom University; or
(ii) possess other qualifications deemed, by the Course Director (or nominee)
acting on behalf of Senate, to be equivalent to (i) above; or
(iii) be deemed, by the Course Director (or nominee) acting on behalf of
Senate, to have achieved an academic standard equivalent to (i) above

19.1.2 In all cases, applicants whose first language is not English, shall be required to
demonstrate an appropriate level of competence in the English language.

19.1.3 Applicants who satisfy the provisions of Regulation 19.1.1 may, in addition, be
required to have had a period of relevant experience acceptable to the Senate.

Credit Transfer and Recognition of Prior Learning (RPL)

19.1.4 The relevant Course Director (or nominee) may admit applicants and/or approve
exemption from part of a course by credit transfer or RPL provided this is done in
accordance with University procedures and against criteria defined on a course by
course basis.
Credit granted for credit transfer or RPL may only be used once and, when used to
gain exemption, will normally relate to achievements within 5 years of registration
on a University of Strathclyde programme.
Exemption granted on the basis of credit transfer or RPL will be allowed primarily
where students can demonstrate that the relevant specific learning outcomes have
been achieved (i.e. primarily for specific rather than general credit). The extent of
any allowed exemption shall be preferably no greater than 34% and normally not
exceed 50% of the credits appropriate to the course. Exceptionally, by formal
resolution, the Senate may approve up to 67% exemption in special circumstances.
Where any such exemption is granted, the Board of Study, acting on behalf of
Senate, may approve an appropriate reduction in the minimum period of study.

Minimum Periods of Study

19.1.5 The minimum period of study shall normally be as follows:

For full-time study
Masters by full-time study 12 months
PG Diploma by full-time study 8 months
PG Certificate by full-time study 4 months

For part-time study, the minimum period of study shall be the learning equivalent of
the full-time study period required taking account of the conditions under which the
student will work. The overall duration of study will normally be greater than for full-
time study.

Maximum Periods of Study

19.1.6 Unless specifically stated otherwise in the relevant course regulations, students
shall be required to complete their course including the submission of any
dissertation, design or report within a prescribed period from the date of the
student’s registration as follows:

For full-time study
Masters by full-time study 36 months
PG Diploma by full-time study 24 months
PG Certificate by full-time study 12 months
For part-time study
Masters by part-time study 60 months elapsed time
PG Diploma by part-time study 48 months elapsed time
PG Certificate by part-time study 24 months elapsed time

Exceptionally, the maximum period of study may be extended by Senate on the recommendation of the Board of Study.

Mode of Study
19.1.7 Courses may be offered on a full-time and/or part-time basis. At the discretion of the relevant Board of Study on the recommendation of the relevant Course Director (or nominee), a student may transfer from full-time to part-time study and vice-versa where an appropriate course is available, at which time the relevant minimum and maximum periods of study will be reviewed.

Place of Study
19.1.8 Except where Senate has approved distance learning arrangements for off campus delivery, study shall normally be undertaken within the University or within an institution or agency approved by Senate for the purpose (see Regulation 20.6 and University Guidelines and Procedures for collaborative provision leading to awards or joint awards of the University).

Course Structure and Curriculum
19.1.9 Each candidate for an award must follow the curriculum as prescribed in the relevant course regulations. These may be amended from time to time by the Senate on the recommendation of the relevant Board of Study.
19.1.10 In accordance with the University Awards Framework, individual classes shall be assigned a level based on expected learning outcomes and a credit rating based on the volume of learning required.
19.1.11 The structure of taught courses shall normally accord with the following table:

<table>
<thead>
<tr>
<th>Award</th>
<th>Credit Requirements</th>
<th>Minimum Level Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate Certificate</td>
<td>60</td>
<td>50 credits at Level 5</td>
</tr>
<tr>
<td>Postgraduate Diploma</td>
<td>120</td>
<td>100 credits at Level 5</td>
</tr>
<tr>
<td>Masters Degree</td>
<td>180</td>
<td>150 credits at Level 5</td>
</tr>
</tbody>
</table>

Notes:
1 For a typical student one credit equates to approximately 10 hours of total student effort.
2 In certain circumstances, for example to meet professional accreditation requirements, the credit requirement may exceed the above framework.
19.1.12 The curriculum of every student must be approved in advance by the relevant Course Director or equivalent acting on behalf of the relevant Board of Study.
19.1.13 Where a pass in a particular class is a necessary condition for progress or for an award, this shall be clearly stated in the relevant course regulations.
19.1.14 The curriculum may include a design or other project or a dissertation.
19.1.15 Course delivery, materials, assessed work and oral examination shall be in English unless stated otherwise in individual course regulations and published in the Course Handbook.
19.1.16 Notwithstanding the provisions of Regulation 19.11.12, where unlisted optional classes may be chosen as part of the curriculum, the approval of the Head of Department (or nominee) responsible for offering each class is also required.
19.1.17 The University cannot guarantee that all optional classes will be available in any given academic year. The choice of classes may be subject to constraints of timetabling and may also be influenced by professional requirements as well as by a student’s entrance qualifications or pre-requisite classes passed.
19.1.18 In order to qualify for a University of Strathclyde award, a student who has been granted exemption from part of a University of Strathclyde course through credit transfer or RPL (in accord with Regulation 19.1.3) must gain from the University of Strathclyde course curriculum a minimum of one-third of the overall credit requirement for that award.

**Dissertation**

19.1.19 Where a dissertation is required, a student will normally be expected to have performed to the satisfaction of the Board of Examiners in the taught components of the course before being permitted to proceed to the dissertation. The dissertation shall be of a length and standard approved by the Board of Study and shall normally be submitted by a date approved by the Board of Study and published in the appropriate Course Handbook.

19.1.20 Any dissertation submitted under the provisions of Regulation 19.1.19 must be written in English. Exceptionally, having regard to the nature and content of the dissertation, the Board of Study concerned, acting on behalf of Senate, may permit submission in another language, in which case a translation of the abstract as a minimum into English must accompany the dissertation.

**Attendance and Performance**

19.1.21 Every applicant admitted to a course of study shall be required to attend regularly and to perform satisfactorily the work of each class in their curriculum.

19.1.22 A student has an obligation to inform the University Student Experience – Student Business at the first reasonable opportunity of any medical or other circumstances which might adversely affect their attendance, performance and/or ability to study.

19.1.23 A student who, in the opinion of the Head(s) of the Department(s) (or nominee(s)) offering a class, does not satisfy the requirements as to attendance and to performance and having been informed in writing, shall not be entitled to take the examination in the subject of that class and shall be so informed. The names of such students shall be reported immediately to the relevant Board of Study.

19.1.24 Notwithstanding Regulation 19.1.23, a student may subsequently be permitted by the Course Director (or nominee) to take the examination in the subject of the class at the next available opportunity subject to satisfactory completion of appropriate course work.

**Examinations and Assessment**

19.1.25 The Board of Examiners shall consist of not less than four persons including an External Examiner and academic staff responsible for the conduct of the course. It shall normally meet under the Convenership of the Course Director or Head of Department.

19.1.26 A student shall normally complete the assessments during the academic year in which the classes were undertaken unless permitted by the relevant Board of Study to postpone the assessment.

19.1.27 Classes shall be assessed by
   (i) coursework assignments; or
   (ii) written examinations; or
   (iii) oral examinations; or
   (iv) any combination of the above
unless specified otherwise in the relevant Course Handbook.

19.1.28 Except where a course includes an integrative/reflective class that will draw on work in other classes, each item of work may only be assessed in one class.

19.1.29 Candidates are required to pass written and oral examinations and to perform to the satisfaction of the Board of Examiners in the course work, and in the case of candidates for the degree of Master, in the dissertation or project.

19.1.30 A student who is deemed to have failed a taught class or who has been debarred in terms of Regulation 19.1.23 shall normally have one further opportunity to be reassessed on a similar basis or by such other means as the Department(s) offering
the class may decide. The nature of re-assessment shall be identified in module descriptors and/or Course Handbooks. The attempt shall normally be made at the next available diet of examinations.

Exceptionally, candidates for taught masters degrees who fail to satisfy the Board of Examiners may, in the light of their overall performance and subject to the approval of the Board of Examiners, be permitted to revise and re-submit their dissertation, normally within one year of the first submission.

19.1.31 Notwithstanding Regulation 19.1.30, Boards of Examiners may exceptionally permit alternative forms of re-assessment for a class where they consider it to be in a student’s interest.

The Board of Examiners may also require the student to re-attend the class.

19.1.32 The Board of Examiners may discount an attempt for a class where appropriate medical or other evidence has been provided subject to report to the relevant Board of Study.

19.1.33 At the discretion of the Board of Examiners or Course Director (or nominee), and, where appropriate, in conjunction with the External Examiner, a student may be required to attend and participate in an oral examination.

Award of Credits

19.1.34 The relevant Board of Examiners shall award the credits for the classes passed.

Progress of Students

19.1.35 Details of any required minimum level of performance to permit a student to progress from Certificate to Diploma and from Diploma to Masters are shown in individual course regulations hereafter.

19.1.36 To proceed to the next year of a course, a full-time student must normally accumulate the minimum number of credits in accordance with the following general framework:

<table>
<thead>
<tr>
<th>Progression</th>
<th>Minimum Number of Credits Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>First – Second Year</td>
<td>90</td>
</tr>
</tbody>
</table>

Individual courses may specify minimum credit numbers greater than those given above in which case these shall be given in the relevant course regulations.

Where a course is available on a part-time basis, progress requirements shall be specified in the relevant course regulations.

Where credits in particular classes are required for progress, these shall be specified in the relevant course regulations.

19.1.37 Candidates for the degree of Master will normally be expected to perform to the satisfaction of the Board of Examiners on the taught components of the course before being permitted to proceed to the project and/or dissertation. Notwithstanding Regulation 19.1.30, a candidate may be subject to a restriction in the number of classes that may be re-assessed.

19.1.38 Subject to prior approval of the Senate, Boards of Study may permit a Board of Examiners to apply compensation procedures according to prescribed criteria. In such cases, the criteria shall be detailed in the Course Handbooks.

19.1.39 The Board of Examiners shall report to the appropriate Board of Study which, acting on behalf of Senate, shall ratify one of the following:

(i) award of the appropriate degree, diploma or certificate with distinction;
(ii) award of the appropriate degree, diploma or certificate with merit;
(iii) award of the appropriate degree, diploma or certificate;
(iv) progress to subsequent stages of the course;
(v) withholding of the award of the degree or other qualification pending further study or submission/resubmission of assignments;
Transfer of Registration, Suspension and Withdrawal

19.1.40 Where a candidate has failed to satisfy the Board of Examiners, the Board of Study, acting on behalf of Senate and in accordance with the recommendation of the Board of Examiners, may

(i) require that registration be transferred to Postgraduate Diploma or Postgraduate Certificate course by instruction (as appropriate), subject to a related course being available; or

(ii) suspend a student from attendance at classes but require them to undertake assessments in accord with Regulations 19.1.30 – 19.1.32 until the required number of credits and necessary passes have been obtained to allow the student to proceed to the next stage/year of the course; or

(iii) recommend the award of such a Postgraduate Diploma or Postgraduate Certificate (as appropriate); or

(iv) terminate the student’s registration and require the student to withdraw.

19.1.41 On the recommendation of the relevant Course Director (or nominee), the Board of Study may permit a student to undertake voluntary suspension for the whole or part of an academic year or transfer to part-time study subject to this mode of study being available.

19.1.42 A student may be required to withdraw from a course as a consequence of academic dishonesty or unprofessional conduct. Such a decision would be taken in consequence of a disciplinary hearing as provided for in Regulations 5.4 and 5.5.

19.1.43 On the recommendation of the relevant Course Director (or nominee), the Board of Study may approve transfer of a student’s registration between

(i) a Masters degree
(ii) a Postgraduate Diploma;
(iii) a Postgraduate Certificate.

as appropriate, subject to a related course being available.

The Board of Study shall determine what recognition towards the fulfillment of the requirements may be given to the period that the student has completed.

19.1.44 Where a candidate for the degree of Master or Postgraduate Diploma has satisfied the Board of Examiners but requests transfer to the Postgraduate Diploma or Postgraduate Certificate, the Board of Study, acting on behalf of Senate and in accordance with the recommendation of the Head of Department or Course Director or Board of Examiners, may

(i) permit registration to be transferred to Postgraduate Diploma or Postgraduate Certificate course by instruction (as appropriate), subject to a related course being available; or

(ii) recommend the award of such a Postgraduate Diploma or Postgraduate Certificate (as appropriate); or

(iii) terminate the candidate’s registration.

Appeals against Transfer of Registration, Suspension, Termination, Withdrawal or Award Classification

19.1.45 A student who has been required to transfer registration or is suspended from attendance at classes or is required to withdraw under the provisions of Regulation 19.1.39 - 19.1.43 may appeal to the relevant Board of Study for reconsideration of the case.

19.1.46 A student may appeal to the relevant Board of Study for reconsideration of the classification of the award. Such an appeal must be submitted and the outcome of any such appeal must be decided upon before the student’s award is confirmed.

19.1.47 The grounds for appeals under Regulations 19.1.45 and 19.1.46 may be any of the following:
(i) that there were procedural irregularities in the conduct of the examination or of the assessment (including alleged administrative error of such a nature as to cause reasonable doubt as to whether the examiners or the Board of Study would have reached the same conclusion if the alleged error had not been made); or

(ii) that there were medical, personal or other circumstances affecting the student's performance of which the examiners or the Board of Study were not aware when their decision was taken; or

(iii) that there was inadequate assessment, prejudice or bias on the part of one or more of the examiners or assessors.

Such an appeal shall be lodged in writing with the relevant Faculty Officer no later than a date specified by the Board of Study and notified in the letter informing the student of the transfer of registration or suspension or requirement to withdraw or the award classification. The appeal shall be supported by appropriate documentary evidence not previously available.

19.1.48 A student has the ultimate right of appeal to the Senate normally following an unsuccessful appeal to the relevant Board of Study. Such an appeal shall be lodged in writing supported by all appropriate documentary evidence and shall be lodged with the Deputy Secretary within a period of six weeks from the date of notification to the student of the outcome of the preceding appeal to the Board of Study and shall be supported by all the appropriate documentary evidence. The student will have a right of appearance, either alone or accompanied by one person, at the hearing of the appeal to the Senate.

Classification of Degrees

19.1.49 A student may be awarded a degree, a degree with merit or a degree with distinction.

In reaching their decision, Boards of Examiners shall have regard to a student's performance against approved criteria and consider the composite mark against the following general framework:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Composite Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distinction</td>
<td>70 - 100</td>
</tr>
<tr>
<td>Merit</td>
<td>60 – 69</td>
</tr>
<tr>
<td>Award</td>
<td>50 – 59</td>
</tr>
</tbody>
</table>

Award

19.1.50 A candidate who satisfies the conditions of the Ordinances governing the award of degrees, diplomas and certificates and of the general and course regulations will, on payment of the required fees, be entitled to receive the appropriate award. To qualify for the award, a candidate must have obtained passes in classes at all levels of the curriculum as specified in the course regulations. The candidate will receive a parchment setting forth the course of study in which the award has been granted and, if appropriate, the classification in which the candidate has been placed.

19.1.51 A candidate on a course that has multiple exit points (e.g. Postgraduate Certificate, Postgraduate Diploma and degree of Master) may normally only retain one of the possible awards.

19.1.52 Notwithstanding the provision of 19.1.50 where such a course of study is undertaken on a part-time basis over a period of more than three years, Senate may approve interim awards that may be retained provided that such awards relate to separately named courses governed by distinct course regulations.
PART A: GENERAL GUIDELINES

Progress Requirements and Assessment

1. PGT Boards of Examiners assess students' performance in meeting the progress, transfer and award requirements for all postgraduate taught courses (PgCert, PgDip, MSc and MArch) and also the taught classes of research degrees (e.g. MRes, MPhil, PhD and EngD).

2. Students are required to meet the conditions set down in the general and course regulations. All regulations are published in the University Calendar. The general requirements are contained in Regulations 19.1, 20.1-20.4, and the requirements of individual Faculty courses appear in regulations 19.40 – 19.49. Copies of the relevant regulations are included in course handbooks that are issued to all students on admission to the University.

Boards of Examiners must also comply with the requirements outlined in section 9 of the University “Policy, Procedures and Guidelines” document.

3. Student progress is determined by the accumulation of credits. The pass mark at PGT level (level 5) is 50%.

4. Regulation 19.1.34 confirms that a candidate who satisfies a Board of Examiners in a class will be awarded the number of credits specified for that class.

5. The Faculty of Engineering operates a compensation scheme that can be applied only to a student’s first attempts. It is not used at later Boards unless first attempts are being considered or there are special circumstances. Further details are given in Part B below.

6. The Faculty of Engineering PGT Compensation Scheme applies to all PGT degrees in the Faculty, unless approval has been granted by the Board of Study and Senate for a course to be exempted. Departments that wish to exempt a course from the scheme must submit a request to the Faculty Office in writing, accompanied by appropriate supporting documentation.

8. PgCert and PgDip students (in contrast to MSc students) may resit once any number of classes, as per University general regulations.

Method of Operation of the Boards of Examiners

13. The Board of Examiners will be chaired by the relevant Head of Department or their nominee.

14. The Board of Examiners will scrutinise the marks that have been set out in the Schedules of Assessment. Course co-ordinators should advise the Board of any amendments that require to be made to the Schedule. It is also their
responsibility to recommend to the Board how the Compensation scheme should be applied in individual cases.

15. Generally, a mark of 50% or more in a class is regarded by the Board as a clear pass.

16. A candidate who satisfies a Board of Examiners in a class will be awarded the number of credits specified for that class.

17. Boards of Examiners will make one of the following decisions for all students:

**AWARD** A clear Award. The student has successfully completed all the taught and, if appropriate, the project/dissertation components of his/her degree, diploma or certificate course.

**P** A clear Pass. The student has no re-sits and should proceed to the next year of study (normally only for students who are undertaking the course over more than one academic session).

**MP** May Proceed to Project/Dissertation. The student has normally satisfied all the taught components of his/her course and may proceed to the project/dissertation. (see 20, 21 and 22)

**TM** Terminate. The student will be instructed to withdraw from the course.

**R** Re-sit (May/June Board only). The student should take re-sit examinations in August, after which a decision will be made on possible award of MSc, PgDip or PgCert.

**SL** Unusual circumstances dictate that the student should receive a Special Letter, outlining his/her academic position as determined by the Examiners. In order to avoid unnecessary delay in students’ receiving results, it is preferable that this option only be recorded in exceptional circumstances.

**TF** Transfer. The student will be transferred to another degree, diploma or certificate course in the same group of courses. This may be qualified by the decision of, for example, **TF and resit** etc.

**1st Examination Board (usually May/June)**

18. This Board will normally consider the transfer of candidates between PgCert, PgDip and MSc and progression to the MSc project/dissertation. This Board will also consider any outstanding candidates from the previous academic year.

19. The compulsory and optional classes required by candidates for either progression or award can be found in the relevant course regulations

20. To proceed to the MSc project/dissertation a candidate will normally have accumulated all the credits on the taught component of the course at the first attempt.
21. With respect to students who have not passed all their credits at the first attempt the Board of Examiners will apply the Faculty PGT Compensation Scheme, if applicable, as outlined in Part B below. If this can be done and the student thereby gains sufficient credits, then the decision will be “Proceed to MSc Project/Dissertation”.

22. MSc students will normally only be allowed to resit a maximum of 10 credits, provided all other taught classes have been passed at the first attempt, with a minimum mark of 50% in each class, and no compensated passes have been awarded. [See, however, paragraph 36 when a student's credit-weighted average mark is at least 55%].

23. Students who are allowed to proceed to their project/dissertation, under the terms of paragraphs 22 and 36, must be warned that they cannot remain on the MSc course unless all outstanding taught classes are passed at the second attempt. Such students are required to sign a form verifying that they understand and accept the conditions required to remain on the MSc course.

24. MSc students who have failed to achieve the required number of credits on the taught component of the course, under the terms of paragraphs 20-22 will normally be transferred to the PgDip.

25. PgDip students who satisfy the terms of paragraphs 8 and 20-22 and have passed all taught components may be transferred to the appropriate MSc course and proceed to the project/dissertation.

26. Any student who has failed one or more classes will normally be entitled to one further attempt (19.1.19) to obtain enough credits for the award of a PgCert or a PgDip. A student is only entitled to a further attempt at classes for the award of an MSc if he/she satisfies the conditions outlined in paragraph 22.

27. The Board may also consider awards for students who have satisfactorily completed the requirements of the course.

2nd Examination Board (usually September)

28. This is the main Examination Board for PGT Courses. Notwithstanding paragraph 27, this Board considers the award of MSc, PgDip and PgCert, and the transfer of students between MSc, PgDip and PgCert. Outstanding issues from the earlier Examination Board will also be considered.

Awards

29.

a. Where a candidate has accumulated 120 credits of taught classes from the curriculum, together with 60 credits for the project/dissertation, he/she will be awarded an MSc.

b. Where a candidate has accumulated 120 credits of taught classes from the curriculum, but has not obtained 60 credits for the project/dissertation, he/she will be awarded a PgDip.

c. Where a candidate has not accumulated 120 credits of taught classes after 2 attempts, he/she may be considered for a PgCert. The PgCert can be awarded if the candidate has accumulated at least 60 credits of taught classes from the curriculum.
d. A candidate who has accumulated less than 60 credits of taught material after two attempts will be deemed to have failed and no award will be made.

Awards may be made “with Merit” or “with Distinction”. Examination Boards

<table>
<thead>
<tr>
<th>Classification</th>
<th>Composite Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distinction</td>
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</tr>
<tr>
<td>Award</td>
<td>50 - 59</td>
</tr>
</tbody>
</table>

Notwithstanding University General Regulation 19.1.49, PGT students are eligible for an award with merit/distinction only if they pass all classes at the first attempt. (This includes any compensated class)

**PART B: THE FACULTY PGT COMPENSATION SCHEME**

35. The Faculty operates a compensation scheme that is designed to assist Boards of Examiners to take decisions about student progress to the MSc project/dissertation. The scheme can be applied only to the student's first attempts and, therefore, is normally used only at the May/June meetings of the Boards of Examiners. Marks of N + a mark (i.e. where there is an examination result but missing coursework) are not eligible for compensation.

36. Students who have accumulated at least 120 credits from the course curriculum and who have a credit-weighted average (CWA) of at least 55% are eligible for compensation. Any combination of classes, up to a maximum of 20 credits, may be compensated (where the class marks are in the range 40-49%) or taken as a resit (where the class marks are below 40%).

Compensation can be applied to part-time students when they have completed classes totalling at least 60 credits. Students who have accumulated at least 60 credits and who have a CWA of at least 55% are eligible for compensation.

A maximum of 10 credits of classes may be compensated (where the class marks are in the range 40-49%) or taken as a resit (where the class marks are below 40%).

37. Only in circumstances where compensation is not acceptable for professional accreditation will degrees be allowed to deviate from the scheme. In such cases, Departments must provide documentary evidence of the concerns expressed (e.g. a letter from the accrediting body stating that the Department may not apply compensation to specified accredited courses) together with any alternative proposals. Any such modification requires approval by the Board of Study and by Senate.
Details of the module organisation (timetables, assessment, location etc) will be maintained on the University of Strathclyde’s virtual learning environment “Myplace”. All students will be given access when they register. Myplace will be used extensively throughout this course, with course notes and presentations available for download from the website. It will also usually be the route for assignment submission and communications with the class lecturers.

The timetable is as follows. Students will be notified in the event of changes becoming necessary.

<table>
<thead>
<tr>
<th>Semester 1 (S1)</th>
<th>Semester 2 (S2)</th>
<th>Semester 3 (S3)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>September</strong></td>
<td><strong>Sept - Dec</strong></td>
<td><strong>January</strong></td>
</tr>
<tr>
<td>ME928 Energy</td>
<td>ME 929 Electrical</td>
<td>ME917 Advanced Boilers I</td>
</tr>
<tr>
<td>Systems Analysis</td>
<td>Power Systems</td>
<td>13-17 Jan 2014</td>
</tr>
<tr>
<td>day release, S1</td>
<td>Day Release</td>
<td></td>
</tr>
<tr>
<td>ME922 Energy</td>
<td>ME920 Materials for</td>
<td>EF929/CL504 Financial</td>
</tr>
<tr>
<td>Resources &amp; Policy</td>
<td>Power Plant</td>
<td>Eng Day Release</td>
</tr>
<tr>
<td>Day Release</td>
<td>Distance Learning</td>
<td></td>
</tr>
<tr>
<td>AB975 Sustainability</td>
<td>Dec 2013/Jan 2014</td>
<td>EF932 Risk Mgt,</td>
</tr>
<tr>
<td>Day Release</td>
<td>(Week 1, S2)</td>
<td>Day Release</td>
</tr>
<tr>
<td>EF927/EF933 Design</td>
<td>exam release early</td>
<td>EF930 Information Mgt</td>
</tr>
<tr>
<td>Mngmt Day Release</td>
<td>March</td>
<td>Day Release</td>
</tr>
<tr>
<td>EF931/EF935 Project</td>
<td>Submission deadline</td>
<td>ME923 Gas &amp; Steam</td>
</tr>
<tr>
<td>Management Day Release</td>
<td>mid April</td>
<td>Turbines Distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning (Week 1, S2)</td>
</tr>
</tbody>
</table>

Please note ME924 Power Plant Systems not running in 2013/14 (replaced by ME928)
Instructional Module Descriptors

Specialist Modules

The following module descriptors are described in this section:

ME917  Advanced Boiler Technologies 1
ME918  Advanced Boiler Technologies 2
ME919  Electrical Power Systems
ME920  Materials for Power Plant
ME921  Environmental Performance and Related Technologies
ME923  Gas and Steam Turbines
ME926  Nuclear Power Systems
ME927  Energy Resources and Policy
ME928  Energy Systems Analysis

Generic Modules

The following generic module descriptors are also provided in this section:

EF927  Design Management
EF928  Sustainability
EF930  Information Management
EF931/EF935  Project Management
EF932  Risk Management
CL504/EC929  Financial Engineering
ME917 ADVANCED BOILER TECHNOLOGIES I

Module Registrar: Dr W Dempster
william.dempster@strath.ac.uk

Taught To (Course): MSc Power Plant Engineering/Power Plant Technologies

Other Lecturers Involved:
Dr A Galloway, + Guest lecturers from Doosan Power Systems

Credit Weighting: 10
Semester: 2

Assumed Prerequisites: BEng level in Mechanical/Chemical Engineering
Optional
Academic Level: 5

Educational Aim
This module aims to provide core knowledge of the modern conventional power plant boiler and to develop a critical awareness of the operation, design and integration of the key components that comprise a boiler system.

Learning Outcomes
On completion of the module the student is expected to be able to

LO1 Identify and discuss the key components of boiler systems for a variety of boiler configurations for power plant use within an operational and thermodynamic context.

LO2 Carry out design based calculations for draft systems, combustion processes, heat exchanger and two phase hydraulics pipe work relating to boiler components.

LO3 Critically evaluate erosion, corrosion and fouling/slagging of heat transfer surface

LO4 Critically evaluate the working principles and effectiveness of the technologies associated with boiler emission control for NOx, SOx, particulates and CO2 capture and storage

Syllabus
The module will teach the following:

(i) Boiler types and configurations
(ii) Draft System hydraulics
(iii) Two phase heat transfer and hydraulics: two phase flow regimes, two phase pressure drop, critical heat flux
(iv) Furnace heat transfer using simple thermal design models.
(v) Superheater and reheater heat transfer
(vi) Fuels and combustion calculations
(vii) Erosion and corrosion issues in boilers
(viii) Environmental control technologies for NOx, SOx, particulates and CO2 mitigation

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
<tr>
<td>4</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

L/Outcomes

Recommended Reading

***Purchase essential ***Purchase recommended  **Highly recommended reading
*Simply for reference (do NOT purchase)

Steam, Its Generation and Use, Babcock and Wilcox Publications, 41 edition
ME918 ADVANCED BOILER TECHNOLOGIES II

<table>
<thead>
<tr>
<th>Module Registrar: Prof D H Nash</th>
<th>Taught To (Course): Power Plant Engineering and Power Plant Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Lecturers Involved: Prof D MacKenzie, (external) visiting Prof S Cameron, Mr W Bell (Doosan)</td>
<td>Credit Weighting: 10 Semester: 2</td>
</tr>
<tr>
<td>Assumed Prerequisites: Engineering Mechanics to BEng level</td>
<td>Optional class Academic Level: 5</td>
</tr>
</tbody>
</table>

Educational Aim

Pressurised systems are inherently dangerous since they contain stored energy which must be carefully controlled. The class aims to set down a methodology whereby a range of pressurised components (spheres, cylinders, cones, etc.) can be designed, manufactured, installed and operated to a high degree of safety. An overview of the main elements of power plant will be given. Attention will be given to the design of the boiler and associated equipment. In addition the design of piping systems will be addressed. Each of the key elements of the power plant will be review in the light of current standards, PD5500 and EN13445 for Vessels, EN12952 for boiler and EN13480 for piping. In addition, some reference will be made to the Pressure Equipment Directive PED EN/97/23

Learning Outcomes

The main learning outcome is the provision of a basic understanding of the main factors influencing the design of boilers, pressure vessels and piping associated with modern power plant. In addition, behaviour of components used in boilers, pressure systems and storage containment will be addressed.

Part of the class is devoted to a fundamental development of the appropriate stress analysis of thin shells, including spheres, cylinders, cones, etc. under pressure, temperature and local loadings; discontinuity analysis is employed to derive the forces and moments that arise at nozzle/shell, shell/head junctions, etc.

The remainder of the class uses the ideas developed above to examine design methodologies established in the British and EU Boiler and Pressure Vessel Design Codes. Some comments on American standard will be included. In these, ‘design by rule’, ‘design-by-analysis’, stress analysis procedures will be expanded and an understanding of their relevance in the power plant sector will be achieved.

On completion of the module the student is expected to be able to

- LO1 - understand the basic philosophy behind boiler and pressure systems Codes, Standards and design manuals
- LO2 - know their way around such Standards - since they will have undertaken an industrial design exercise using the appropriate standards and design manuals and have some ability to examine the unusual non-standard pressure vessels
- LO3 - be aware of the limitations of such Standards and appreciate the assumptions contained and appreciate the use of current computer-based design tools.
- LO4 - understand the importance of legislation governing power plant and the drivers for new power plant

Syllabus

- Introduction and Overview of Advanced Boilers
- Introduction to Pressure Equipment
- The Basics of Stress Analysis
- The PED, PSSR and CDR (Pressure Equipment Directive, Pressure Systems Safety Regulations and Construction Design and management Regulations)
- Shell Theory (Background and Edge Bending)
- Plastic Design Concepts
- Materials for Pressure
- Nozzles and Openings
- Design-by-Analysis for Pressure Systems
- EN12952 Pressure Calculations
- Overview of ASME1
- Local Loads
- Creep-Fatigue (with case studies)
Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>L/Outcomes</th>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>4 weeks</td>
<td>60%</td>
</tr>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.*

Recommended Reading

*Full notes are provided and no other document is mandatory.*

Guide to Pressure Equipment”, by S W Earland, D H Nash & W Garden, PE Publishing  
Stresses in Shells” by W Flügge, Springer Verlag  
Pressure Vessel Design” by H H Bednar, Van Nostrand Reinhold  
Pressure Vessel Design - Principles and Concepts” by J Spence and A S Tooth, E & F Spon (in imprint of Chapman and Hall)
### Educational Aim

This module aims to provide students with an understanding of the operation of modern electrical power systems along with the techniques to undertake a basic technical analysis of key electrical devices and systems.

### Learning Outcomes

On completion of the module the student will be expected to:

1. Explain the basis of operation of modern electrical power systems and the consequences of electrical power production and consumption for the environment and energy security.
2. Apply complex numbers and fundamental analysis techniques such as Kirchoff’s current and voltage laws to solve power flow problems and analyse equivalent circuits of electrical systems and devices.

### Syllabus

The module will teach the following:

- An overview of electricity generation, distribution and demand within the UK.
- The fundamentals of electrical power: alternating current and voltage, their mathematical representation and converting time varying, fixed frequency quantities to phasor form.
- The basic of equivalent circuit analysis: basic circuit elements (resistor, inductor and capacitor) and their effect on current and voltage in AC systems.
- Power in AC systems: looking at the concepts of real, reactive, apparent power and impedance.
- The basics of electromagnetism, specifically focusing on how it underpins the operation of electrical equipment.
- An overview of electrical devices including the transformer, synchronous generator and induction machines (used as both motors and generators). For each, an equivalent circuit will be developed and used to illustrate the operational characteristics of these devices in AC power systems.
- An introduction to protection in electrical power systems.

### Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>L/Outcomes</th>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
<tr>
<td>L01 L02</td>
<td>4</td>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

Indicate which learning outcomes (L01, L02 etc) are to be assessed by exam/coursework/project as required.

### Recommended Reading

### Educational Aim

This module aims to give students a thorough introduction to the materials science and metallurgy that underpins the design of power plant. This will build on basic concepts to give an appreciation for the theory of alloy design and strengthening mechanisms, including an understanding of the importance of fracture and creep.

### Learning Outcomes

On completion of the module the student is expected to be able to:

- LO1 Describe and understand the structure of metals and alloys
- LO2 Understand the techniques used to strengthen metals and alloys
- LO3 Appreciate the importance of fracture, thermal fatigue and creep as limiting factors in the design of power plant

### Syllabus

The module will teach the following:

- The structure of metals and alloys, building on atomic bonding and crystallography, including an appreciation of crystal defects
- Definitions of material properties used in engineering
- The importance of the motion of dislocation defects as the major mechanism of plastic deformation, and an understanding of their effect on the strength of the material
- The important strengthening mechanisms available in metals and allows, namely: Solid solution strengthening, work hardening, particle strengthening and grain size control.
- The use of equilibrium phase diagrams to predict the structure of alloys
- The importance of diffusion and phase transformations and the concept of non-equilibrium conditions
- The factors that limit the design of power plant components from a materials point of view

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
<tr>
<td>1</td>
<td>4 weeks</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Assessment Method(s) Including Percentage Breakdown and Duration of Exams

- **Examinations**
  - Number: 1
  - Duration: 4 weeks
  - Weighting: 100%

### Recommended Reading

- ***Purchase essential***
- ***Purchase recommended***
- **Highly recommended reading**
- *Simply for reference (do NOT purchase)*

(Textbook is provided free of charge on a loan basis to each student)
Module Registrar: Prof P Hall  
*peter.hall@sheffield.ac.uk*  
Taught To (Course): Power Plant Engineering/Power Plant Technologies cohorts

<table>
<thead>
<tr>
<th>Other Lecturers Involved:</th>
<th>Credit Weighting: 10</th>
<th>Semester: 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assumed Prerequisites:</td>
<td>Optional class</td>
<td>Academic Level: 5</td>
</tr>
</tbody>
</table>

**Educational Aim**

The aim of this module is to gain knowledge of the new technologies available to mitigate potential environmental impacts.

**Learning Outcomes**

On completion of the module the student is expected to be able to:

- LO1 Develop a critical awareness of the impact of the energy industry on the natural environment, particularly CO₂, NOₓ, SOₓ, and particulates
- LO2 Understand the importance of fossil fuels in the global energy economy
- LO3 Understand the options available to mitigate the various pollutants and how this relates to the fundamentals of coal conversion technologies

**Syllabus**

The module will teach the following:

- Review the impacts of pollutants from the energy industry on atmospheric physical and chemical structure
- Introduce the structure of the global energy industry and economics
- Review coal conversion technologies and the selection of different coals
- Describe technologies that limit the emission of environmentally harmful pollutants and how regulation impacts this.

**Assessment Method(s) Including Percentage Breakdown and Duration of Exams**

<table>
<thead>
<tr>
<th>L/Outcome 5</th>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Examinations</td>
<td>Courseworks</td>
<td>Projects</td>
</tr>
<tr>
<td></td>
<td>Number</td>
<td>Month(s)</td>
<td>Duration</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1hr</td>
<td>25% each</td>
</tr>
<tr>
<td>LO1, LO2</td>
<td>LO3</td>
<td>LO1, LO2, LO3</td>
<td></td>
</tr>
</tbody>
</table>

*Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.*

**Recommended Reading**

****Purchase essential  ***Purchase recommended  **Highly recommended reading  
*Simply for reference (do NOT purchase)*
Educational Aim

This module aims to give students an advanced knowledge of applications of both steam and gas turbines within the power generation industry. The module includes details of power-plants that have been developed specifically to integrate gas turbines such as (gas turbine exhaust gas) heat recovery steam generators (HRSGs) used in combined cycle gas turbine (CCGT) plants. Also, aspects of gas and steam turbine design and operation are discussed. Key inputs will come from industry to ensure the course material is in line with current professional practice.

Learning Outcomes

On completion of the module the student is expected to be able to
LO1 Generate and modify simple numerical models to undertake design calculations that can be used to assess and interpret the predicted performance for a range of technologies.
LO2 Write short technical reports that demonstrate an understanding of the main factors and design limitations that influence energy generation using turbo-machinery.

Syllabus

- Gas turbine design, including aero derivatives and industrial designs for power generation
- GT thermodynamics, including the Brayton cycle
- Simple (open) cycle and combined cycle configurations.
- Efficiency of CCGT plant, feedwater heating in the CCGT cycle
- HRSGs, including supplementary firing and once-through HRSGs,
- Fuel options, and dual pressure cycles
- Characteristics of CC steam turbines
- Condition monitoring and maintenance regimes
- Theory of gas and steam turbines
- Design of turbomachinery

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
<tr>
<td>1</td>
<td>3 weeks – open book exam</td>
<td>70%</td>
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L/Outcomes

LO1 & LO2

Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required

Recommended Reading

The following texts are recommended reading, relevant to this course, but are not essential purchases.

Module Registrar: Dr Paul Tuohy  

Taught To (Course): MSc Power Plant Engineering/Power Plant Technologies

Other Lecturers Involved:  

Credit Weighting: 10  

Semester: 2  

Assumed Prerequisites: BEng level in Mechanical/Chemical Engineering  

Academic Level: 5

Educational Aim

This module aims to provide core knowledge of nuclear power plant engineering and to develop a critical awareness of the nuclear basics, reactor basics, reactor operation and design, waste disposal and key issues relating to health and safety.

Learning Outcomes

On completion of the module the student is expected to be able to

LO1 Understand atomic physics terminology, nuclear particles and interaction processes with material.

LO2 Identify and discuss the purpose of key components of nuclear power plant for a variety of different configurations.

LO3 Understand the basic nuclear principles underlying power reactor technology and be able to carry out basic calculations in relation to the design and operation of the plant.

LO4 Have a critical understanding of nuclear plant health, safety and environmental issues.

Syllabus

Prelude - history of nuclear power and typical power plant configuration.

Part 1 Nuclear fundamentals

(i) Fundamentals of nuclear physics

(ii) Interaction of radiation with matter

(iii) Radiation protection and shielding

Part 2 Nuclear Reactor Engineering

(i) Neutron diffusion and moderation

(ii) Reactor core theory

(iii) Heat generation and core thermal characteristics

(iv) Nuclear reactor designs

(v) Reactor operational characteristics

Part 3

(i) Radiation and health

(ii) Plant safety and accidents

(iii) Uranium resources and fuel processing

(iv) Waste and storage

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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</thead>
<tbody>
<tr>
<td>Numbe r</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
<tr>
<td>LO1, LO2, LO3, LO4</td>
<td>1</td>
<td>100%</td>
</tr>
</tbody>
</table>

Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.

Recommended Reading


D.J. Bennet, J.R. Thompson, , Elements of Nuclear Power, 3rd edition, 1989
Module Registrar: Professor J A Clarke
joe@esru.strath.ac.uk
Taught To (Course): Cohorts for whom class is compulsory

Other Lecturers Involved: Dr Nick Kelly
Credit Weighting: 10
Semester: 1

Assumed Prerequisites: 1st degree in engineering or related
Compulsory class
Academic Level: 5/PG

Educational Aim
Against the background of international commitments on atmospheric emissions, diminishing fossil fuel resources and the liberalisation of energy markets, this module examines sustainable options for energy production, supply and consumption. The aim is to give students an understanding of current trends, and to enable a critical evaluation of emerging ideas, technologies and policies.

Learning Outcomes
On completion of the module, students are expected to have attained the following learning outcomes.
LO1. An appreciation of recent history and current trends in the energy sector.
LO2. An understanding of the impact energy has on the local and global environment.
LO3. The ability to undertake an evaluation of developments in energy conversion technology.
LO4. A working knowledge of legislative, economic and environmental constraints.

Syllabus
The module covers the following topics.
1. Historical trends in energy production: role of fossil fuels; nuclear power; fuel reserves.
2. Atmospheric pollution: global and local; UK and international commitments.
3. Thermal power generating plant: thermal efficiency; emissions; combined cycle plant; CHP.
4. Nuclear plant: history of technology; environmental impacts; policy issues.
5. Renewable sources: nature and extent of resources; exploitation methods; environmental impacts; costs.
7. The transport sector: fuel use and emissions; environmental impacts; options for change.
8 General policy issues: support mechanisms for renewables; CO₂ stabilisation strategies; future role of nuclear power.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>L/Outcome</th>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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</thead>
<tbody>
<tr>
<td>Number</td>
<td>Month(s)</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
<tr>
<td>1</td>
<td>January</td>
<td>3 hours</td>
<td>60%</td>
</tr>
<tr>
<td>All</td>
<td>All</td>
<td>All</td>
<td>All</td>
</tr>
</tbody>
</table>

Recommended Reading
ME928 ENERGY SYSTEMS ANALYSIS

Module Registrar: Paul Tuohy
paul.tuohy@strath.ac.uk

Taught To (Course): MSc Sustainable Engineering: Renewable Energy Systems and the Environment

Other Lecturers: Credit Weighting: 10
Semester: 1

Assumed Prerequisites: None
Compulsory class
Academic Level: 5/PG

Educational Aim
This module aims to impart an understanding of the underpinning theoretical principles and practical calculation methods for analysis of energy systems and an appreciation of how these systems are integrated in practical applications. Emphasis is on heat transfer and thermodynamic cycles. The underlying principles and analysis methods is appropriate for both renewable and non renewable energy systems.

Learning Outcomes
On completion of the module the student is expected to be able to

LO1: Recognise the basis of operation and carry out thermodynamic cycle performance analysis for modern energy systems.

LO2: Recognise the basis of operation and carry out heat transfer performance analysis for modern energy systems.

Syllabus
The module will teach the following:
- An overview of common energy conversion systems and their context.
- Laws of classical thermodynamics.
- Thermodynamic analysis principles: properties and states, equilibrium, open and closed systems, reversibility, heat and work, properties of gases and vapours, state equations, property tables and diagrams, Carnot cycle, entropy, isentropic efficiency, nuclear reactions.
- Thermodynamic analysis methods: thermal power generation, steam cycles, gas turbine cycles, nuclear fission and fusion, vapour compression cycles for heat pumps and refrigeration, absorption cycles.
- Heat transfer principles: conduction (Fourier's law), natural and forced convection, radiation, overall heat transfer, extended surfaces, heat exchangers.
- Heat transfer analysis methods.
- Psychrometric principles and analysis methods: psychrometric properties and relationships, analysis methods including psychrometric chart.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
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<tbody>
<tr>
<td>Numbe...</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
</tbody>
</table>
| 1 | 2hrs | 60% | 2 | 40% | LO1, LO2

| LO1, LO2 |

Indicate which learning outcomes (LO01, LO02 etc) are to be assessed by exam/coursework/project as required.

Recommended Reading
A fundamentals course text book is supplied but students may find it useful to consult a supporting text book for an alternative perspective, suitable text books include:
- Duffie and Beckman ‘Solar Engineering’.
Module Registrar: Prof A Duffy
alex.duffy@strath.ac.uk

Taught To (Course): Postgraduate Courses

Other Lecturers Involved: R Maclachlan, W Ion

Credit Weighting: 10
Semester: 1

Assumed Prerequisites: None

Compulsory/Optional/Elective class: Academic Level: 5

Educational Aim
To provide a structured introduction to the Design Management process, issues and tools.

Learning Outcomes
On completion of the module the student is expected to be able to

LO1 Appreciate and understand the role of design within an organisation and the organisational structures required for effective design.
LO2 Appreciate the role of design models, approaches and methods
LO3 Know a variety of aspects and the complexities of design development
LO4 Appreciate the role of innovation in design and know how to measure design performance

Syllabus
The module will teach the following;

- Background and design for competitiveness and sustainability.
- Integrated Product Development, and different approaches and aspects to design development including concurrent engineering, team engineering, product management, design management, distributed design, and decision support.
- The design activity, methods and process models including role of the market, specification, conceptual and detail design
- Basic team and management structures (organisation)
- Key issues related to design complexities (e.g. relating to the people, processes, resources, product, key considerations, knowledge and information, decision making) and the key aspects of design co-ordination
- Design performance and innovation

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Duration</td>
<td>Max Marks</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>LO1, 2, 3 and 4</td>
</tr>
</tbody>
</table>

Recommended Reading
Module Registrar: Dr David Grierson
d.grierson@strath.ac.uk

Taught To (Course): Sustainable Engineering Programme

Other Lecturers Involved: na

Credit Weighting: 10

Semester: 1

Assumed Prerequisites: na

Compulsory class

Academic Level: 5

Educational Aim

This module aims to provide students with an understanding of the concepts of sustainability and sustainable development. The social, environmental, and economic impact of development strategies will be identified and the mitigation of negative impacts discussed.

Learning Outcomes

On completion of the module the student is expected to be able to

LO1: understand the concept of social, environmental and economic sustainability

LO2: discuss population, urban, and economic growth strategies and their impacts

(UK SPEC suggests no more than 4 learning outcomes per module. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the programme specifications.)

Syllabus

The module will cover the following:

- Shifting world views with respect to technology and ecology
- Green politics
- Green theoretical perspectives
- Climate change
- Sustainable development
- Limits to growth (people, economies & cities)

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>Duration</td>
<td>Weighting</td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td>LO1 and LO2</td>
</tr>
</tbody>
</table>

Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project

Recommended Reading

- Bookchin, M. Remaking Society (Black Rose Books, Montreal and New York, 1989)
- Fox, W. Towards a Transpersonal Ecology; Developing New Foundations for Environmentalism (Green Books Ltd, Devon, 1995)
- Kuhn, T. The Structure of Scientific Revolutions (Houghton Mifflin, New York, 1962)
- MacKay, D.J.C. Sustainable Energy: without the hot air (UIT Cambridge, 2009)
General Aims

The module aims to introduce elements of financial engineering that are applied to reduce risk of business insolvency and enhance the financial robustness of business enterprises. To this end, the module covers the essentials of Financial Engineering both as an academic discipline and as a strategy of financial and business risk management in the light of contemporary circumstances. Recent trends in corporate business behaviour in major industrialized countries have heightened concern with issues of corporate governance, corporate ethics, financial strategies and the role of the financial engineer. Central to this concern is the aim of managing risk to ensure the solvency and sustainability of business ventures. In exploring the way forward, business enterprises often consider organisational and management options that would enable them to enhance their position of competitiveness and solvency under uncertain and risky market conditions. Why do businesses go bust? What is the best strategy for survival and growth? What are the options for financing investment projects both in the private and public sectors of an economy? How would the financial engineer propose to combine loan capital and equity capital to raise funds for an investment initiative; and how would he/she advise his/her company/organization to build its investment portfolio to ensure financial security in volatile market conditions? These are some of the major issues the financial engineering module takes on board.

Specific Learning Outcomes

Upon successful completion of this module, the student will be able to:
✓ Identify and analyse issues arising from the financial accounts and reports of companies
✓ Evaluate investment decisions in the light of financial market circumstances
✓ Identify and evaluate sources and methods of raising finance
✓ Analyse the principles underlying operation of financial/capital markets
✓ Identify and evaluate financial strategies and instruments for corporate risk management
✓ Evaluate the financial viability of risk transfer options available to PFI and PPP projects in terms of cost-benefit analysis.

Syllabus

Introduction to the credit
✓ Elements of Financial Accounting
✓ Financial Reports: Balance sheets, income statements, Financial Ratios
✓ Financial assets and asset valuation
✓ Sources of project finance
✓ Capital structure and gearing
✓ Financial engineering of capital projects
✓ Influence of the stock market on Engineering firms
✓ Cases in business failures
✓ The PFI Debate
✓ Investment decisions, financial instruments and portfolio risk management
✓ Restructuring strategies - acquisitions and mergers

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examination</th>
<th>Coursework</th>
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</thead>
<tbody>
<tr>
<td>Duration</td>
<td>No. of Assignments</td>
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<tr>
<td></td>
<td>2</td>
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</tbody>
</table>

Recommended Reading

**EF930 INFORMATION MANAGEMENT**

<table>
<thead>
<tr>
<th>Module Registrar:</th>
<th>Professor Alex Duffy</th>
<th>Taught To (Course):</th>
<th>PG</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="mailto:alex.duffy@strath.ac.uk">alex.duffy@strath.ac.uk</a></td>
<td>Other Lecturers Involved:</td>
<td>Dr Andrew Lynn, Dr Iain Boyle</td>
<td>Credit Weighting:</td>
</tr>
<tr>
<td>Assumed Prerequisites:</td>
<td>None</td>
<td>Compulsory/Optional/ Elective class:</td>
<td>Academic Level:</td>
</tr>
<tr>
<td>Educational Aim</td>
<td>This module aims to give students an understanding of the types of different approaches, techniques and systems used in building information based systems. In particular to:</td>
<td></td>
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<tr>
<td></td>
<td>• Introduce students to the software engineering process, identifying information requirements and visual modelling.</td>
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<td></td>
<td>• Acquire a basic understanding of information storage, retrieval, and systems.</td>
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<tr>
<td></td>
<td>• Provide an appreciation and basic skills in the process of developing information systems.</td>
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<tr>
<td></td>
<td>• Familiarise students with information technology, how to model and use information and in introduction into a way of representing information on a computer based system.</td>
<td></td>
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</tr>
<tr>
<td>Learning Outcomes</td>
<td>On completion of the module the student is expected to be able to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LO1</td>
<td>Identify information requirements and model information in a readily recognised way.</td>
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<tr>
<td>LO2</td>
<td>Design and model platform independent information.</td>
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<tr>
<td>LO3</td>
<td>Develop and implement an appropriate information system to meet the identified information requirements.</td>
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<tr>
<td>LO4</td>
<td>Delivery and report the development of an information system.</td>
<td></td>
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</tr>
<tr>
<td>LO5</td>
<td>Discuss key aspect of information management.</td>
<td></td>
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</tr>
<tr>
<td>Syllabus</td>
<td>Introduction; information systems; reasons for centralised information, information input and retrieval; information modelling process and techniques, databases as an information resource; information normalisation; information system development process; visual modelling; information requirements; information structure and organisation; information retrieval; web-based information systems; integration of information systems.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment Method(s) Including Percentage Breakdown and Duration of Exams</td>
<td></td>
<td></td>
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<tr>
<td>Examinations</td>
<td>Courseworks</td>
<td>Projects</td>
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</tr>
<tr>
<td>Number</td>
<td>Duration</td>
<td>Max Marks</td>
<td>Number</td>
</tr>
<tr>
<td>LO1, LO2, LO3, LO4, LO5</td>
<td>3</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

*Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.*
EF931/935 PROJECT MANAGEMENT

Module Registrar: B Dickson
brian.dickson@strath.ac.uk

Taught To (Course): MSc Power Plant Engineering

Other Lecturers Involved: Credit Weighting: 10 Semester: 1
Assumed Prerequisites: optional class
Academic Level: 5

Educational Aim
This module aims to provide students with skills relating to the use of engineering practices in Project Management with particular respect to the effective and efficient use of resources.

Learning Outcomes
On completion of the module the student is expected to be able to

LO1 Demonstrate practical skills so that they are able to outline the scope of managing projects and the importance of completing projects on time, to an agreed quality and cost without excess use of resources.

LO2 Gain intellectual skills so that they are able to demonstrate understanding of project network methods and demonstrate familiarity with industry standard project planning software.

LO3 Develop an understanding of the inter-dependency between project estimating and project control and cost management.

LO4 Understand the basis of contract law, the different types of contract and when they are used.

(UKSpec suggests no more than 4 learning outcomes per module. Statements must be broad and be syllabus free and link in with the intended learning outcomes on the programme specifications.)

Syllabus
A statement on the range of learning

Introduction to Project management techniques and project control.
Basic aspects of project teams; project scope of work; network related management techniques; project features; project constraints and resources; quality assurance and document control.
Project networks: definition of events; activities and nodes; precedence networks and "activity on node" method; analysis of critical path.
Procedural and Graphical presentation techniques that are used as industry standard planning packages.
Introduction to Contract Law: formation of contract; validity; terms of the contract; breach of contract; agency; company contracts.
Project Budgetary control including cash flow, financial borrowing and investment.

Assessment Method(s) Including Percentage Breakdown and Duration of Exams

<table>
<thead>
<tr>
<th>Examinations</th>
<th>Courseworks</th>
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<tbody>
<tr>
<td></td>
<td>Number</td>
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<td></td>
<td>1</td>
</tr>
<tr>
<td>L/Outcomes</td>
<td>LO1</td>
</tr>
</tbody>
</table>

Indicate which learning outcomes (LO1, LO2 etc) are to be assessed by exam/coursework/project as required.

Recommended Reading
Course notes and provided references
Industrial based case studies
Under Health and Safety legislation, and under the wider European Post-Seveso Directives, it is mandatory for many industries to carry out risk assessments with the aim of showing that risk is “As Low As Reasonably Practicable”. This module aims to introduce the fundamental techniques of risk analysis and risk-informed decision making. Students will have the opportunity to learn the general principles of methods and their place in risk management, as well as the chance to develop skills in applying these methods to variety of engineering examples.

**Syllabus**

<table>
<thead>
<tr>
<th>Week</th>
<th>Location</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Class</td>
<td>Managing risks of technological systems and fault and event tree modelling</td>
</tr>
<tr>
<td>2</td>
<td>Lab</td>
<td>Using commercial software (e.g. Reliability Workbench) to support system risk analysis</td>
</tr>
<tr>
<td>3</td>
<td>Class</td>
<td>Processes for identifying, assessing and managing common cause failures</td>
</tr>
<tr>
<td>4</td>
<td>Class</td>
<td>Role of the human in technological risk</td>
</tr>
<tr>
<td>5</td>
<td>Class</td>
<td>Guest lecture from industry collaborator</td>
</tr>
<tr>
<td>6</td>
<td>Class</td>
<td>Class test and guest lecture from industry collaborator</td>
</tr>
<tr>
<td>7</td>
<td>Class</td>
<td>Cost-benefit analysis to support ALARP assessments</td>
</tr>
<tr>
<td>8</td>
<td>Class</td>
<td>Risk informed decision-making using Bayesian belief nets and uncertainty analysis</td>
</tr>
<tr>
<td>9</td>
<td>Lab</td>
<td>BBN Cases using Genie</td>
</tr>
<tr>
<td>10</td>
<td>Holiday</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Class</td>
<td>Managing structured expert judgement to inform risk assessment</td>
</tr>
<tr>
<td>12</td>
<td>Class</td>
<td>Guest Lecture – Professor John Quigley (University of Strathclyde)</td>
</tr>
</tbody>
</table>

**Learning Outcomes**
- To understand the general process of risk management and its applications in industry
- To build risk models, appreciating the modelling issues involved in their application
- To understand key theoretical concepts and their application in the development of an ALARP case
- To use commercial software to conduct detailed risk analysis of technological systems

**Assessment Method(s)**
- Class tests to assess understanding of key concepts and methods (50%) scheduled in weeks 6 and 12
- Group assignment to develop full risk analysis of a technological system (50%)

**Coursework, case studies**
- Major case studies (fully developed cases developed in collaboration with lead risk analysts in the partner organisations) include:
  - NASA Space Shuttle Risk Assessment;
  - RSSB UK Railway Network Risk Informed Investment Decisions
  - Octel Chemical Plant Risk Modelling and Management
- Invited speakers from industry (e.g. risk analysts or managers in relevant industries) and academics (e.g. international visitors to University).

**Recommended Reading**
- E-learning material customised for the module, originally developed with funding from EPSRC
- D. Vose “Risk Analysis”
EF900: Individual Project/Dissertation

In this part of the course, students undertake supervised, individual project work, with the award of MSc being made on the basis of an acceptable report/dissertation submission.

**Students should check submission requirements with their Course Director.**

This component is valued at 60 PG credits.
At the University we are committed to providing a safe learning environment where dignity is respected and discrimination or harassment does not occur on the basis of age, disability, gender reassignment, marriage and civil partnership, pregnancy and maternity, race, religion or belief, sex, sexual orientation and socio-economic background. No student should intentionally be made to feel threatened or excluded from class participation.

You are reminded of your responsibility for the duration of your studies by showing respect to fellow classmates and staff by remembering the following protocol:

- Attend all scheduled lectures/ seminars and/ or practical sessions such as labs, including any additional learning and teaching sessions.

- Arrive on time and remain in class until the end of the session. If you need to leave early for any reason, please notify the tutor at the beginning or prior to the class.

- Do not disrupt the class by habitually coming in late or coming and going from the classroom during the session. Students arriving late, without justified reasons, may be refused entry.

- Refrain from consistently interrupting another speaker and listen to the ideas of others with respect. Do not be rude or make personal attacks on individuals during group discussions.

- Inform and establish consent of the tutor if you wish to record the lecture. The recording must be used only for personal study.

- Do not bring food into the classroom, other than for medical reasons, e.g. diabetes. Beverages may be permissible at the tutor’s discretion if the room utilisation rules allow.

- Inform tutors of specific requirements for example the need to perform prayers for practising students of diverse faiths.

- Seek consent of students and staff before taking any photos in the classroom.

- At any course related external visit you are acting as ambassadors of the University and are reminded to act as such.

- Refrain from smoking on premises as this is prohibited in all University buildings.

- Follow emergency instructions and health and safety procedures.
Academic Dishonesty:
to be read in conjunction with University Regulations 5.4 and 5.9

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.

Examples of Academic Dishonesty

a cheating in written examinations
   illicit copying or communicating; possession of prohibited materials

b false candidature
   being replaced by a false candidate or impersonating a candidate

c collusion
   the representation of a piece of unauthorised group work as the work of a single candidate

d commissioning, stealing or acquiring
   submitting an assignment done by another person as the student’s own work

e duplication
   the inclusion in coursework of material identical or substantially similar to material which has already been submitted for another assessment within the University

f false declaration
   making a false declaration in order to receive special consideration by an Examination Board/Committee or to obtain extensions to deadlines or exemption from work

g falsification of data
   presentation of data in laboratory reports, projects, etc based on work purported to have been carried out by the student, which have been invented, altered or copied by the student

h plagiarism
   the unacknowledged use of another’s work as if it were the student’s own work. Examples, which apply both to conventional sources and information downloaded from the internet, are:
   i inclusion of more than a single phrase from another’s work without the use of quotation marks and acknowledgement of source;
ii summarising another’s work by changing a few words or altering the order of presentation without acknowledgement;

iii copying another’s work;

iv use of another’s ideas without acknowledgement or the presentation of work which is substantially the ideas of another.

Advice and Information:
If you need advice or information about a particular difficulty an Adviser will help you look at the options relevant to your circumstances. Staff are experienced in responding to a wide range of issues and will also be able to refer you appropriately, if necessary.

As well as providing a general service, specific information and advice are offered on University procedures such as voluntary/academic suspension, examination appeals, course problems, and negotiation with departments.

There is a range of useful information and self-help leaflets on our website (see below). Appointments and enquiries may be made in person, by telephone or by email:

Student Advisory and Counselling Service
Level 4
Graham Hills Building
50 George Street
Glasgow G1 1QE

Tel: 0141 548 3510
Email: r.sacs@strath.ac.uk
Website: http://www.strath.ac.uk/sacs

Absence:
For absences of seven days or less
If you have been absent from the University for seven days or less you should record a self-certification online via PEGASUS using the 'Personal Circumstances' link under the Services tab.

For absences of more than seven days
Where sickness results in absence of more than seven days, you are required to submit a medical certificate (signed by a medical practitioner who is not a member of your family) to Student Business.

For absences from an examination
If you are absent from an examination due to sickness you must submit a formal medical certificate. Certificates that are submitted to Student Business are kept in your file, and details are recorded on computer. Student Business informs the relevant departments and Board of Examiners of certificates which are relevant to a diet of examinations or the corresponding period of study, including, where appropriate, the relevant details. The following University regulations relating to absence through illness should be noted:-

Regulation 4.1.10
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.

Regulation 6.4.11
Students must sit all terminal tests and examinations unless prevented by illness, in which case a medical certificate must be produced.
For absences of 7 days or less. Students who have been absent for 7 days or less should record a self-certification online via PEGASUS using the Personal Circumstances link under the services tab.

For absences of more than 7 days. Where sickness results in absence of more than 7 days, the student is required to submit a medical certificate (signed by a medical practitioner who is not a member of the student’s family) to Student Business-Engineering. Student Business will inform the relevant Department and, if the absence continues for 14 days or more, the SAAS or relevant grant awarding body.

For absences from an examination or failure to complete assessed coursework. The self-certification convention does not apply and a student absent from an examination, class test or who fails to submit an assessment/assignment on time due to sickness must submit a formal medical certificate.

In considering results, the Board of Examiners is concerned to take into account medical or other circumstances which may have adversely affected a student’s performance. It is very important that the University is made aware of such circumstances in writing and, where relevant, with the production of a medical certificate. Students should provide information on adverse circumstances both to their Adviser of Study and to Registry-Engineering. They may also find it useful to arrange to see their Counsellor.

Academic Appeals:
Please refer to the Personal Circumstances and Appeals Procedure, before submitting an appeal to the Faculty Office - Engineering:
http://www.strath.ac.uk/staff/policies/academic/

Change of Address:
Students are required by Regulation 6.4.9 to notify the Student Experience and Enhancement Services (Student Business) of any change in your permanent home or term- time addresses. The University will use these addresses for official communications, including examination results. Students should update their address on their Pegasus record.

Examinations – Use of Dictionaries:
4.2.1 Students whose native language is not English are permitted to use paper-based English/native language dictionaries in University examinations, except as detailed in regulation 4.2.2. These dictionaries will be subject to scrutiny by the Invigilator in Charge of each examination. Electronic dictionaries are not permitted in University examinations.

4.2.2 Unless instructions have been issued to the contrary, dictionaries shall not be used in language examinations.

Mitigating Circumstances:
When circumstances beyond your control affect your performance in assessment you should report these circumstances to the University as soon as possible as Mitigating Circumstances. You should submit Mitigating Circumstances as soon as you feel you have not performed as well as you expected. You should not wait until the results have been published. Failure to submit mitigating circumstances within five working days may render them inadmissible in the event of a subsequent academic appeal.

The Mitigating Circumstances procedure and Form can be found on the Academic Policies & Procedures page under the ‘Assessment and Feedback and External Examiners’ section.
http://www.strath.ac.uk/staff/policies/academic/
Equality and Diversity:
The University of Strathclyde is committed to achieving and promoting equality of opportunity in the learning, teaching, research and working environments.

We value the diversity of our students and support the development of mutual respect and positive relations between people.

The University has in place Equality Outcomes which meet the requirements the Equality Act 2010. You are advised to familiarise yourself with the University approach on equality and diversity and relevant developments and information by visiting the website: www.strath.ac.uk/equalitydiversity/equalityinformationforstudents/

Graduation:
Award Ceremonies (or Congregations) are held in June/July and October/November each year. All students hoping to graduate or be presented must enrol to graduate by completing a form and paying the appropriate fee. Details of the ceremonies and enrolment forms are usually available from Registry in March each year.

Issues with Physical Access on campus:
If you experience an issue with physical access anywhere on campus, please email: physicalaccess@strath.ac.uk where a member of Estates staff will be able to help.

Mental Health:
Student with mental health conditions and concerns can choose from several support services when seeking assistance, depending on the nature of the support being sought. The Student Advisory and Counselling Service, the Student Health Service, the Chaplaincy and the Adviser to International Students all provide advice and support to students with mental health concerns. The Disability Service can discuss the possible impact of mental health conditions on students’ studies and, in some cases, help to arrange personal and financial support. For further information please feel free to contact any of the above services.

Student Advisory and Counselling Service:
This is a confidential service for UK undergraduate and postgraduate students at the University of Strathclyde, available at any time during your university career. We also offer personal counselling to International Students, although general advice and information is provided by the International Office.

Our service may be a good place to start if you are experiencing difficulties which prevent you from making the most of yourself and the many opportunities which university offers.

Counselling:
Counselling gives an opportunity to talk through any personal issue causing you concern. You will meet with a trained Counsellor who will not judge you or try to tell you what you should do. You may gain a greater understanding of how you are affected by your experiences and begin to feel life is more manageable. You also might discover that making some changes will help you live more effectively, and counselling may help you find resources to address the concerns you face.

Students with disabilities:
The University is committed to providing an inclusive learning and working environment for disabled people.

If you have, or think you have, a disability we encourage you to disclose it as soon as possible. Declaring your disability will enable you to access any additional support that you may need and help to ensure you become a successful student. The information you provide will be treated as confidential and will not be shared with other staff without your consent.

The University has a dedicated Disability Service that offers specific advice, information and assistance to disabled students, including information on the Disabled Students Allowance (DSA). Further information is available from the website: www.strath.ac.uk/disabilityservice/

In addition, each academic Department/School (for HaSS) has at least one Departmental Disability Contact (DDC), who act as a first point of contact for disabled students. The Departmental Disability Contact list is available on the website at: www.strath.ac.uk/disabilityservice/ddc/
Please inform your course tutor, the DDC and a member of the Disability Service of your needs as soon as possible. The Disability Service will then formally communicate your needs to your Department/School.

Email: disabilityservice@strath.ac.uk
Telephone: 0141 548 3402
www.strath.ac.uk/disabilityservice

**Student Health Service**
The Student Health Service (SHS) offers clinics for the diagnosis and management of treatable disorders and, when necessary, referral to an appropriate specialist. The service is located on Level 1 of Livingstone Tower and appointments can be arranged by students themselves or, on their behalf, by their family doctor or a member of staff. Health information is available at the Department for a wide range of health issues and this can be accessed at the reception.

It is important that all students register with a family doctor (GP). Please note also that the Student Health Service is not a 24-hour, emergency service. Medical emergencies should be referred to the University Security Services (0141 548 2222 or dial 2222 from internal phones) whose staff are trained in first-aid and can, if required, contact the emergency services.

Tel: 0141 548 3916
Email: studenthealth@strath.ac.uk
Website: http://www.strath.ac.uk/studenthealth

**Student Finance Office**
The Student Finance Office offers advice to UK students on financial matters, including assistance for students with financial difficulties, e.g. assistance with applications for awards from the Hardship Fund and the Childcare Fund, or loans from the University's Emergency Aid Fund. The office also provides advice to students and others on queries in relation to fees, loans, bursaries etc. (Please note: there is a separate Adviser to International Students whose office is based in the University's Recruitment and International Office, Graham Hills Building).

The Student Finance Office is located in the McCance Building. Appointments and enquiries can be made in person, by telephone or email:

McCance Building
16 Richmond Street
Glasgow G11XQ

Tel: 0141 548 2753
Email: s.finance@strath.ac.uk

**Centre for Sport and Recreation**
The Centre for Sport and Recreation offers all members of the University the opportunity to participate in physical activity as a means of achieving a healthier lifestyle, to develop new physical skills and to maintain or improve their sporting talents. The department is located in the Sports Centre at the top of John Street, close to the Students' Union.

Facilities include a twin court Sports Hall containing 6 badminton courts and facilities for all major indoor games; a separate activities room which houses fitness classes and a range of martial arts; 6 squash courts, a weight training room and a well-equipped cardiovascular fitness suite containing 70 exercise machines and personal weight training stations. In the Royal College Building, accessed from John Street, there is a 20yd x 10yd 4 lane swimming pool, above which is a traditional gymnasium. The University Playing Fields are sited at Stepps. Facilities include grass soccer and rugby pitches and a floodlit sand-dressed artificial turf hockey pitch.

The Centre offers a range of fitness class, fitness testing, health and lifestyle consultations, weight and fitness room inductions, sports coaching classes, and swimming and lifesaving classes. The Centre also provides facilities for many of the Sports Clubs run through the Students Sports Union. The Centre co-ordinates the University/Glasgow City Council Sports Bursary programme for elite sportsmen and women and the Golf Scholarship Programme is currently supported by the R&A, details of which are available from the CSR Office or the website.

For full details of facilities, classes, opening hours and other queries, contact:
Telephone: 0141 548 2446
Website: http://www.strath.ac.uk/sport/
The Swimming Pool can be contacted direct on 0141 548 2017.

Study Skills
The Study Skills service works with students to enhance the quality of their learning. We offer practical advice and support to help you study more effectively. We do this through workshops, one to one appointments and self-access materials. For further information see our website:- http://www.strath.ac.uk/studyskills/

The Chaplaincy
The Chaplaincy provides students with the opportunity to join a community, offering friendship, support and advice. The Chaplaincy Centre is located in St Paul's Building, John Street (opposite the Students' Union) where you will find the Ark Café, chapel, TV lounge, study room and common room. The Centre provides space to eat, study, worship and relax and accommodation for various groups to meet.

The University Chaplain and Roman Catholic Chaplain work full-time alongside the Chaplain to International Students and a team of part-time denominational Chaplains to offer confidential help and support and a varied programme of events throughout the year. Information about and contact with a number of faith groups within the City is also provided.

Chaplaincy Centre
St Paul's Building
90 John Street
Glasgow G1 1JH

Tel: 0141 548 4144
Email: chaplaincy@strath.ac.uk
Website: http://www.strath.ac.uk/chaplaincy

If you have any queries please bring these to the attention of staff or the University's Equality and Diversity office.
Email: equalopportunities@strath.ac.uk
Telephone: 0141 548 2811
www.strath.ac.uk/equalitydiversity/

Copying Facilities
Copying facilities are available in the Students' Union and Andersonian Library

Access to Buildings Outwith Normal Hours:
For access to computer rooms outwith normal hours (8 a.m. - 6 p.m.) it is necessary for students to sign a card which (for access to computer and study rooms) may be obtained from, and must be signed by your Head of Department or nominated Deputy. Thereafter the card should be taken to IT Services for counter-signature. Students wishing to access laboratories outwith normal hours should speak to their Departmental Safety Officer. It is important that all students familiarise themselves with the Safety Regulations which may be found at Appendix 1 of this Handbook.

Staff-Student Committee:
The purpose of the Staff-Student Committee is to provide a forum where students can raise issues on any aspect of the Postgraduate Training Package. Each theme of the Package has one student representative on the Committee, normally elected in the first few weeks of the first semester. If there is an issue which is important to a number of students and you believe it should be discussed at this Committee, please inform your theme representative and ask for it to be raised at the next meeting. The Committee will normally meet at least once per semester.

Student Complaints:
The revised student complaints procedure was approved by Court and Senate in May/June 2007. Please refer to the website for the new complaints procedure.
www.strath.ac.uk/media/ps/humanresources/policies/student_complaints.pdf
Semester Dates 2013-14

Semester 1: 20 September 2013 – 17 January 2014

Semester 2: 20 January 2014 – 30 May 2014
Easter Vacation: 29 March 2014 – 11 April 2014

The University is CLOSED on the following dates:
Monday, 30 September 2013 (Local Autumn Holiday)
Tuesday, 24 December 2013 – Thursday, 2 January 2014 (Christmas/New Year)
Friday, 18 April 2014 (Easter)
Monday, 21 April 2014 (Easter)
Monday, 5 May 2014 (May Day Holiday)
Monday, 26 May 2014 (Queen’s Birthday Holiday)
Friday, 18 July 2014 (Local Glasgow Fair Holiday)
Monday, 21 July 2014 (Local Glasgow Fair Holiday)
Appendix 1
Departmental Safety Regulations

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 Convener of the Area Safety Committee 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 Convener of the Area Safety Committee. 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's 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

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 (15th 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

<table>
<thead>
<tr>
<th>Location</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andersonian Library</td>
<td>(as stated in Regulation 3.5 of the University Calendar)</td>
</tr>
<tr>
<td>Computer Centre</td>
<td>0800-2200</td>
</tr>
<tr>
<td>Sports Centre</td>
<td>(as stated in the Regulations of the Centre for Sport and Physical Activity)</td>
</tr>
<tr>
<td>All other departments</td>
<td>0800-1800</td>
</tr>
</tbody>
</table>

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 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.
# Appendix 2

## Key to Buildings

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Building Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB</td>
<td>John Arbuthnott Building Robertson Wing</td>
</tr>
<tr>
<td>AR</td>
<td>Architecture Building</td>
</tr>
<tr>
<td>AT</td>
<td>Alexander Turnbull Building</td>
</tr>
<tr>
<td>BH</td>
<td>Barony Hall</td>
</tr>
<tr>
<td>CL</td>
<td>Collins Building</td>
</tr>
<tr>
<td>CU</td>
<td>Curran Building</td>
</tr>
<tr>
<td>CV</td>
<td>Colville Building</td>
</tr>
<tr>
<td>EM</td>
<td>181 St James Road</td>
</tr>
<tr>
<td>GH</td>
<td>Graham Hills Building</td>
</tr>
<tr>
<td>HD</td>
<td>Henry Dyer Building</td>
</tr>
<tr>
<td>HW</td>
<td>John Arbuthnott Building Hamnett Wing</td>
</tr>
<tr>
<td>JA</td>
<td>John Anderson Building</td>
</tr>
<tr>
<td>JW</td>
<td>James Weir Building</td>
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<tr>
<td>LD</td>
<td>Lord Todd</td>
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<tr>
<td>LH</td>
<td>Lord Hope Building</td>
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<tr>
<td>LT</td>
<td>Livingstone Tower</td>
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<tr>
<td>MC</td>
<td>McCance Building</td>
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<tr>
<td>RC</td>
<td>Royal College Building</td>
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<tr>
<td>RT</td>
<td>Ramshorn Theatre</td>
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<tr>
<td>SB</td>
<td>Strathclyde Business School</td>
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<tr>
<td>SP</td>
<td>St Pauls Chaplaincy Centre</td>
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<tr>
<td>ST</td>
<td>Stenhouse Building</td>
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<tr>
<td>SU</td>
<td>Students’ Union</td>
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<tr>
<td>TG</td>
<td>Thomas Graham Building</td>
</tr>
<tr>
<td>UC</td>
<td>University Centre</td>
</tr>
<tr>
<td>WC</td>
<td>Wolfson Building</td>
</tr>
<tr>
<td>WD</td>
<td>Sir William Duncan Building</td>
</tr>
</tbody>
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