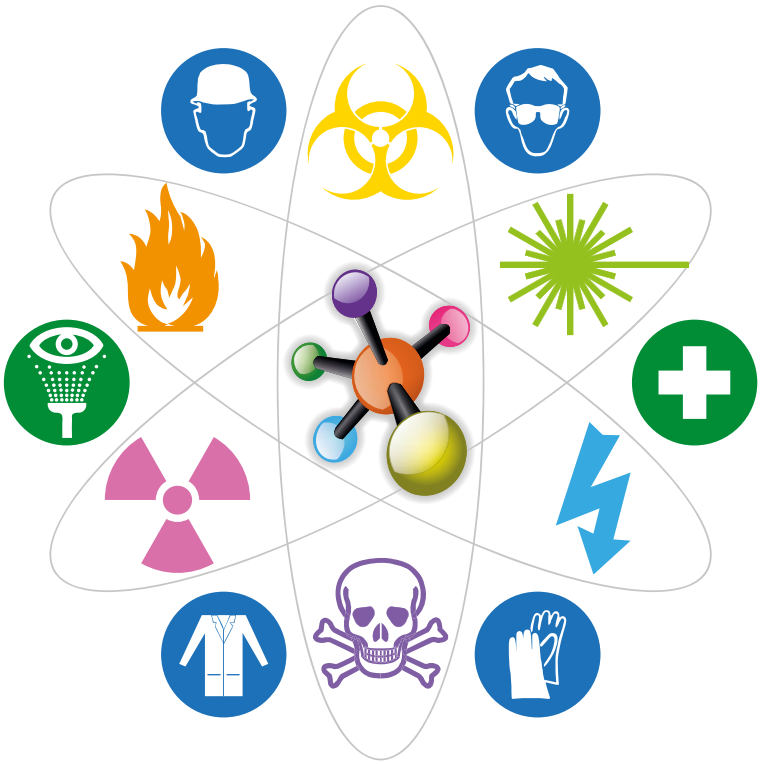
Imperial College London

DEPARTMENT OF CHEMICAL ENGINEERING

SAFETY HANDBOOK



All staff and postgraduate students are required to read this document.
Departmental members will be informed of any updates brought to this document and are required to familiarise themselves with these promptly.
In the event of a dispute involving safety matters, ignorance of the regulations will not be considered a valid excuse.

This document is reviewed annually for October. Information in this document may change during the year, for latest information go to the latest version on the Chemical Engineering safety webpages.

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Author Name(s):	ST
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1. Acknowledgement of Receipt

All staff and postgraduate students are required to read the Departmental Safety Handbook.

Departmental members will be informed of any updates brought to this document and are required to familiarise themselves with these promptly.

In the event of a dispute involving safety matters, ignorance of the regulations will not be considered a valid excuse.

Once you have properly read the Departmental Safety Handbook, please print out/cut out this page, fill it in, sign it and return it to the Departmental Safety Officer.

You can leave it in the tray by Office BONE 321.

To: Head of Department
Departmental Safety Officer

First Name: _____

Last Name: _____

Position (PhD, MSc, Staff): _____

Supervisor: _____

CID Number:

I confirm that:

- I have received a copy of the Departmental Safety Handbook.
- I have read and understood the rules, procedures and regulations contained in the Departmental Safety Handbook.
- I agree to abide by the rules, procedures and regulations laid out in the Departmental Safety handbook.
- I agree to remain up to date with the content of the Safety Handbook.

Signature: _____

Date: _____

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2. Introduction

The Department of Chemical Engineering and the Faculty of Engineering aim to operate to the highest safety standards. Maintaining vigilance and care depends on each and every one of us. Please read these documents carefully before starting work as they will assist you in complying with both the "College Health and Safety Policy" and the "Department of Chemical Engineering Health and Safety Statement and Arrangements" (see section 4 on page 7). Give particular attention to the general information as well as any subsequent sections that are relevant to your work environment. You must also refer to the College Safety Department web pages which are linked to the Chemical Engineering Safety Pages.

Web pages are the source of up to date safety information, documentation and access to training. You must contact your line manager and safety co-ordinator for induction and to discuss your training needs. They will be your first line of contact for safety information and advice. You must assist in arranging training and attend all identified task-specific and compulsory courses.

Information in this document may change during the year, for latest information go to the version on the Chemical Engineering safety web pages:
http://www3.imperial.ac.uk/chemicalengineering/aboutcect/healthandsafetyinformation

3. Finding Safety Information

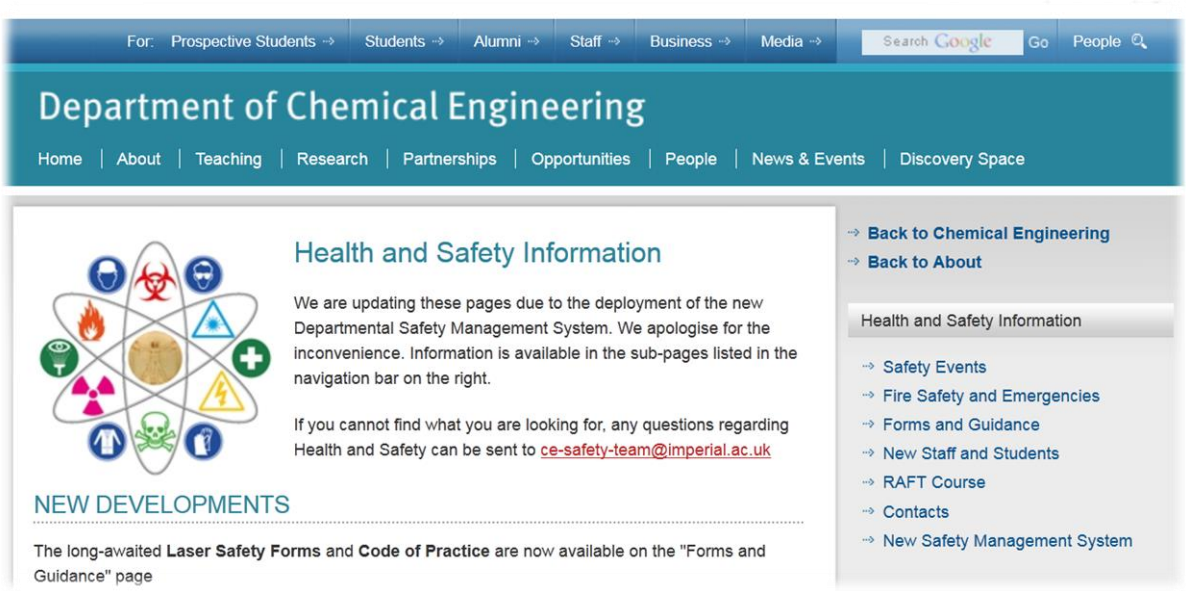
If you have any specific questions, contact the Departmental Safety Team ce-safety-team@imperial.ac.uk

But, first, try to explore the Imperial College web pages, as the information is often all there.

If you are looking for safety information, you can find it in the following places:

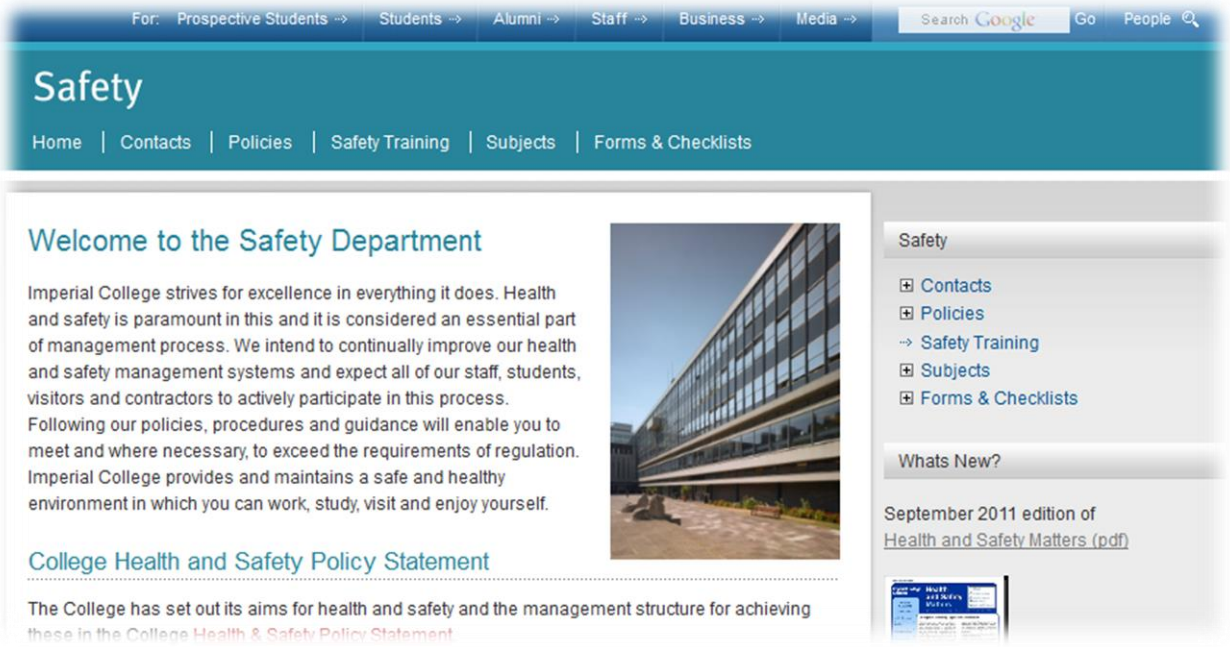
The Chemical Engineering Safety web pages

http://www3.imperial.ac.uk/chemicalengineering/aboutcect/healthandsafetyinformation



The Imperial College Safety Department web pages

http://www3.imperial.ac.uk/chemicalengineering/aboutcect/healthandsafetyinformation



Imperial College London

DEPARTMENT OF CHEMICAL ENGINEERING

HEALTH & SAFETY STATEMENT AND ARRANGEMENTS

The Department of Chemical Engineering is committed to pursuing excellence in research and teaching. This includes ensuring the health and safety of staff, students, visitors, contractors and members of the public who are, or may be, affected by Department activities.

Risk assessment of health, safety and environmental hazards and the identification of the relevant control measures, is a vital part of good research and teaching management. All members of the Department must identify hazards, assess the risks from them and where these are significant, identify the control measures already in place, and any further ones that may be required. The process must be systematic, recorded and reviewed.

The Rector requires all staff, students, contractors, visitors and other employers who work at Imperial College to fulfil their responsibilities as described in the College Health and Safety Structure and Responsibilities document.

Departmental Arrangements

The Department has a safety management system (SMS) to ensure no-one is affected adversely by work carried out within its environs and receives competent advice from the appointed Departmental Safety Officer and Faculty Safety Manager. The SMS is designed to achieve effective communication throughout the Department and includes having written arrangements to demonstrate compliance at all levels with the College Health and Safety Policy statement and individual College policies. To ensure success, each element in the system must connect with every other and be monitored and reviewed to confirm its effectiveness. Other arrangements are described below:

The Department has a Health & Safety Committee, which meets once a term. The committee has its own terms of reference. The Chairman of the Health & Safety Committee reports to the Executive Committee.

The Department has arrangements to ensure information on health and safety is communicated to all staff and students. Minutes from the Health & Safety Committee are circulated to all staff and students. Health and Safety information and the Health & Safety Handbook are on the Departmental Safety web pages as are links to the College Safety Department web pages. Representatives from the Department attend all relevant Building User Group (BUG) meetings to ensure information is exchanged with other Departments sharing the buildings. Information from BUG meetings is taken to the Health & Safety Committee and to the Departments Operations and Infrastructure meetings.

The Department has arrangements for at least annual health and safety inspections of its areas.

All staff **must** receive appropriate guidance and training from the College on their line management responsibilities.

Health and safety **must** be considered as a standing agenda item at all Departmental meetings, so its impact on laboratory and departmental activities is considered.

The College Safety Department and Fire Office will be consulted on any renovation or refurbishment work done in the Department.

All supervisors must ensure that their staff and students are trained to carry out their work safely and effectively, and to ensure they understand how and why they are using the associated control measures. In addition, everyone must be trained in emergency procedures.

The Head of Department must ensure that all supervisors are meeting their responsibilities.

The Department keeps a register of its risks, control measures, and whether the associated risk assessments have been carried out and reviewed.

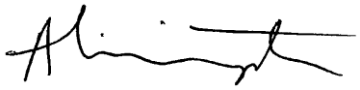
Maintenance, testing, repairs and replacements of equipment must be planned and accounted for.

These statements and arrangements will be reviewed on an annual basis.

The statement and arrangements described above are endorsed by the Departmental Safety Committee and signed off by the Head of Department:

Head of Department

Professor Andrew G. Livingston



September 2014

Review August 2015

Please Note: This statement is supplemented by the Departmental Health and Safety Policy and Arrangements available on the Departmental Safety web pages or in Appendix 1.

In addition to the Departmental Safety Policy, The College has a collection of Health and Safety Policies **which all Departments must follow**. These cover safety management as well as experimental practice and are available at the following links:

All policies: http://www3.imperial.ac.uk/safety/policies

Policies on experimental practice: http://www3.imperial.ac.uk/safety/policies/individualpolicies

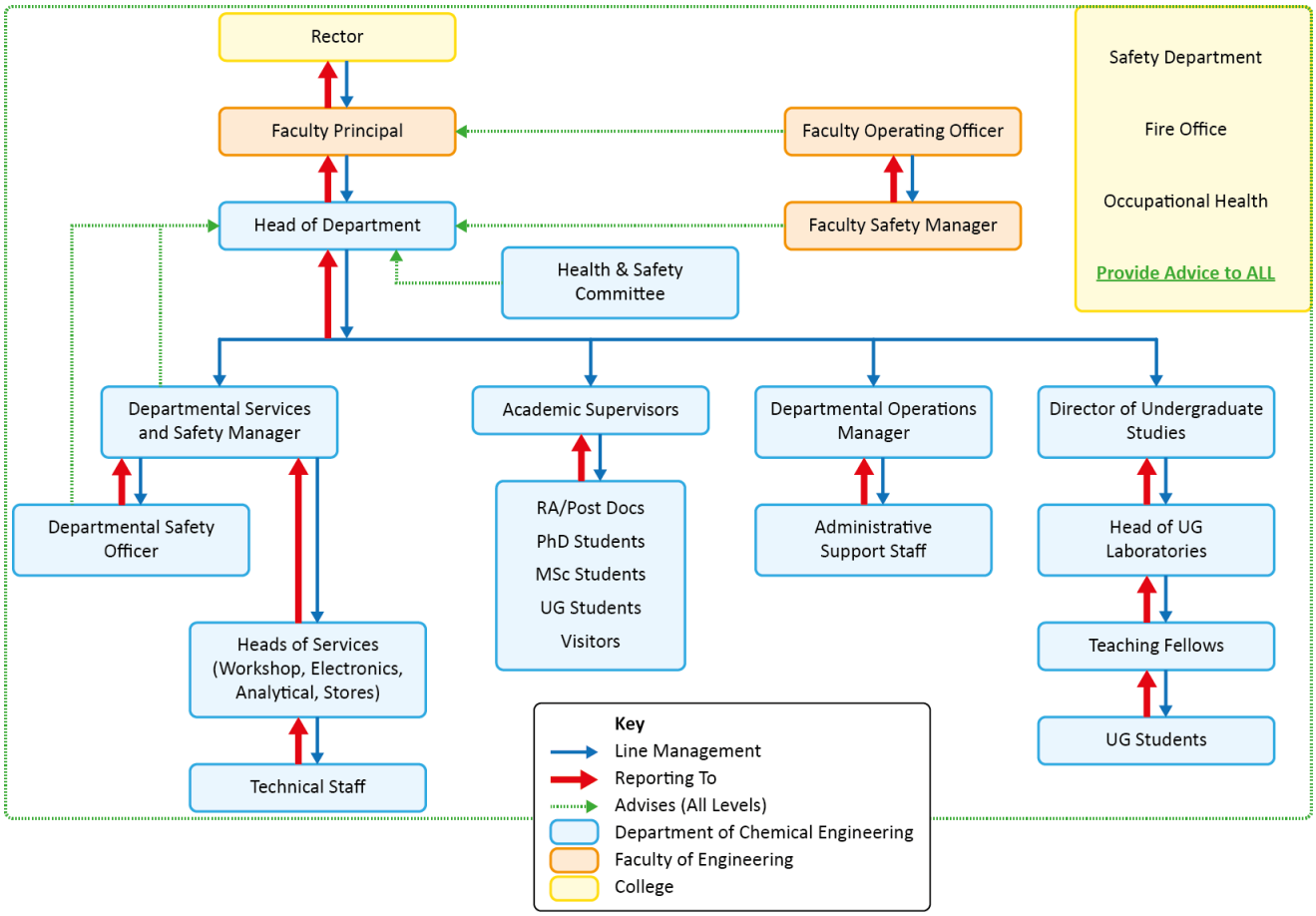
5. Safety Support and Advice in Chemical Engineering

5.1. List of Useful Contacts

The **Departmental Safety Team** consists of Mr Pim Amrit and Dr Severine Toson. We can be contacted at the following email address: ce-safety-team@imperial.ac.uk

Faculty Safety Manager	FSM	Stephen Greenwood	stephen.greenwood@imperial.ac.uk	57626
Departmental Safety Officer	DSO	Dr Severine Toson	severine.toson03@imperial.ac.uk	42225
Departmental Services & Safety Manager	DSSM	Mr Pim Amrit	p.amrit@imperial.ac.uk	45600
Laser Safety Officer	DLSO	Dr Christos Markides	c.markides@imperial.ac.uk	41601
Biological Safety Officer	DBSO	Dr Cleo Kontoravdi (on maternity leave)	cleo.kontoravdi98@imperial.ac.uk	46655
First Aid Coordinator	DFAC	Mr Bob Brace	r.brace@imperial.ac.uk	55674
Head of Analytical Services		Ms Patricia Carry	p.carry@imperial.ac.uk	45631
Head of Workshop		Mr Tony Meredith	a.meredith@imperial.ac.uk	45613
Head of Electronics		Mr Chin Lang	c.lang@imperial.ac.uk	45599
Stores Manager		Mr Keith Walker	keith.walker@imperial.ac.uk	45615
Building Manager	BM	Mr Peter Schreiber	p.schreiber@ímperial.ac.uk	49009

5.2. Safety Management Structure in Chemical Engineering



A few More Names…

Head of Department	HoD	Prof Andrew Livingston	a.livingston@imperial.ac.uk	45582
Departmental Operations Manager	DOM	Mrs Anusha Sri-Pathmanathan	a.sri-pathmanathan@imperial.ac.uk	45602
Director of Undergraduate Studies	DUGS	Prof Omar Matar	o.matar@imperial.ac.uk	49618
Director of Postgraduate Studies	DPGS	Prof Yun Xu	yun.xu@imperial.ac.uk	45588
MSc Coordinator	MScC	Prof Kang Li	kang.li@imperial.ac.uk	45676

5.3. The Departmental Safety Committee

The role of the Chemical Engineering Department Safety Committee is to monitor departmental safety matters and performance as well as to advise and assist the Head of Department in the implementation of the best safety practices in the Department.

The committee receives, reviews and monitors:

- reports of accidents, near misses, or work related health problems
- reports from safety representatives
- the results of inspections carried out by the DSO, committee members, the College, HSE or other regulatory authorities
- staff training
- provisions for emergency evacuations, evacuation drills and first aid

The committee makes recommendations to the Head of Department on:

- improvements in departmental health and safety standards
- actions to minimise accidents or near misses
- local arrangements for implementing new College or statutory requirements

The Departmental Safety Committee Consists of:

Prof Martin Trusler	*Chairman*	m.trusler@imperial.ac.uk
Dr Severine Toson	*Departmental Safety Officer*	severine.toson03@imperial.ac.uk
Mr Pim Amrit	*Departmental Services and Safety Manager*	p.amrit@imperial.ac.uk
Dr Christos Markides	*Laser Safety Officer*	c.markides@imperial.ac.uk
Dr Cleo Kontoravdi (on maternity leave, covered by Dr Severine Toson)	*Biological Safety Officer*	cleo.kontoravdi98@imperial.ac.uk
Ms Patricia Carry	*Laboratory Safety Representative* *Radiation Protection Supervisor*	p.carry@imperial.ac.uk
Mr Chin Lang	*Electrical Safety Representative*	c.lang@imperial.ac.uk
Mr Tony Meredith	*Workshop and Union Safety Representative*	a.meredith@imperial.ac.uk
Dr Colin Hale	*Pilot Plant and Teaching Representative*	c.hale@imperial.ac.uk
Mrs Susi Underwood	*Administrative Staff Representative*	s.underwood@imperial.ac.uk
Mr Pedro Arcelus Arrillaga	*PhD Representative*	pedro.arcelus-arrillaga09@imperial.ac.uk

VACANCY	*PhD Representative*
VACANCY	*MSc Representative*
VACANCY	*MSc Representative*
VACANCY	*Undergraduate Representative*

For further details, the Departmental Safety Committee terms of reference are available in Appendix 2.

5.4. Departmental First Aiders

In case of an emergency where you require medical assistance, you can contact your nearest first aider.

Pim Amrit	BONE 321	p.amrit@imperial.ac.uk	45600
Clemens Brechtelsbauer	ACEX 206	c.brechtelsbauer@imperial.ac.uk	41662
Emmanuel Efika		e.efika@imperial.ac.uk	
Huma Lateef	RODH C401	h.lateef@imperial.ac.uk	45559
Raluca Leonte	ACEX 304	r.leonte@imperial.ac.uk	45557
Patrizia Marchetti	ACEX 128	p.marchetti09@imperial.ac.uk	
Paul Mayer (Workshop)	BONE 130	p.mayer@imperial.ac.uk	55674
Severine Toson	BONE 321	severine.toson03@imperial.ac.uk	42225
Ivan Zadrazil		i.zadrazil06@imperial.ac.uk	

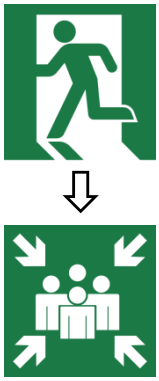
If you cannot find your Departmental First Aider, remember that First Aid is always available in the College:

If you need an ambulance, first aid, or additional help, ring the College Emergency Number
4444 from an internal phone
0207 589 1000 from an external/mobile phone

6. Fire Safety and Emergency Actions

6.1. In the Event of a Fire

In the event of the fire alarm sounding - Evacuation Procedure



If you hear a **CONTINUOUS ALARM**, Evacuate the building by the nearest available exit

- Go to the nearest **ASSEMBLY POINT** - Ensure now that you know where this is along with emergency exits, fire extinguishers and alarm points
- Remain CALM
- **DO NOT USE THE LIFTS**
- DO NOT re-enter the building until permission is given by a Fire or Security Officer
- Keep away from any entrance - Ensure that you keep clear of any vehicular traffic

A map of the fire assembly points for the College and specifically for Chemical Engineering is provided on page 14, and is available for download on the Departmental Safety Web pages.

Fire Assembly points for Chemical Engineering are located as follows:

Leaving the…

Roderic Hill Buildng	• the car park in Callendar Road, next to the Aeronautics building • Corner of Queensgate and Prince Consort Road
ACEX and Bone buildings	• The Bone Courtyard • Ayrton Road, across from the Sherfield building ground level entrance

If you discover a fire

- **SOUND THE ALARM** - operate the nearest fire alarm call point
- Warn people in the vicinity of the fire
- Leave the building promptly via the nearest available escape route and proceed to the designated assembly point

Try to extinguish the fire **ONLY IF YOU HAVE ATTENDED THE FIRE SAFETY COURSE.**
Use the nearest extinguisher.
DO NOT TAKE ANY PERSONAL RISKS

Fire drills are carried out once a year in the department, usually in the autumn term. Weekly fire alarm tests are carried out on Thursday mornings at about 08:30.

Departmental Fire Marshalls and Wardens

Departmental Fire Coordinator: Pim Amrit

Fire Marshalls

Building	Floor			Reporting Point
ACEX	5	Sakis Mantalaris	Sakis Mantalaris	Callendar Road
	4	Kang Li	Martin Trusler	Callendar Road
	3	Susi Underwood	Rayner Simpson	Callendar Road

	2	Sarah Payne	Omar Matar	Callendar Road
	BSE M	Colin Hale	David Stuckey	Callendar Road
	BSE 1	Colin Hale	David Stuckey	Callendar Road
	1M	Patricia Carry	Chin Lang	Callendar Road
	1	Andrew Macey	Nicola Guirguis	Callendar Road
BONE	4	Paul Luckham	Daryl Williams	Callendar Road
	3	Graham Stuart	Raluca Leonte	Callendar Road
	2	Paul Fennell		Callendar Road
	1	Richard Wallington	Gavin Barnes	Callendar Road
RODHILL	6	Claire Adjiman		Callendar Road
	5	Senait Selassie		Callendar Road
	4	Paul Luckham	Daryl Williams	Callendar Road
	3	Terrence Crombie		Callendar Road
	2	Marcos Millan-Agorio		Callendar Road
	1	Tony Meredith		Callendar Road

Control Wardens

ACEX	Keith Walker	Ben Kistnah	Callendar Road
RODHILL	Tony Meredith	Paul Mayer	Callendar Road

6.2. In the Event of an Emergency

In the case of injury the nearest first aider or life-saver, should be contacted. The list of Departmental First Aiders can be found in section 5.4 of this handbook and on notices posted at the end of each corridor nearest the lift.

If you cannot find a departmental first aider, contact Security as Explained below.

If you need an ambulance, first aid, or additional help
ring the College Emergency Number
4444 from an internal phone
0207 589 1000 from an external/mobile phone

Please state clearly:

- **the details of the emergency**
- **your exact location (Building, & Room)**
- **your name, your telephone number**

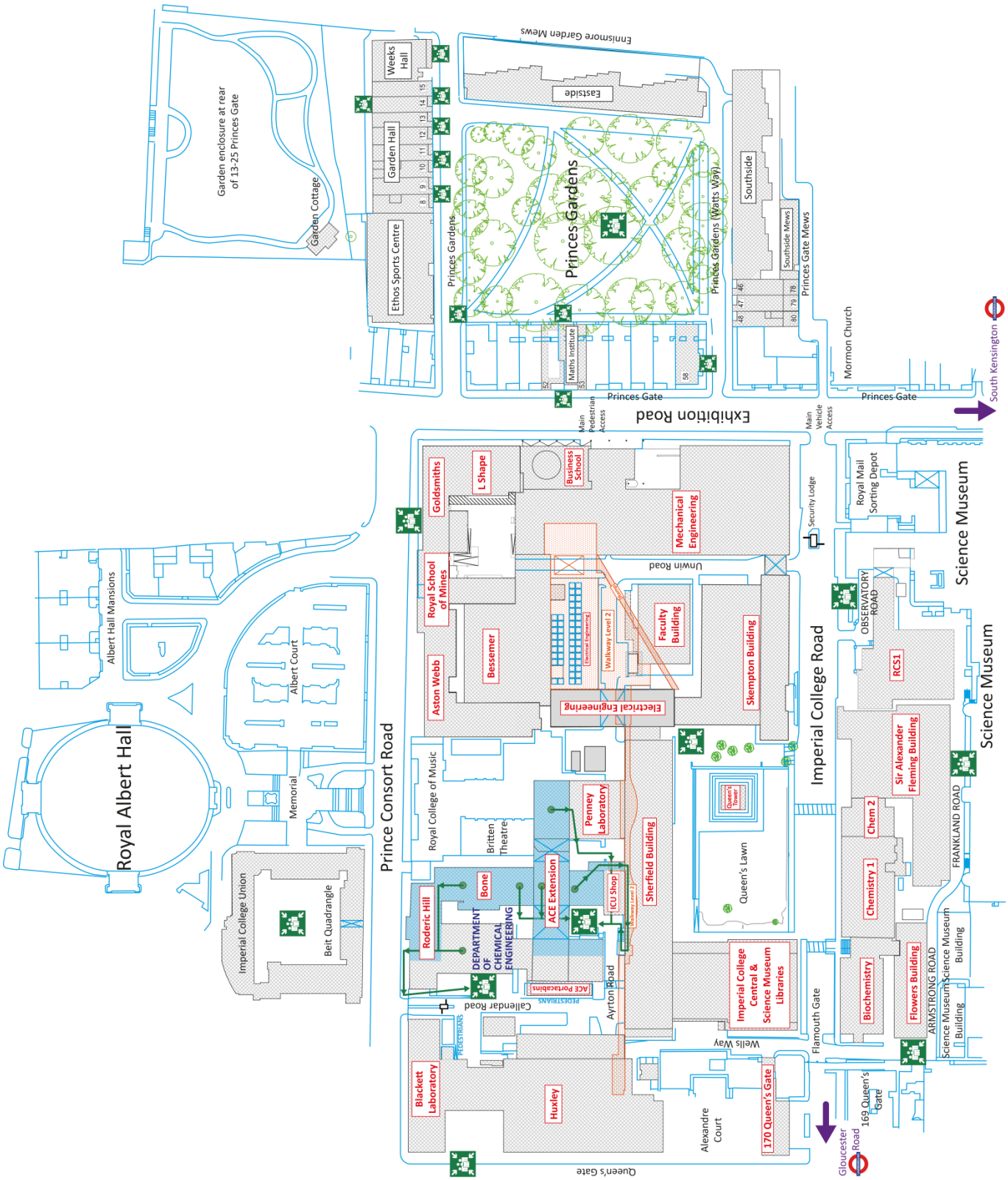
Depending on the severity of the injury, Security will be able to quickly arrange for an ambulance or walk the injured person to the Imperial College Health Centre. The Imperial College Health Centre will only see casualties if contacted in advance by a Security first aider.

In the event of a spillage of blood DO NOT attempt to clean it up.

Contact a first aider who will be aware of the correct procedure.

If you are exposed to particular substances, you may need to receive special medical attention. The poster displayed on page 15 contains all the information required if you need medical assistance. It is available for download on the Departmental Safety web pages.

Map of the Fire Assembly Points for Chemical Engineering



Poster for Obtaining Medical Help

Imperial College London

OBTAINING MEDICAL HELP AFTER A HAZARDOUS LABORATORY EXPOSURE

v2-30/08/2011

If you need an ambulance or additional help ring the College Emergency Number

4444

from an internal phone

0207 589 1000

from an external/mobile phone

Please state clearly: the details of the emergency, your exact location, your name, your telephone number

Depending on the severity of the injury, Security will be able to quickly arrange for an ambulance or walk the injured person to the Imperial College Health Centre. **The Imperial College Health Centre will only see casualties if contacted in advance by a Security first aider.**

Exposure to....	Level of Exposure	Source of Help	Speed	Comments
human blood, serum or tissue	Inoculation, contamination of broken skin or splash into mouth, eye or nose	1. Campus OH clinic or local A&E if closed 2. College OH service	within 1 hour	If the wound is sufficient to require medical treatment beyond simple first aid, go to A&E first. Take any information available on the source of the material: donor, supplier, antibody or other virology data (negative test results are as important as positives). If the donor is traceable, the treating OH service may wish to contact the donor to arrange tests for infection with blood borne virus.
human pathogen	Variable (risk assessment should specify) Inoculation should ALWAYS be regarded as SIGNIFICANT	1. College OH Service, South Kensington 2. Local A&E if out of hours & same day assessment required	Same day - next work day SEE COMMENTS	For most exposures immediate treatment to prevent infection is not necessary, or possible. Follow-up to monitor for infection will be needed but can begin the next working day and will be carried out by the College OH Service. Where post-exposure prophylaxis is necessary, then the medical assessment should be the same day. If seeking help from A&E, take a copy of the risk assessment or protocol which defines the recommended treatment.
genetically modified organism	Variable (risk assessment should specify) Inoculation should ALWAYS be regarded as SIGNIFICANT	College OH Service, South Kensington	By next work day	For most GMO exposures immediate treatment to prevent infection is not necessary, or possible. Follow-up, to monitor for signs of infection will be needed but can begin the next working day. It will be carried out by the College OH Service.
bite or scratch from animal	Breach of skin: puncture mark or bleeding	1. Local A&E department 2. College OH Service	Immediate or same day or report only, dependant on circumstances	Immediate: A&E for major allergic reaction (collapse or difficulty breathing) Same day A&E for wounds sufficient to require a dressing or for rat bites over finger joints. College OH Service assessment for bites from animal infected with human pathogen Report: lesser allergic reactions via College accident report procedure
chemical	Skin contamination, ingestion, inhalation or splash into mouth, eye or nose	1. Local First Aider; 2. A&E or College Health Centre, Princes Gardens (South Kensington only)	Within 1 hour for some exposures SEE COMMENTS	Wash immediately. The need for medical help will depend on the specific chemical involved Attend A&E for: all eye splashes; visible skin damage; any inhalational exposure sufficient to cause initial breathing difficulty; relevant exposures to chemicals with 'toxic' risk phrases (R22-R28)
biological toxin	Inoculation, ingestion, contamination of broken skin	1. College OH Service 2. Local A&E department	Within 1 hour	A&E for any symptoms. Take the risk assessment or MSDS for the material. Otherwise, contact the OH Service by phone in the first instance to discuss & assess the risk. Give details of: The incident, Substance(s) involved, Risk assessment or MSDS for the material
laser beam	Any flash into the eye from a Class 3B or Class 4 laser	Western Eye Hospital 171 Marylebone Road, NW1 5YE. tel: 020 7886 6666	Same day	Laser burns require an urgent specialist ophthalmological opinion. The eye hospital has a specialist 24 hour A&E department for assessment and treatment of eye injuries. Retinal burns are usually painless. Seek urgent assessment after ANY perceived flash event or sudden visual loss.
ionising radiation	Ingestion, inhalation, inoculation, absorption, contamination of skin, exposure to photons etc.	Phone the College RPA or one of the RPOs for advice. If not available phone the HPA (Health Protection Agency)	Same day	If incident/accident involves a wound sufficient to require medical treatment beyond simple first aid, go to A&E first. Take any information available on the source material including nuclide, activity, compound and form (solid, liquid or gas). College Radiation Protection Adviser: 07764 959 682 College RPOs: 07711 684 746 or 07725 159734 HPA Radiation Protection Division (Oxford): 01235 831 600

Occupation Health Departments

Campus	Telephone	Location	Hours
College	(020 759) **49401**	Level 4, Sherfield Building, South Kensington campus	9:00-5:00
Hammersmith	(020 838) **33063**	2nd Floor, Hammersmith House	8:00-4:00
Charing Cross	(020 8846) **1134**	Ground Floor, Golding House, CC Hospital	8:00-4:00
Chelsea & Westminster	(020 8746) **8330**	Lower Ground floor (Lift bank C)	8:30-4:00
St Mary's	(020 7886) **6799**	Praed Street, Basement of Mary Stanford Wing, St Mary's Hospital	8:00-4:00
Harefield	01895828 721	Harefield Hospital	9:00-5:00
Northwick Park	020 8869 2580	Level 5BB, Admin Block	9:00-4:00

1. The College OH Service is the primary source of OH support for all campuses. Hospital OH Depts only provide emergency assistance for exposure to blood borne infections.
2. Occupational Health departments do not always have a physician or OH nurse present throughout their opening hours. PHONE BEFORE ATTENDING.
3. There are A&E departments at Charing Cross, Hammersmith, Chelsea & Westminster & St Mary's hospitals

Nearest Accident & Emergency Departments

Campus	Hospital	Location	Telephone
South Kensington	St Mary's Hospital	Praed Street, London W2 1NY (Paddington)	020 3312 6666
	Chelsea and Westminster Hospital	369 Fulham Road, London, SW10 9NH	020 3315 8080
For eye injuries:	Western Eye Hospital	171 Marylebone Road, London NW1 5QH	020 7886 6666
Hammersmith	Hammersmith Hospital	150 Du Cane Road, London, London W12 0HS	020 8383 1000
Silwood Park	Wexham Park Hospital	Wexham, Slough, Berkshire, SL2 4HL	017 53 633000
	Frimley Park Hospital	Portsmouth Road, Frimley, Surrey, GU16 7UJ	020 331 3100

7. Induction and Training Procedures for New Members of the Department

7.1. Day One Safety Induction

iCare

Who? Staff, Undergraduate, PhD, MSc students and visitors

Building safety inductions are needed for all persons entering College premises and expected to be on site for five days or more, so that they have access to basic safety information. This includes a range of information from how to call for assistance or emergency services, action to take in the event of fire, obtain first aid and notify of accidents and incidents or building problems.

When? Safety Events beginning of October or Individual Inductions any other time

If you join Imperial at the beginning of or just before October

All staff and Students joining the College at the beginning of the Academic Year (October), should attend the Departmental General Safety Induction which will cover the Day One Safety Induction. You will be required to fill in the sign-in sheet.

The schedule of Departmental General Safety Inductions for October 2011 is available in **Error! Reference source ot found.**.

If you join Imperial at any other time of the year

All staff and Students joining the College in the middle of the Academic Year should see their manager / supervisor in order to organise their Day One Safety Induction. You will need to tick and sign the "Day One Safety Induction Checklist" and return it to the Departmental Safety Officer.

A copy of the "Day One Induction Checklist" is available in **Error! Reference source not found.**, or you can ownload it from http://www3.imperial.ac.uk/staffdevelopment/safety/induction

Further Information

Security will require the Day One Safety Induction form, appropriately signed, along with other types of identification before they will issue a College Swipe Card.

Your induction should lead to a discussion of training needs as outlined below, in the "Further Safety Training" section below.

7.2. Month One Safety Training (MOST)

Who? All new Staff

MOST is a mandatory on-line course for every new member of staff joining the College and who will work for the College for longer than one month - including those re-joining the College.

All new staff are enrolled automatically through Human Resources.

The MOST follows on from the Day One Safety Induction. By completing this course, you will:

- Understand your role in the college safety management system (SMS)
- Know where you can find details of your responsibilities and
- Know who can give you assistance and guidance in carrying them out

When? During your first month at Imperial College London

Three days after receiving your College login, you should receive an automated email notifying you of enrolment on the course, with a link and instructions on how to access it.

Further Information

More details about the Month One Safety Training course can be found at the following link:
http://www3.imperial.ac.uk/staffdevelopment/safety/index/most/mytraining

7.3. Risk Assessment Foundation Training (RAFT)

Who? All new Staff, PhD and MSc Students

It is a departmental requirement that all new Staff and Postgraduate students take the RAFT course and pass the ensuing test.

At the end of this course you should have a good understanding of the reasons why risk assessment is a legal requirement in every UK and EU workplace, of how it helps to control risk in the workplace, and of the risk assessment process itself.

When? During your first 3 months at Imperial College London

All Staff and Postgraduate students are required to pass the RAFT test within 3 months of their arrival at Imperial College London.

For PhD students, passing the RAFT test is a requirement in order to submit your First Year Research Plan.

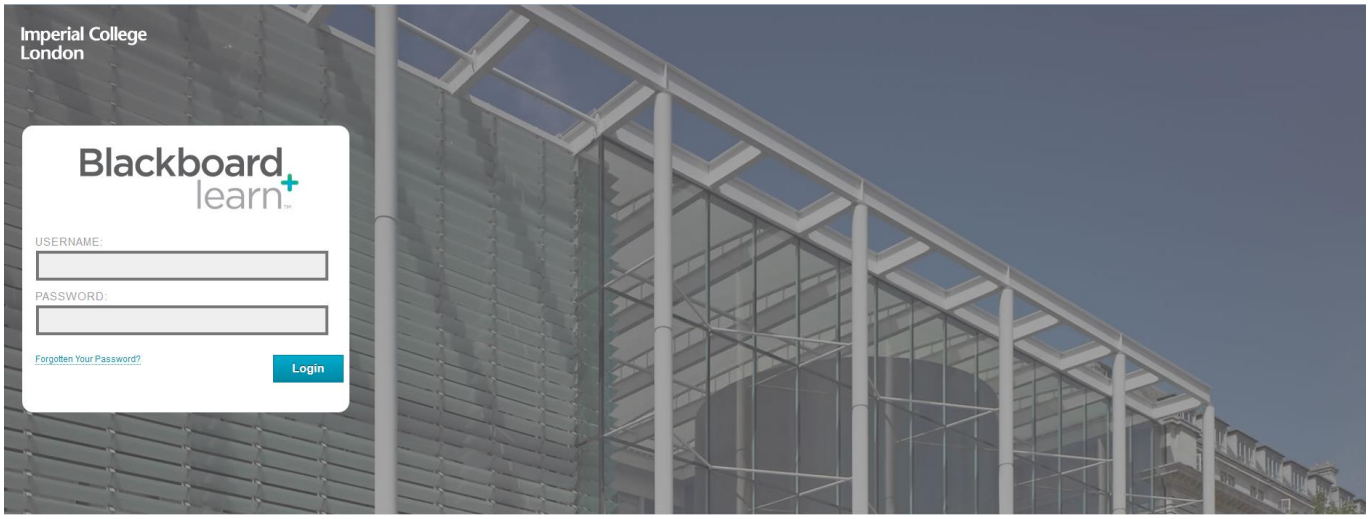
For MSc students, passing the RAFT test is a general requirement.

For ALL, passing the test is a requirement for the approval of the Risk Assessment Forms you submit to the Departmental Safety Team.

THE RAFT TEST MUST BE PASSED AND RISK ASSESSMENT FORMS COMPLETED BEFORE STARTING ANY EXPERIMENTAL WORK.

Enrolment

The RAFT course for Chemical Engineering has been set up on Blackboard Learn, the Imperial College Virtual Learning Environment. You can access Blackboard Learn at: http://bb.imperial.ac.uk



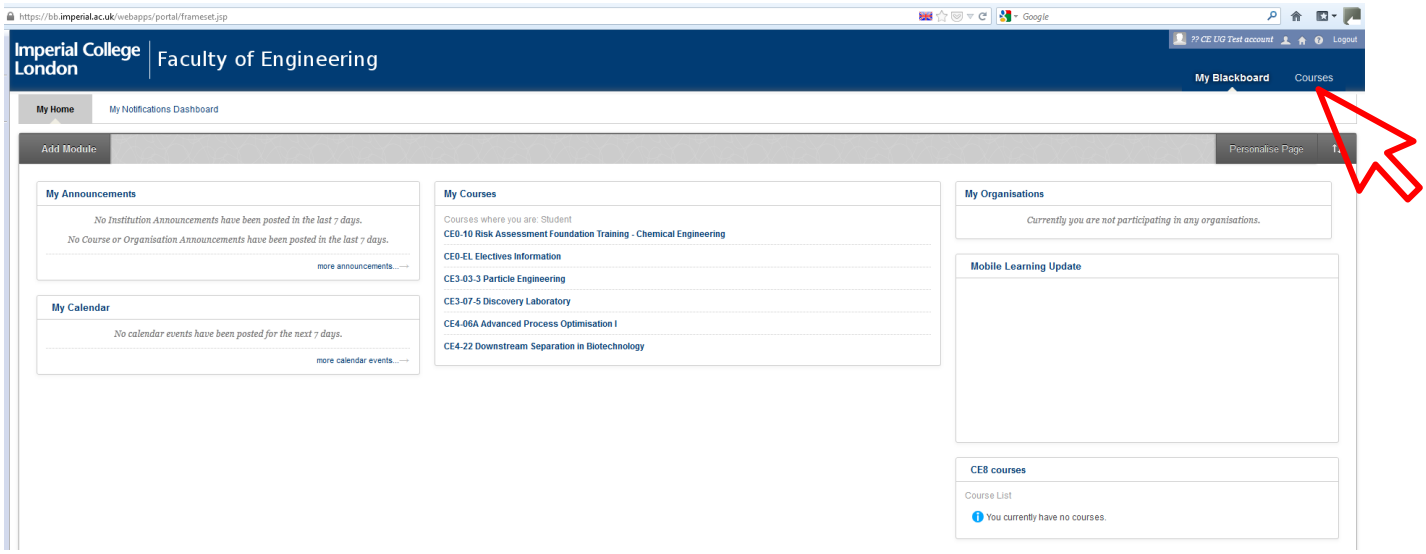
Log in to Blackboard Learn.

Browser Requirements

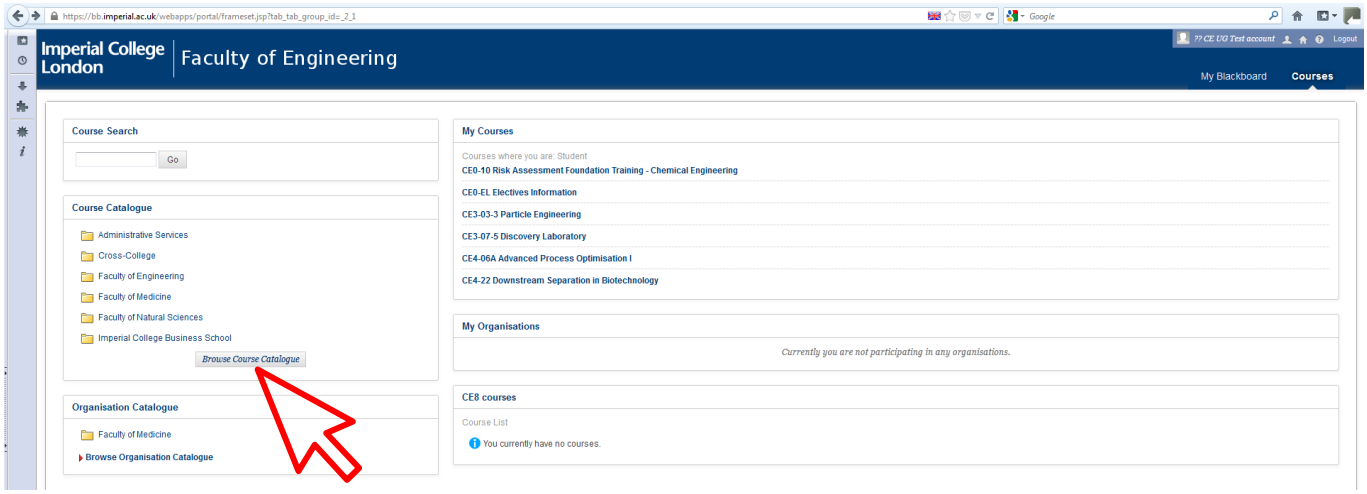
Internet Explorer, Firefox or Safari – ICT do not support Chrome

Do not use "My Imperial" as it links to Blackboard CE8, which is no longer used in Chemical Engineering.

Click on the "Courses" link in the top right corner.



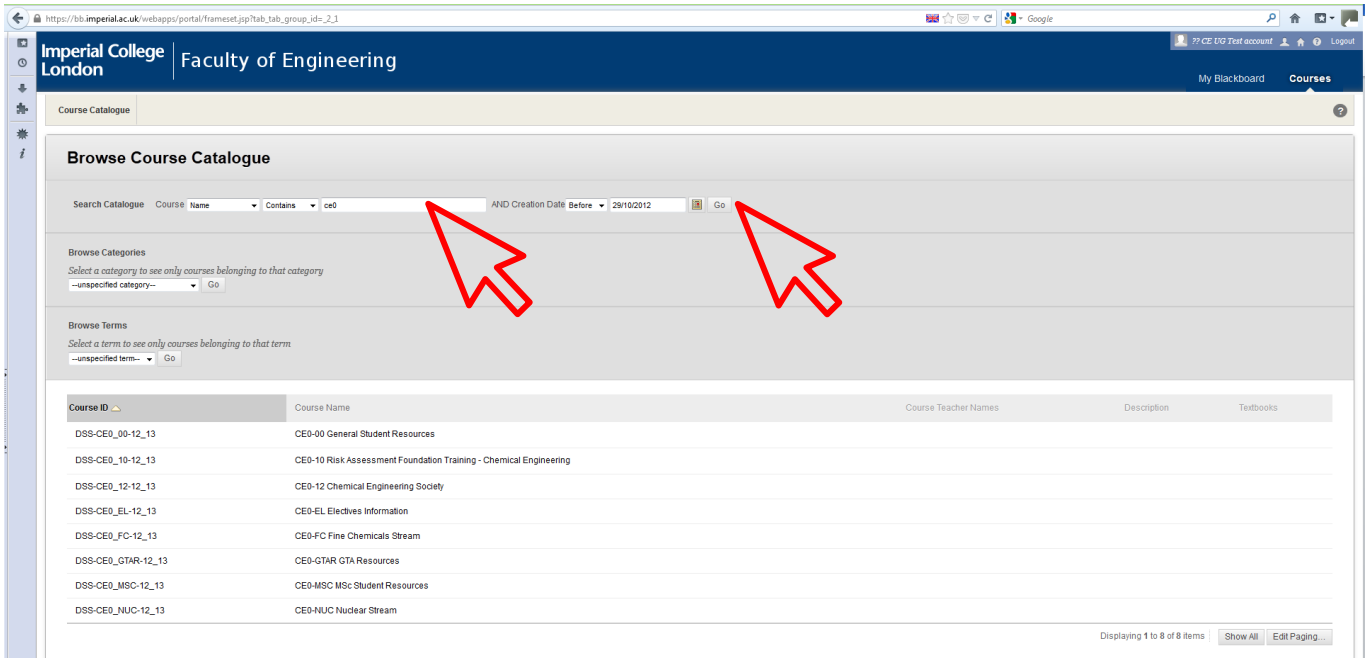
You should see the following screen. Click on the "Browse Course Catalogue" button.



You should get the search window below.

Set your Search Parameters. For the RAFT course, you can type in "ce0".

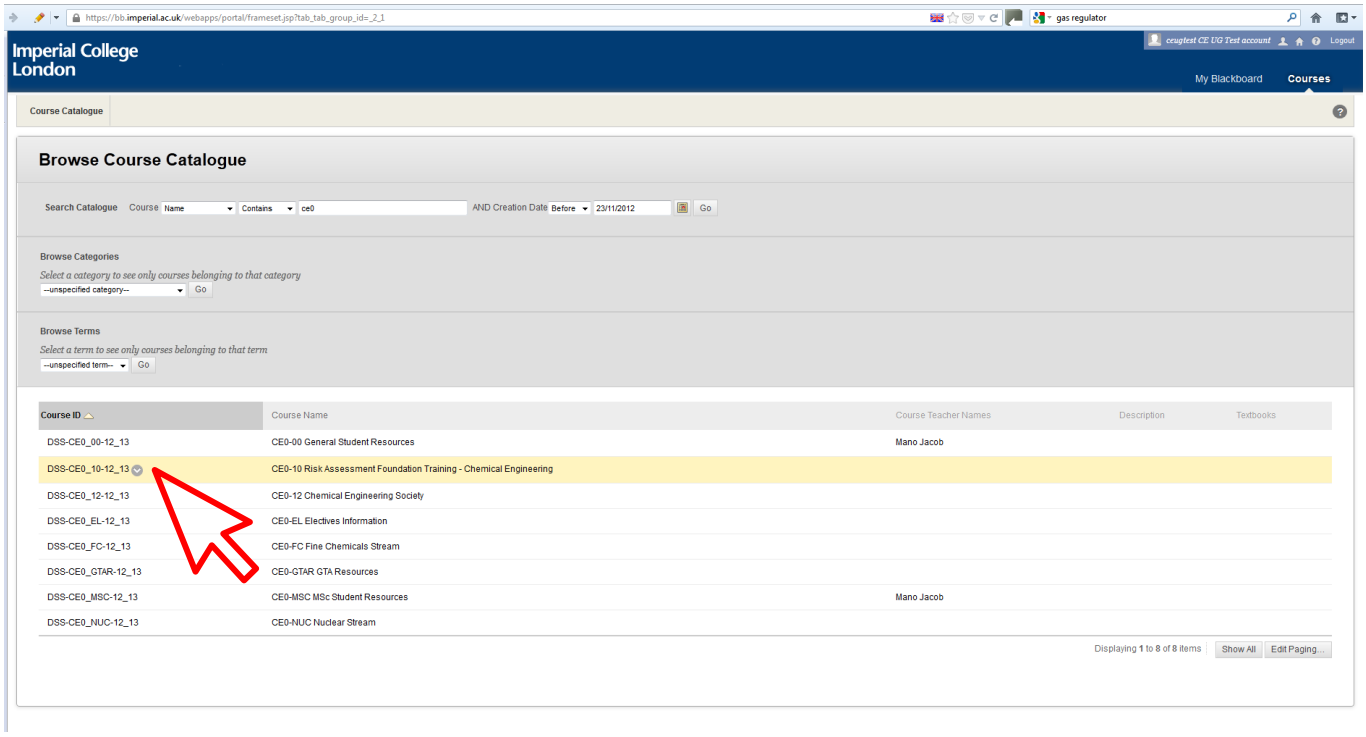
Press "Go" – You will get a list of results.



You should select "CE0-10 Risk Assessment Foundation Training - Chemical Engineering"

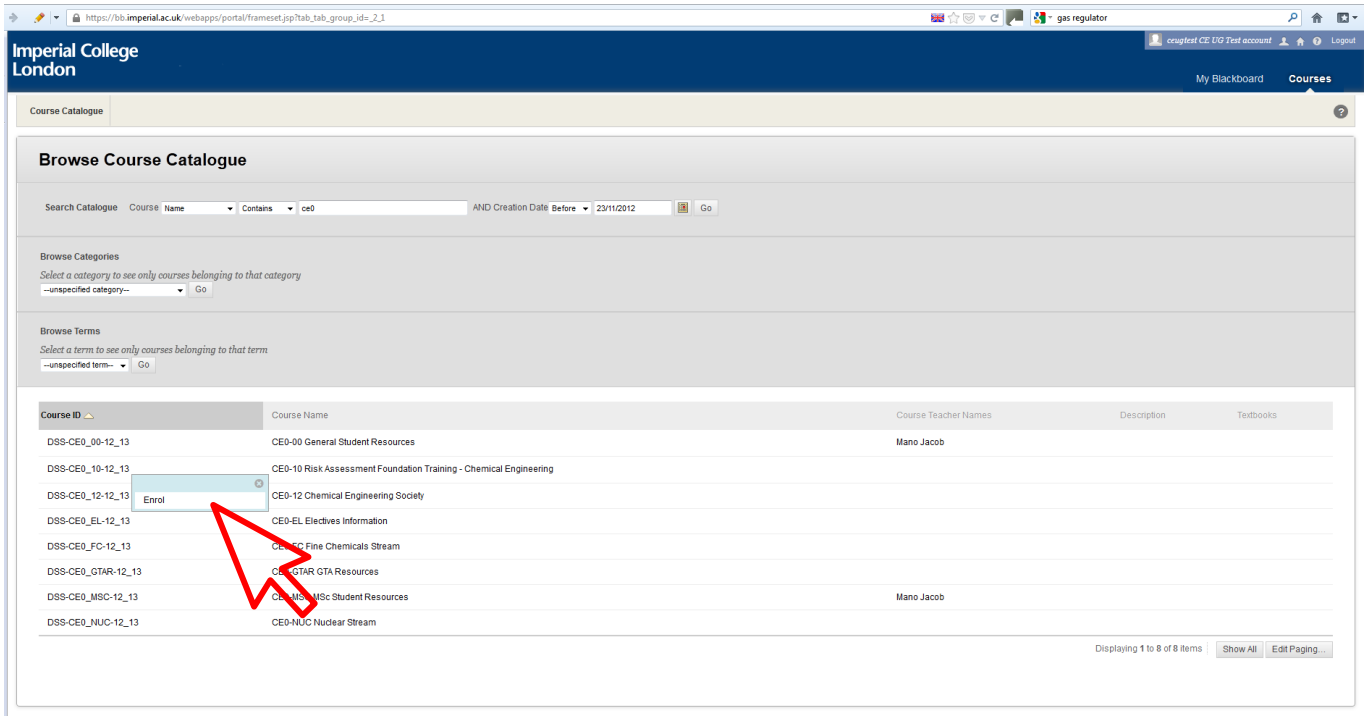
If you hover your mouse cursor on the desired course, the row will be highlighted in yellow and the following symbol will appear by the course ID: 

This is a drop-down menu – click on it.

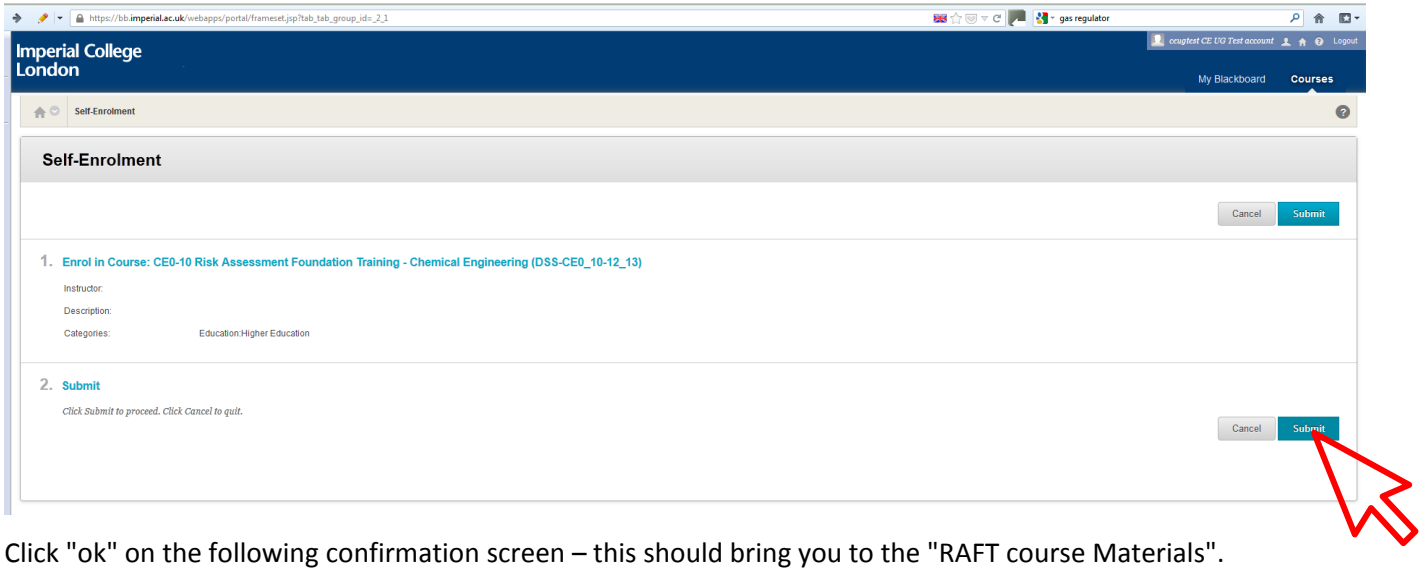


The drop-down menu will list the option "Enrol".

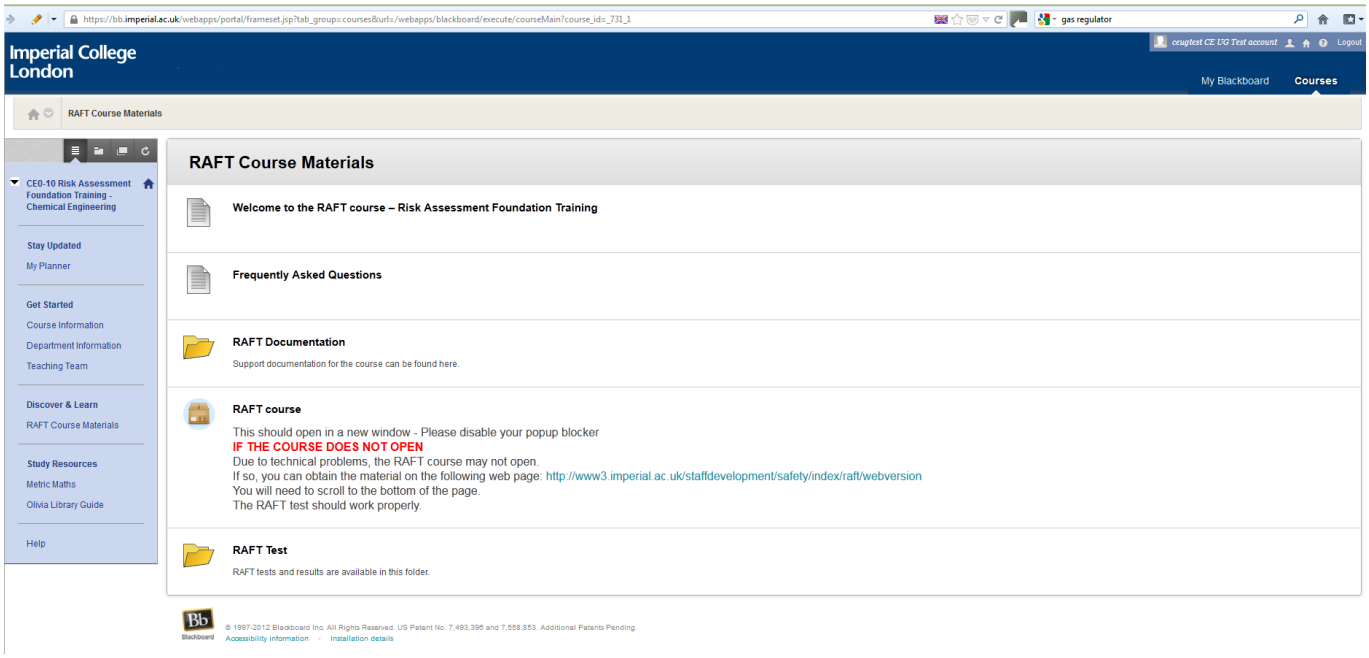
Click on it.



You will get the message screen below. Click "Submit".

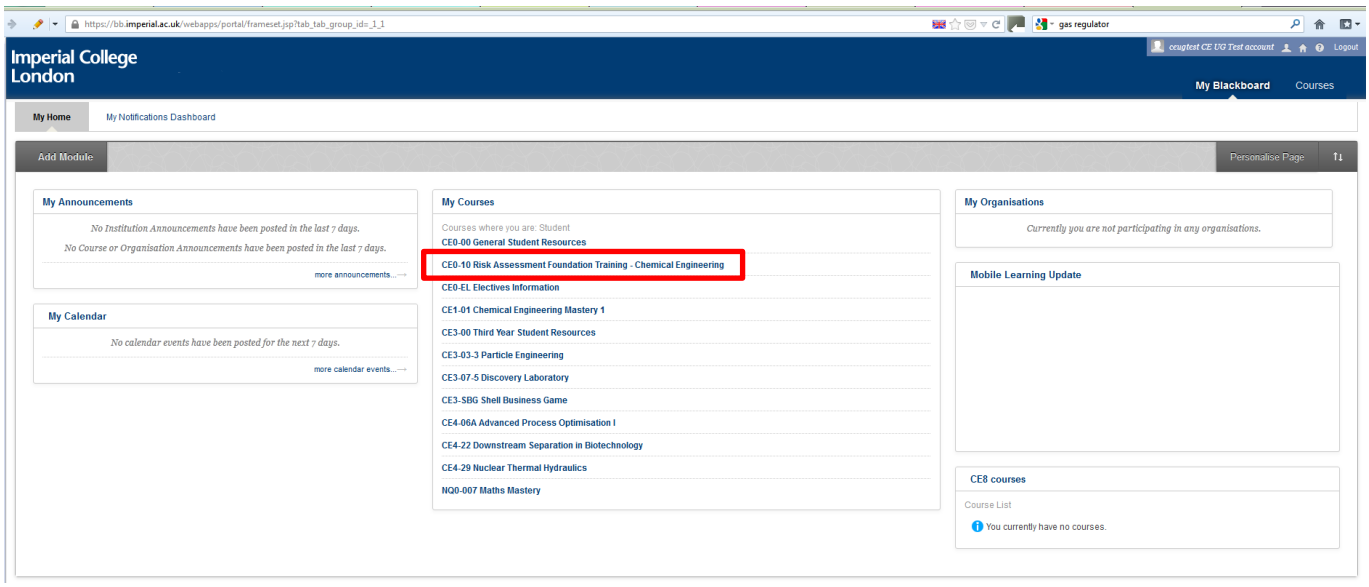


Click "ok" on the following confirmation screen – this should bring you to the "RAFT course Materials".



You can now access the RAFT online course and test.

It should appear in your list of courses ("My Courses") in the main Blackboard Learn window.



The RAFT Course in Practice

The course should take between 60-120 minutes to complete. During the course, you will be offered a choice of scenarios, which are based on the work environments found in the College – office and administration, the laboratory, the workshop, the plant-room and the kitchen. Please choose which is most relevant to you – the learning outcomes are the same, except that the workshop scenario also covers machinery risk assessment.

Please READ the "Welcome to the RAFT Course" section before you start the course.

Before starting the course your will need to print out the Risk Assessment Form and Risk Matrix with Evaluation Tables found in the "RAFT Documentation" section.

To check that you have understood the process, particularly in the way it is implemented at the College, you will be tested. **You do need to pass the test!** So, during the course, pay particular attention to the clickable "key facts" boxes as these contain the learning points. Also, at the end of each section, there is a summary of the key facts which you can copy or print.

The test (multiple choice), should take between 15-30 minutes to complete. It is an "open book" exam, so bring whatever you think will help you pass. THERE IS NO TIME LIMIT FOR THE TEST.

Once you have taken the RAFT test, you can view your result by returning to the "RAFT Test" section on Blackboard. The pass mark is **70%** for the Chemical Engineering Department. You get two chances at taking and passing the test - after this, you are advised to ask your line manager / supervisor or their delegate for assistance with the final attempt.

You can find more details about the RAFT on our dedicated Departmental RAFT pages at the following link: http://www3.imperial.ac.uk/chemicalengineering/aboutcect/healthandsafetyinformation/raftcourse

7.4. COMPULSORY Safety Training

All types of practical work listed below require compulsory safety training provided by the College **BEFORE** the work is started.

Please see below, in section 7.5 how to access them.

Type of Work / Individuals	Compulsory Safety Courses
All Departmental Members	Risk Assessment Foundation Training (RAFT) online course Please see section 7.3 above
Academic Supervisors	Health and Safety Responsibilities for Academic Supervisors http://www3.imperial.ac.uk/staffdevelopment/safety/index/academicsupervisors
 Biological Work	Biological Safety - Foundation Training http://www3.imperial.ac.uk/staffdevelopment/safety/index/biologicalsafety
 Work Involving Lasers	Introduction to Laser Safety http://www3.imperial.ac.uk/staffdevelopment/safety/index/lasersafetycourses **For Academic Supervisors** Ensuring Laser Safety http://www3.imperial.ac.uk/staffdevelopment/safety/index/lasersafety1
 Work Involving Radioactive Sources Work Involving X-Rays For Radiation Protection supervisors	Principles of Radiation Protection http://www3.imperial.ac.uk/staffdevelopment/safety/index/radiationsafetycourses Radiation Protection - X-Ray Safety Awareness Training http://www3.imperial.ac.uk/staffdevelopment/safety/index/xray Radiation Protection Supervisors http://www3.imperial.ac.uk/staffdevelopment/safety/index/rps
 Work involving Compressed Gases	Laboratory Gases and Decanting Liquid Nitrogen http://www3.imperial.ac.uk/staffdevelopment/safety/index/gassafety2 Connecting Gas Regulators and Manual Handling of Cylinders http://www3.imperial.ac.uk/staffdevelopment/safety/index/gassafety3 Pressure Fittings, Tubes, Valves and Regulators Training http://www3.imperial.ac.uk/staffdevelopment/safety/index/pressurefittings
 Work Involving Cryogenic Liquids	Laboratory Gases and Decanting Liquid Nitrogen http://www3.imperial.ac.uk/staffdevelopment/safety/index/gassafety2

7.5. Further Safety Training

The College Safety Department run many training courses, a list of which is provided on their brother website at the following link: http://www3.imperial.ac.uk/staffdevelopment/safety

These courses are available to staff as well as students.

Some courses (for example for those using lasers, radiation sources or biological substances) are compulsory before work can begin. Others will also be mandatory depending on the type of work you are doing and this will be decided in consultation with your line manager or supervisor.

To assist in deciding which courses you may need to attend, consult the College Training Needs Analysis page at the following link: http://www3.imperial.ac.uk/staffdevelopment/safety/tna and use the Training Needs Assessment form with your supervisor/line manager.

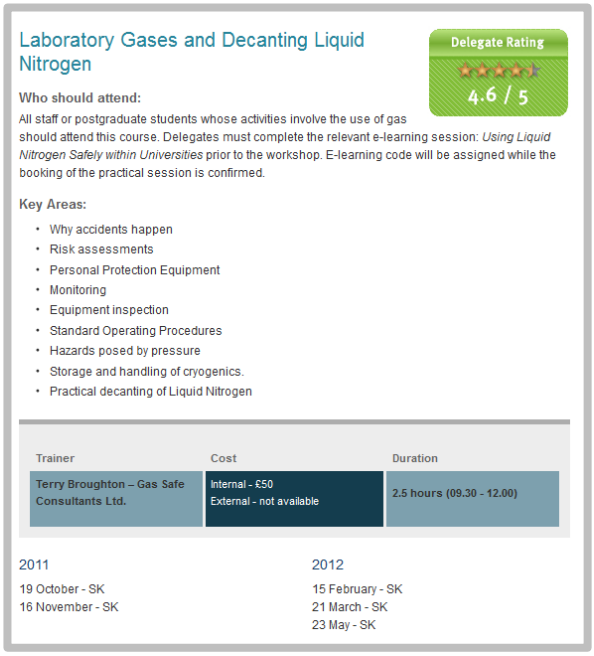
7.6. Booking of Safety Training Courses

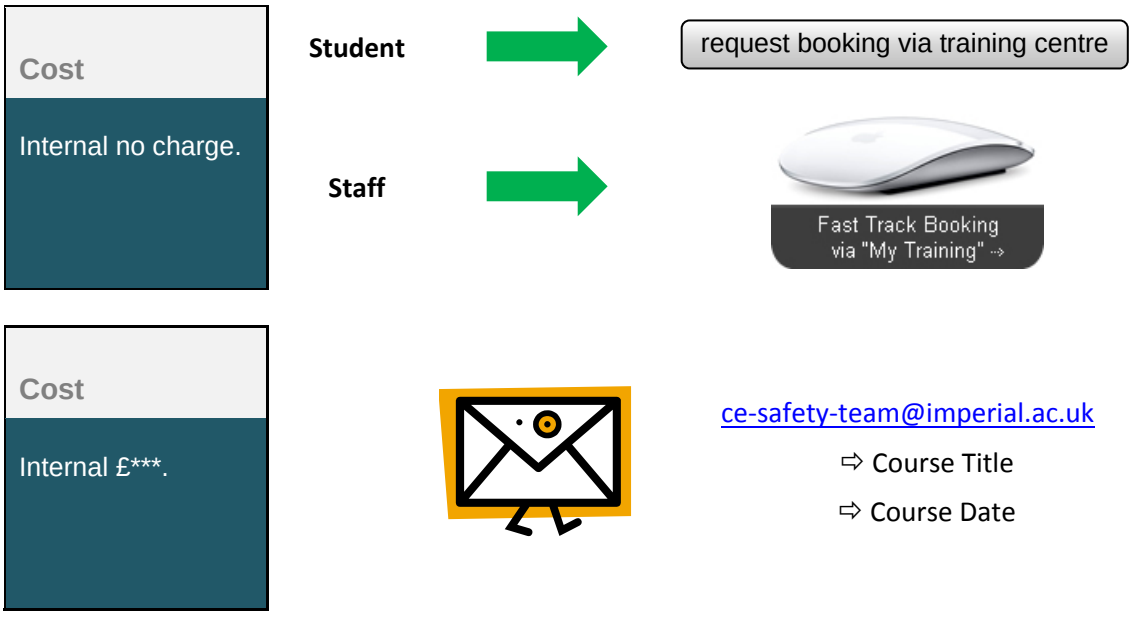
Once you have selected a training course, as illustrated here, follow the steps below:

If the course is **FREE**, you can book it yourself, using the online form (for students) or via "My Training" for staff.

If the course has a **COST**, email the Departmental Safety Team (ce-safety-team@imperial.ac.uk) with the details of the course. The Safety Team will book it for you and provide an account number.

If you get a certificate for the training you have received it will be sent to the Departmental Safety Team and they will let you know where to pick it up or put it in your pigeonhole.





8. Departmental General Safety Rules and Arrangements

8.1. Working Hours and Access Procedures

Access to the department is allowed from **07:30 to 00:00** except when the College is closed to all on Christmas and New Year's days. Access is organised as follows:

	Times	Access to the Department
Core Hours	09.30-17.30 weekdays	Free access
Extended Hours	07.30-09.00 and 17.30-00.00 during weekdays All the time during weekends	Access by swipe card only
Out of Hours	All times outside 07.30 and 00.00	No access unless special permission is granted

If you are locked in the Department after 00:00, call Security on:

x 58900 (internal) or 020 75891000 (external / mobile phone)

They will send someone to let you out

College Closure Periods

Over the Christmas and Easter holidays, the College is closed to all but essential personnel - Access is by swipe card only. The College is fully closed on Christmas Day and New Year's Day. No access to anyone is permitted on those days.

No experimental work is allowed during College closure periods without the permission from the Departmental Safety Team.

You can request this by email in due time.

24 Hour Access

NO ONE MAY CARRY OUT WORK OUT OF HOURS UNLESS AN APPROPRIATE RISK ASSESSMENT HAS BEEN CARRIED OUT AND THE WORK HAS BEEN DECLARED NON-HAZARDOUS BY THEIR SUPERVISOR.

8.2. Lone Working

Lone working is where a person works by themselves without close or direct supervision or contact with others, for example:

- Where only one person is working in an area and there is no one to provide immediate assistance in the event of an emergency.
- Workers working by themselves away from their fixed base.
- Working in an isolated area.

Lone working MUST BE AVOIDED AS MUCH AS POSSIBLE

If lone working cannot be avoided MAKE SURE that someone

- **Knows WHERE you are**
- **Knows WHAT you are doing**
- **Can check on you in case of an accident**

- **Has the contact number of a colleague who can find you**

8.3. Emergency Access to Offices and Laboratories

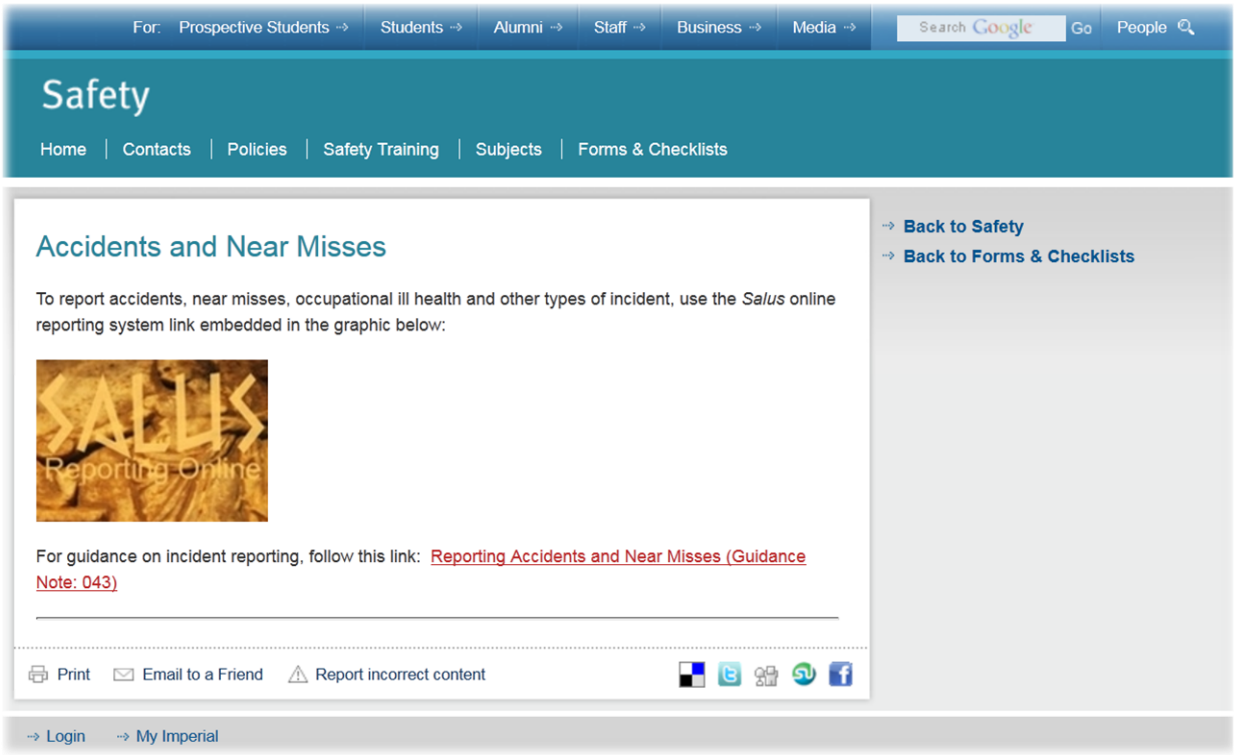
Always leave the door unlocked when working in a laboratory or an office.

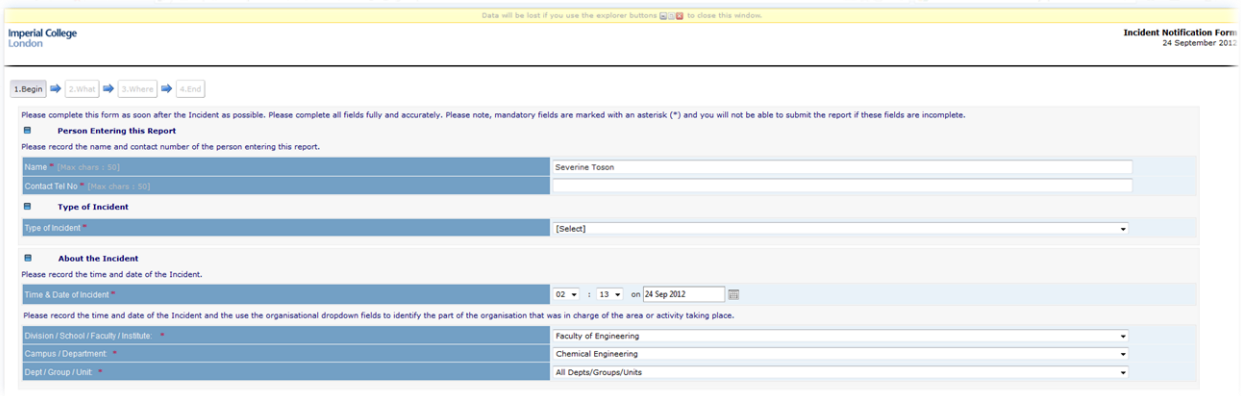
In the event of an Accident, help will be able to reach you much more quickly.

8.4. Reporting of Accidents, Near Misses and Dangerous Occurrences

All incidents that are considered dangerous, whether or not they cause injury, must be reported on the online SALUS system AS SOON AS POSSIBLE after the event.

The Accident Report Form and the corresponding Guidance Note can be accessed from the Safety Department's web-site: http://www3.imperial.ac.uk/safety/formsandchecklists/accidents





Definitions

Accident

Any unplanned event that results in injury or ill health of people, or damage or loss to property, plant, materials or the environment.

Near Miss

Any incident which could have resulted in an accident.

Examples

- A door swings open and could have hit someone walking towards it.
- A sign, fixture, window sill falls off the wall and could have hit someone below.
- Someone has left needles or broken glass in a domestic waste bin and a cleaner could be cut or stabbed when clearing the waste.
- People enter lift while it is transporting liquid nitrogen - but are not asphyxiated.

Dangerous Occurrence

A Near Miss which could have led to injury or loss of life.

8.5. Reporting Defects

Any defects, e.g. broken lights, dangerous ceiling tiles, defective fume cupboards, dangerous floors, etc., should be reported immediately to the **Facilities Management Helpdesk**:

Call x 48000 or

email estates-help@imperial.ac.uk or

Go to the online form: http://www3.imperial.ac.uk/facilitiesmanagement/helpdesk/defects

You will be required to provide the following information:

- Your contact details (Name, Email, Department, Contact Number)
- Location: building, floor, Room
- Type of Job: Asbestos, Blockage, Carpentry, Chemical Waste Disposal, Cleaning, Heating, Leak, Lifts, Lighting, Other, Pest Control, Plumbing, Power, Space Database, Water
- Description of the problem
- Priority of the job: 2 (24 hours), 3 (48 hours), 4 (4 days), 5 (7 days), 6 (Minor Works), Quote for Works, Waste-hazardous

After you have logged your request, you will receive a confirmation email with a task number which you can quote if you contact the Helpdesk for any updates on your request.

Once the repair has been completed, you will receive an email confirming completion of the job.

9. Assets and Activity Risk Assessments

It is a College requirement that all activities be covered by a risk assessment. These include standalone activities such as sample or solution preparations and the use of equipment such as furnaces, GCs or reactors, … as well as any activity in between.

Under the Departmental Safety Management System, risk assessments for activities are decomposed into the following items:

- Registration of equipment, also known as Assets
- Specialist risk assessments for the "special hazards": biological material, ionising radiation, lasers, compressed gases and cryogenics, chemicals
- Activity risk assessment on all aspects of work involved in a procedure or in the use of a piece of equipment

These items and requirements are detailed below.

9.1. Registration of Assets

In the frame of risk assessments, pieces of equipment must be registered as **ASSETS**.

An Asset is a piece of equipment or assembly which plays an important/substantial role in departmental research and/or teaching activities. These include autoclaves, any type of mechanical control, gas detection systems, experimental rigs, piped gas systems, high performance computing grids, etc…

Assets are recorded in the Departmental Asset Register (DAR), with all related risk assessment forms, training records, maintenance records and relevant information. The DAR is held and maintained by the Departmental Safety Officer (DSO) who centralises all the information by liaising with the Asset Managers (AM).

Assets: Requirements and Responsibilities

An Asset Manager is required for each Asset. The Asset Manager has the following responsibilities:

- Arranging maintenance and testing of the asset as well as keeping records of these.
- Training users and ensuring competence for the use of the Asset and for any activities related to the Asset.
- Ensuring that users have completed compulsory College training specified for the Asset.
- Training records for all users must be kept by the Asset Manager and a copy sent to the DSO.
- All assets registered must have **an associated ACTIVITY RISK ASSESSMENT** – This is described in the next section.

Group supervisors or PIs are by default Asset Managers for all their Assets. They can however delegate the tasks described above to a nominated person from their research group. This must be specified on the Asset Registration and will be recorded by the DSO.

Further details can be found in the Departmental Asset Management Policy which is available in Appendix 3 or can be downloaded from the Departmental Safety web pages.

The Asset Registration Form

The Asset Registration Form requires the following essential information:

- Who is the Asset Manager
- A clear description of the Asset, including pictures and diagrams
- Location of the Asset
- A Standard Operating Procedure for the use of the Asset

- Maintenance and testing requirements
- A concise explanation of what the Asset will be used for
- Any compulsory College training associated with the "special hazards" (see section 7.4) required for the use of the Asset
- Any other training required for the use of the Asset

Requirements, in Practice

- Only trained and competent users are authorised to use a given Asset. This will be checked against training records.
- Once an asset is registered, and has an associated Activity Risk Assessment all users trained and competent to use it are covered by the risk assessment associated with it.
- An Asset Registration Form (ARF) is available on the Departmental Safety web pages
http://www.imperial.ac.uk/engineering/departments/chemical-engineering/about/health-and-safety/forms/
- A Training Record Template is also provided.

9.2. Activity Risk Assessments and Specialist Risk Assessments

An Activity Risk Assessment is an evaluation of the risk associated with each of the physical steps carried out during an experiment. This exercise is designed to make the activity considered as safe as possible by anticipating what could go wrong and deciding how this can be prevented through the use of control measures.

Activities are any task carried out in the laboratory. This includes running/using Assets, preparation work, experiments, cleaning, maintenance/testing of equipment, waste disposal, ….

Activities: Requirements and Responsibilities

Group Supervisors or PIs must ensure the following:

- All activities taking place in their laboratories have an associated risk assessment
- Activity Risk Assessments are carried out by COMPETENT individuals
- Users have received adequate training and are competent to carry out these activities.
- Users have completed any compulsory College training associated with the "special hazards" (see section 7.4) involved in the activities.
- Training records for all users must be kept and a copy sent to the DSO.

PIs can however delegate the tasks described above to a nominated person from their research group. This must be specified on the Activity Risk Assessment or on the Asset Registration (the Asset Manager as explained above) and will be recorded by the DSO.

The Activity Risk Assessment Form

The Activity Risk Assessment Form requires the following essential information, in addition to the risk analysis:

- Who is responsible for the Activity
- Location of the Activity
- Any Assets used in the frame of the Activity
- A detailed Standard Operating Procedure for the Activity
- Any Special Hazards associated with the Activity - specialist risk assessments will be required here
- Any compulsory College training associated with the "special hazards" (see section 7.4) involved in the Activity

• Any other training required for the Activity

Requirements, in Practice

• Only trained and competent users are authorised to carry out a given Activity. This will be checked against training records.

• Once an Activity is registered, and has an associated Activity Risk Assessment all users trained and competent to carry it out are covered by the risk assessment associated with it.

• Activity Risk Assessment Forms (ARAF) are available on the Departmental Safety web pages

http://www.imperial.ac.uk/engineering/departments/chemical-engineering/about/health-and-safety/forms/

• A Training Record Template is also provided.

The Activity Risk Assessment, in Practice

Section 1: Person carrying out the assessment

The person(s) carrying out the assessment must be competent, i.e., they must have the training, knowledge and experience to identify the risks and relevant control measures associated with the activity.

We recommend that risk assessments be carried out in groups in order to benefit from the views and experience of several people. Also, it makes the risk assessment easier because you are not alone and you are able to discuss any problematic issues.

Particularly, new inexperienced students should carry out their risk assessment with a senior member of the research group.

If you don't know, ask a competent person!

Please note: It is a departmental rule that only risk assessment carried out by people who have passed the RAFT test will be approved. Please make sure you take the RAFT course and pass the RAFT test before beginning your risk assessment.

Section 2: Person(s) carrying out the work

List all people trained and competent to carry out the activity.

You must put down NAMES and DETAILS – generalities will not be accepted

Example

2. PERSON(S) CARRYING OUT THE WORK eg technician, academic, PG student, UG student etc			
Name	**Email**	**Position**	**Supervisor**
PhD students of Chem Eng	-	-	-
PDRA of Chem Eng	-	-	-

This is not acceptable ⇨ A list of people must be provided

Please note: All groups are required to keep training records for their activities and assets. A template is available on the Departmental Safety Pages. For convenience, we recommend that you have a paper copy of the training record in the lab. This should be signed by any person who has been trained. The Departmental Safety Team

Each year, when you review your risk assessment, you can update the list of persons carrying out the work with the training record.

Section 3: Asset Utilization

List the (registered) Assets used in the activity and the associated Reference numbers, which were allocated by the DSO upon registration.

If you are carrying out a risk assessment for an asset registration, just put down "Asset Registration" in the Reference Number column.

Section 4: Description of Activity / Title of Experiment

In a few lines, describe the activity/experiment you are intending to carry out. You don't need to go as far as an SOP, but include enough detail for the reader to get a clear idea of what you will be doing.

Example

Nanocapsules, a New Material for Controlled Release This is clearly not a good description	

Synthesis of nanocapsules by emulsion polymerization using styrene and methyl methacrylate as monomers, Sodium dodecyl sulphate and potassium persulfate as initiators and hexadecane as a hydrophobe	

Section 5: Location

Obviously, give the details of the lab you will be working in.

Section 6: Hazards

The hazards have been grouped into 2 categories: Special Hazards and General Hazards

<u>Special Hazards</u>

These hazards have the potential to cause major injuries and damage. Consequently, the associated work requires additional specific risk assessments and higher level approval.

These activities come under specific regulations which generally require that they be closely monitored.

The table below summarises the requirements for the special hazards.

It is recommended that you fill out the specialised risk assessment first, so that you are aware of any hazards for the next steps of the risk assessment process.

Ionising Radiation			
Registration with…	***COMPULSORY READING***	***Form(s)***	***Training***
College Radiation Protection Team	College Code of Practice	• Registration of Personnel • Registration of Work	**COMPULSORY** Principles of Radiation Protection Radiation Protection -X-Ray Safety Awareness
Biological Materials			
Registration with…	***COMPULSORY READING***	***Form(s)***	***Training***
College Biological Safety Team	College Code of Practice	Bio1	**COMPULSORY** Biological Safety - Foundation Training
Lasers			
Registration with…	***COMPULSORY READING***	***Form(s)***	***Training***
Departmental Laser Safety Officer	Departmental Code of Practice	• Laser Registration • Laser User Registration	**COMPULSORY** Introduction to Laser Safety
Hazardous Substances			
Registration with…	***COMPULSORY READING***	***Form(s)***	***Training***
Departmental Safety Officer	Departmental Guidance and Rules	COSHH	None
Compressed Gases or Cryogenic Substances			
Registration with…	***COMPULSORY READING***	***Form(s)***	***Training***
Departmental Safety Officer	College Code of Practice & Guidance	Compressed Gases and Cryogenics	**COMPULSORY** Laboratory Gases and Decanting Liquid Nitrogen Connecting Gas Regulators and Manual Handling of Cylinders Pressure Fittings, Tubes, Valves and Regulators Training
All relevant links are available on the Departmental Safety Pages With the special hazards, the rule is: If you tick the box, you need to do the form!			

General Hazards

The table of general hazards list the most common hazards found in laboratories.

If you tick any of the boxes, use the blank box to describe or locate the hazard as follows:

Give the range of operating conditions

Level of Vacuum, Pressure, temperature, wavelength(s), intensity

Indicate where the hazard is located in your experimental setup

Noisy pump, 3-phase voltage, …

Note: "Water" usually refers to any system where water is circulated for temperature control and where flooding can occur due to pipes coming loose or leaking, eg. Condenser, cooling/heating system,…

Section 7: How does harm occur and who or what might be affected?

In order to determine who might be affected, think about the following:

Are there other people in the lab when the activity is being carried out?

Does the experiment run overnight?

In order to describe how harm can occur, take the hazards you have identified in section 6 and think about what could go wrong and how this could affect people and the lab.

Section 8: Worst Case Scenario

Imagine that NO CONTROL MEASURES (You have no fume cupboard, no protective equipment, nothing) for the activity / process are in place and answer the following questions

Use the Risk Evaluation Matrix on the next page to set severity and probability scores and evaluate the risk in the worst case scenario.

The point of this section is to give a starting level of risk to your activity and to demonstrate that control measures reduce the level of risk by reducing the probability of harm, as you will see in the next section of the form.

<u>These tables are designed to help you to gauge whether your risks are low or high</u>

To find the **risk score**, decide how severe (s) you think an outcome will be (minor to fatal) and note the score. Then decide how probable (P) it is to occur (very unlikely to likely) and note the score. Multiply the two together to get the risk score, and plot it on the table. Anything in the red is unacceptable and more controls will be needed – or in some cases, immediate action. **PLEASE NOTE:**

- There are many factors that affect one's judgement of risk – for example, you may not have all the information you need to make a realistic assessment. Lack of space, lack of training, working to deadlines, and working late and alone could all act as risk increasing factors.
- Your assessment of risk will always be subjective, as it depends on not only your knowledge and experience, but also the information you have available. The more information you have, the more accurate the assessment will be.
- Remember, any effective, appropriate control measures will lower risk.

RISK LEVEL			
LOW	MEDIUM	HIGH	VERY HIGH

Category	RISK SEVERITY (S) - Examples	Score
MINOR	Superficial injuries – cuts, bruises, mild skin irritation, mild aches and pains – requiring first aid only. Minor property damage.	**1**
SERIOUS	More serious injuries or ill-health, requiring time off work or study or a hospital visit, e.g. burns, sprains and short –term musculoskeletal disorders, cuts requiring stitches, back injuries, fractures to fingers or toes. More serious property damage.	**2**
MAJOR	Broken limbs, amputations, long-term health problems resulting from work, or acute illness requiring medical treatment, loss of consciousness, serious electric shock, loss of sight. Major property damage.	**3**
FATAL	Injury or ill-health which leads to death either at the time or soon after the incident, or eventually, as in the case of certain occupational diseases, such as asbestos-related cancers.	**4**

Category	RISK PROBABILTY (P) The *likelihood* of the hazard causing harm (example for guidance only – some or all may apply for each category)	Score
VERY UNLIKELY	Good control measures are in place. Controls do not rely on a person using them (i.e. personal compliance). Controls are very unlikely to break down. People are very rarely in this area or very rarely engage in this activity.	**1**
UNLIKELY	Reasonable control measures are in place, but they do rely on a person using them (some room for human error). Controls unlikely to break down. People are not often in this area / do not often engage in this activity / this situation is unlikely.	**2**
POSSIBLE	Inadequate controls are in place, or likely breakdown if not maintained. Controls rely on personal compliance. People are sometimes in this area or sometimes engage in this activity / this situation sometimes arises.	**3**
LKELY	Poor or no controls in place. Heavy reliance on personal compliance (lots of room for human error). People are often in this area / engage in this activity on a regular basis / this situation often arises.	**4**

RISK SCORE (R) **R = S x P**		**SEVERITY OF OUTCOME (S)**			
		Minor 1	**Serious 2**	**Major 3**	**Fatal 4**
PROBABILITY (P)	**Very Unlikely 1**	1	2	3	4
	Unlikely 2	2	4	6	8
	Possible 3	3	6	9	12
	Likely 4	4	8	12	16

Section 9: Overall Risk Assessment on the Standard Operating Procedure (SOP)

We recommend that you fill in each column of the table separately, i.e. write the entire SOP first, then look at each step and think about what could go wrong and what control measures are in place. This way, you can focus on one task at a time and avoid any confusion.

The Standard Operating Procedure

In order to fill in this section properly, make sure that your SOP is sufficiently detailed to allow you to determine what could go wrong in each step. Imagine that you are training a new person on your experiment – They will need to understand what to do in order to carry out each step correctly.

Ideally, you should have 3 main parts: start-up or preparation, running the experiment, shut down and cleaning (if required)

Example

Turn on the machine Place sample on stage Start the measurement This is the entire SOP for a contact angle measuring instrument – Clearly not enough detail	

Preparation and Startup Turn on instrument (including video camera) and computer Mount solid sample on stage so that it may be held flat and moved about Choose test fluid and fill syringe Adjust lighting and camera focus Adjust needle location so that the tip is visible in the image Set measurement parameters using the computer and start the video recording	
Experiment Slowly dispense a drop of fluid from the syringe and gently place it on the solid surface Move the stage in order to present a clear area of solid sample surface to the needle Dispense another drop onto the solid surface Repeat as many times as required	
Shutdown and Cleaning Once the experiment finished and the data saved, switch off the instrument and the computer Remove the syringe from its holder and rinse it with water Wipe the solid sample surface with a paper towel Unmount the solid sample from the stage	

A Standard Operating Procedure is simply the description of each physical step that you follow when you carry out your activity. If you don't have a standard operating procedure, just go to the lab, imagine you are carrying out your activity and list each of your actions in order.

Steps like "Switch on/switch off the equipment / computer" are perfectly acceptable.

If you control your activity with a computer, you can summarise the steps on the computer with sentences such as: "Set experimental parameters / operating temperature / flow rate on the computer and run experiment / measurement".

Now paste each step of your SOP in a separate row of the first column.

Once that's done, consider each step at a time and think about what could go wrong and what control measures are used.

What could go wrong?

Describe what could go wrong, but also explain the consequences, i.e., the resulting damage or harm. This helps to choose control measures.

Examples

- You could spill chemicals on yourself while preparing a solution
- Your rig could explode due to over pressurisation
- You could burn yourself while using a furnace
- You could inhale vapours or powder during pouring or weighing of a compound
- Your rig could have a gas leak

Control measures

Please Remember: Control measures are designed to PREVENT things from going wrong or PREVENT any damage/harm in case of an incident. Anything you do after something has gone wrong is NOT a control measure.

When you think about control measures, choose collective measures before individual ones. It is easier to handle volatile solvents in a fume cupboard or glove box which isolates them from other lab users than to remind everyone to wear masks every time you need to carry out an experiment. Follow the hierarchy of principles listed below:

- Eliminate the hazard
- Substitute the hazardous item for a safer alternative
- Isolate the hazard
- Reduce the risk by reducing quantities, exposure time
- Safe Systems of Work – Use good practice when working in the lab
- Good Housekeeping – Be tidy and organised
- Information, Instruction, and training – Make sure you are competent to carry out your activity
- Personal Protective Equipment

Example

Standard Operating Procedure	**What could go wrong?**	**What controls are in place?**	
Mix PDADMAC, (NH4)2HPO4 and Ca(NO3)4H2O inside pump	Solution sprays out from the tube Consequence is not explained	Turn off the pump This is not a control measure	
Stir solution with a magnetic stirrer	Liquid spills out of the beaker Consequence is not explained	Turn off the power This is not a control measure	
Dilute HCl with water	Bottle of HCl may be knocked over Consequence is not explained	Wear lab coat and gloves Wearing personal protective equipment will not prevent the bottle being knocked over But it will prevent exposure to HCl	
Dissolve Calcium phosphate cores in HCl solution	HCl could be spilled on skin A bit better	Immediately flush skin with lots of water (at least 15 mins) This is not a control measure	
Most suggestions here are reactive measures, after something has gone wrong, not control measures The SOP is not great either, but let us focus on the control measures…			

Standard Operating Procedure	What could go wrong?	What controls are in place?	
Mix PDADMAC, (NH4)2HPO4 and Ca(NO3)4H2O inside pump	Solution sprays out from the tube resulting in exposure to the mixture by contact	Ensure the tube is capped or contained in a flask in order to collect and contain the sprayed mixture Wear a labcoat, safety spectacles and gloves	
Stir solution with a magnetic stirrer	Liquid spills out of the beaker resulting in exposure to chemicals	Use a large enough beaker to keep it stable during stirring Wear a labcoat, safety spectacles and gloves	
Dilute HCl with water	Bottle of HCl may be knocked over or dropped causing exposure to HCl by contact resulting in chemical burns Risk of HCl splashes and exposure by contact resulting in chemical burns when mixing with water due to exothermic reaction	If you are taking HCL from a Winchester bottle, use a dispenser pump or a pipette If this is not possible, decant a small amount of HCl into a beaker before measuring out exact volume Wear a labcoat, safety spectacles and gloves Always pour acid into water to ensure even dilution Wear a labcoat, safety spectacles and gloves	
Dissolve Calcium phosphate cores in HCl solution	HCl solution could be spilled on skin and cause chemical burns	Dispense HCl solution with a pipette to avoid spillages HCl solution is dilute which reduces the exposure Wear a labcoat, safety spectacles and gloves	

Evaluate the Level of risk

Use the Risk Matrix on page 36 to evaluate the level of risk of each step of your SOP, using the Severity and Probability tables to evaluate the associated scores.

Note: At this point you should notice that the level of risk is lower than the one calculated in Section 8, where we considered that no control measures were in place.

Fail Modes

A fail mode is a failure of equipment or of a control measure in circumstances not related to the activity considered, i.e. usually when it is not being carried out.

Example

For liquid nitrogen intensive work, it is common to have 25L or more dewars in the labs.

Some of the groups in the department use small quantities of liquid nitrogen for their experiments. In order to avoid constantly getting liquid nitrogen from the Stores, they keep 25L of liquid nitrogen in their labs in large dewar tanks.

In this case, the Fail mode would be the failure of the dewar, resulting in the release of 25L of liquid nitrogen which would vaporise into 17.41m3 (1751L) of nitrogen gas. Depending on the size of the room, this could displace enough oxygen in the ambient air to cause asphyxiation of the lab users.

Standard Operating Procedure ***Put each step of your SOP in a row and complete the next 3 columns***	**What could go wrong?** ***Include the hazards identified in section 6***	**What controls are in place?** ***Are they effective and sufficient or are more required?***	**Is risk <u>very high, high, medium or low</u>?** ***R = S x P***
Storage of liquid nitrogen in a 25L dewar tank	Dewar failure would release nitrogen gas which could cause asphyxiation of lab users	Ventilation Regular user checks on the liquid nitrogen dewar	

Section 10: Are any of the risks High or Medium?

The reason for this question is that ideally, all activities in the College and Department should have sufficiently adequate control measures to be low risk.

This section basically points out that if any of your risk scores is not Low, you must consider additional control measures.

If this is the case, go back to your SOP and consider what can be done to lower the risk of the problematic steps. If need be, feel free to seek guidance from the DSO.

Section 11: Residual Risks

Residual risk is the level of risk after you have put all your control measures in place.

Ideally it should be low.

Section 12: Emergency Actions

Please make sure that your emergency actions are actually ACTIONS and not just calling the emergency number.

Once you have specified an action, you can put down an emergency contact.

In summary, make sure people in the vicinity are safe before calling for help.

REMEMBER: In certain cases, the best emergency action may be to evacuate the lab and close the door, if there is no safe way to control the situation.

Make sure that all users in your lab know your emergency action and that you know the emergency actions for their activities. Incidents don't wait for the main users to be in the lab to happen.

Section 13: Will experiments be running overnight?

If experiments are run overnight, the DSO must be notified and an overnight running notice with emergency information must be put up.

Make sure that overnight running notices are only in place when experiments are actually run overnight. Leaving them up all the time will convey the wrong idea.

Section 14: Monitoring and Review

<u>Monitoring</u>

Your control measures must be monitored regularly in order to make sure that they are working properly and that they effectively protect you from harm.

TIP: In the case of control measures which you check or for which it is obvious whether they are working or not, every time your run the experiment, put down that controls should be monitored every time the experiment is run.

Example

If you need to use a fume cupboard, you must check that it is working before you start your experiment, otherwise, you will not be protected. This is a control measure which you should monitor every time you carry out your experiment.

Section 15: IS LONE WORKING outside department hours intended?

This question is fairly obvious.

Note: Departmental hours are 09:00 to 18:00, when most people are in the College.

Please make sure you follow good practice when lone working. (see Section 8.2)

Section 16: Access Controls

This section is intended to ensure that you control the access to your lab, i.e., that random people cannot just come in and use equipment or substances without the required supervision.

Finally…

Once completed, risk assessments reviewed and approved by the research group supervisors and placed in the group folder on the Departmental Safety Drive.

Once a risk assessment has been completed, the form must be printed, signed by the supervisor and displayed in the lab where the activity is taking place.

All risk assessments must be reviewed ANNUALLY or sooner if the conditions of the activity change or if an accident occurs.

10. Requirements for Work with Specific Hazards

10.1. Work Involving Biological Material

All researchers working with biological materials should attend the **"Biological Safety - Foundation Training"** course provided by the College
Details at: http://www3.imperial.ac.uk/staffdevelopment/safety/index/biologicalsafety

All work involving the use of living organisms, their tissues, body fluids or their products must be notified to the Departmental Biological Safety Officer and must be registered with the College Biological Safety Officer.

More information on Biological Safety can be found at the following link:
http://www3.imperial.ac.uk/safety/subjects/biosafety#biosafety

The College Biological Risk Assessment Forms can be found at:
http://www3.imperial.ac.uk/safety/formsandchecklists

Departmental Biological Safety Officer (DBSO)

Dr. Cleo Kontoravdi, Roderic Hill 402, x 46655, cleo.kontoravdi98@imperial.ac.uk

College Biological Safety Officer

Ian Hackford, x 49422, i.hackford@imperial.ac.uk

College Associate Biological Safety Officer

Marian Blokpoel, x 49426, m.blokpoel@imperial.ac.uk

10.2. Work Involving Lasers

All lasers in the Department must be registered with the Departmental Laser Safety Officer.

All Laser Users **MUST AT LEAST** attend the **"Introduction to Laser Safety"** course provided by the College.

Details at: http://www3.imperial.ac.uk/staffdevelopment/safety/index/lasersafetycourses

Any work involving the use of lasers is governed by the **Departmental Laser Code of Practice** and must be **REGISTERED** with the DLSO.

The Departmental Laser Code of Practice and Laser User Registration Form are available on the Departmental Safety web pages:
http://www3.imperial.ac.uk/chemicalengineering/aboutcect/healthandsafetyinformation/guidanceandforms

Departmental Laser Safety Officer (DLSO)

Dr. Christos Markides, ACEX 404, x 41601, c.markides@imperial.ac.uk

10.3. Work Involving Ionising Radiation

All researchers working with ionising radiation **MUST** attend one of the two **Radiation Safety courses** provided by the College.

Principles of Radiation Protection
Details at: http://www3.imperial.ac.uk/staffdevelopment/safety/index/radiationsafetycourses

Radiation Protection - X-Ray Safety Awareness Training
Details at: http://www3.imperial.ac.uk/staffdevelopment/safety/index/xray

All work involving ionising radiation must be notified to one of the Departmental Radiation Protection Supervisors and must be **REGISTERED** with the College Radiation Protection Officer.

More information on Ionising Radiation Safety can be found at the following link:
http://www3.imperial.ac.uk/safety/subjects/ionradiation#ir

The College Ionising Radiation Forms can be found at:
http://www3.imperial.ac.uk/safety/formsandchecklists/irregforms

Departmental Radiation Protection Supervisors

Mr Pim Amrit, General Departmental Radiation Supervisor, Bone 321, x 45600, p.amrit@imperial.ac.uk

Dr Colin Hale, X-Ray tomography, Ba133 and Am241 sealed sources, c.hale@imperial.ac.uk

Dr Ivan Zadrazil, X-Ray tomography, Ba133 and Am241 sealed sources, i.zadrazil06@imperial.ac.uk

Dr Daryl Williams, X-Ray Diffraction, X-Ray, Na-22 Open Source, Co-60 source, x 45611, d.r.williams@imperial.ac.uk

College Radiation Protection Manager (and Radiation Protection Advisor)

Brian Robertson, x 49403, b.j.robertson@imperial.ac.uk

College Radiation Protection Officers

Ross Morgan, x 49425, r.morgan@imperial.ac.uk

Jon Fear, x 43045, j.fear@imperial.ac.uk

10.4. Work Involving Pressurised Systems and High Pressure

All pressurised systems containing a gas or vapour at a pressure greater than 0.5 bar MUST BE REGISTERED with Facilities Management.

All pressurised systems working at a pressure greater than 0.5 bar must have a **written scheme of examination**. This means that a standard operating procedure must be written out for the task of inspecting and testing the system.

If the pressurised system has an energy above 250 barg x litre, it requires STATUTORY INSPECTION

If the pressurised system has an energy above 250 barg x Litre, it requires STATUTORY INSPECTION.

"Statutory Inspection" is inspection and testing required by lay in order to ensure that the system remains safe to use. This is generally carried out annually.

If your pressurised system meets any if these conditions, seek assistance from a competent person or contact the Departmental Safety Team who will point you in the right direction.

Further information on Pressurised Systems Safety as well as the Pressurised Systems Registration Form can be found at the following link: http://www3.imperial.ac.uk/safety/subjects/pressuresystems

10.5. Work Involving Compressed Gases

For users of compressed gases, cryogenics and piped systems, it is a good idea to attend the **Gas Safety Courses** provided by the College.

Laboratory Gases and Decanting Liquid Nitrogen
Details at: http://www3.imperial.ac.uk/staffdevelopment/safety/index/gassafety2

Connecting Gas Regulators and Manual Handling of Cylinders
Details at: http://www3.imperial.ac.uk/staffdevelopment/safety/index/gassafety3

Work involving compressed gases or cryogenics will involve a **specific risk assessment**. If in doubt do not hesitate to ask a competent person.

Further information on Gases and Cryogenics Safety can be found at the following link:
http://www3.imperial.ac.uk/safety/subjects/gasesandcryo#gases

The Gases and Cryogenics Risk Assessment form can be found at the following link:
http://www3.imperial.ac.uk/safety/formsandchecklists/irregforms

10.6. Electrical Safety

By law, all electrical equipment and plant in the Department **MUST BE** subject to regular testing and inspection.

The frequency of testing depends on the risks involved.

Electrical equipment in laboratories is normally tested annually. This is organised by the Department and carried out by a specialist contractor.

All portable equipment, e.g. drills, must be tested every 6 months. Computer equipment usually only needs annual visual inspection plus testing every 3 years. Testing is carried out by a competent person normally a member of the Electronics Workshop or a specialist contractor.

All electrical equipment brought into the Department, whether new or old MUST BE TESTED BEFORE IT IS USED FOR THE FIRST TIME.

The responsibility for ensuring that all electrical equipment brought into the Department is tested lies with:

- Laboratory supervisors - for laboratories.
- Heads of Services - for those areas for which they are responsible.
- Academic Staff - for their offices and those of their students and RAs.

Departmental Electronics Manager

Mr Chin Lang, ACEX 1M , x 4 5599, c.lang@imperial.ac.uk

11. Laboratory Practice

Eating, drinking and smoking in the laboratories and workshops is prohibited.
Smoking is prohibited in the College except in certain external areas.

11.1. Prohibited Substances

The use of the following substances is prohibited BY LAW:

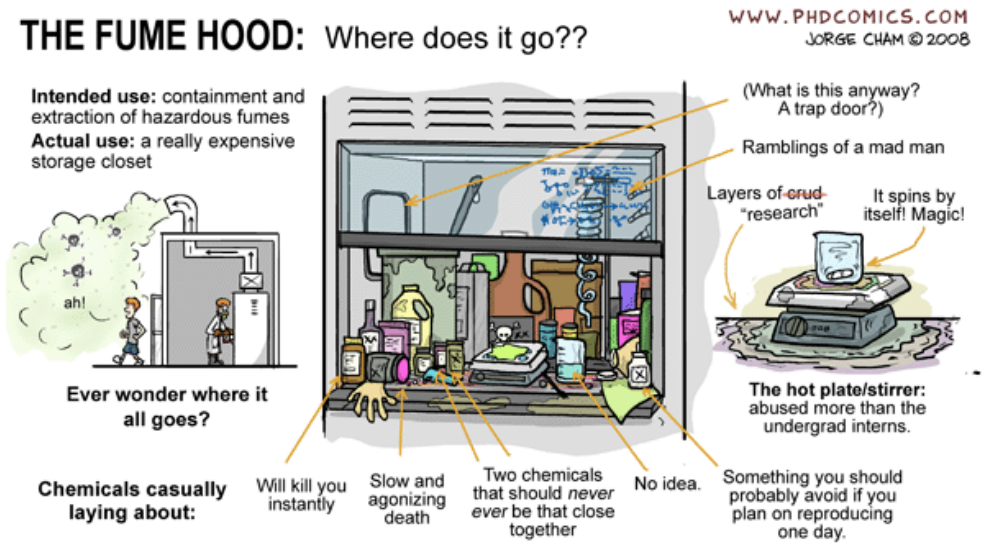
- **2-naphthylamine**
- **Benzedrine**
- **4-aminodiphenyl**
- **4-nitrodiphenyl,**
- **their salts and any substance containing any of these compounds, in any other substance in a total concentration exceeding 0.1%.**

11.2. Housekeeping

A tidy laboratory is much safer than one full of clutter; good housekeeping is essential for a safe environment.

- Put chemicals away when you have finished with them.
- Return cylinders to the Stores when they are empty.
- Do not store excessive amounts of paper or cardboard, they are a fire hazard.
- Keep all passageways clear. Fire doors should not be locked, bolted or obstructed.
- Fire extinguishers must not be moved or used as door stops.

Piled Higher and Deeper by Jorge Cham www.phdcomics.com
title: "Fume Hood" - originally published 5/30/2008



A SITUATION TO AVOID IN THE LABORATORY

11.3. Personal Protective Equipment (PPE)

PPE and Risk Assessments

PPE is necessary to protect you from injury or contamination by hazardous substances. All risk

assessments must indicate if PPE is to be worn and exactly what type is required.

Anyone working in a lab where PPE is required (eg safety glasses and hard hats) and found not wearing it will be excluded from the lab until the Head of Department gives them permission to return.

Safety glasses and goggles

Anyone entering a laboratory MUST wear protective safety glasses or goggles.

Failure to wear safety specs could result in being banned from working in the laboratory until given permission to return by the Head of Department.

Lab coats

Lab coats must be worn in any lab where chemicals are handled.

When your lab coat is dirty **DO NOT take it home to wash it**.

A lab coat laundering service is available in the Department. Make sure you have written your name on your lab coat. Take it to the Departmental Stores and place it in the wooden collection box by the entrance (ask in the Stores if you can't find it).

The Stores personnel regularly send out emails with a list of clean lab coats so that you can collect yours when it returns from the laundry.

Gloves

You may need to use gloves to protect your hands from chemicals and biological substances.

Only wear gloves as long as you need them.
Remove them and dispose of them as soon as possible and wash your hands.

The reason for this is that gloves only protect you for a set amount of time. If you wear your gloves continually, chemicals may permeate through the gloves and into your skin.

Rules for Conduct in Public Places

<u>Labcoats and Gloves</u> SHOULD NOT be worn outside the laboratory or Workshop

TAKE THEM OFF When you leave the lab

The reason for this is that they could cause contamination of door handles or other surfaces. Carry your lab coat in your arms when you leave the lab. All Personal Protective Equipment SHOULD be left in the laboratory or workshop, or stored in a separate area away from personal clothing.

Containers SHOULD be used when chemicals, glassware, and liquids are transported within the Department.

The containers should have a lid and should be appropriate to the specific items transported. Examples of suitable containers are: buckets with lids, coolers, etc.

11.4. Use of Gas Cylinders & Gas Lines

All cylinders should be secured, individually, to a rigid support using an appropriate clamp.

Always keep the number of gas cylinders in the laboratory **TO A MINIMUM**. Return empty or unwanted cylinders to the Stores.

Keep cylinders away from stocks of flammable liquids and ignition sources.

Do not clamp cylinders to the front of fume-cupboards as they restrict the airflow, invalidating their classification.

After use always close the valves and depressurise the regulator. Be especially careful when using oxygen cylinders and make sure that the regulator is in the un-pressurised position before opening the cylinder valve. Several explosions have occurred, as a result of perforation of the regulator diaphragm, when opening oxygen cylinders with the regulator in the pressurised position.

All regulators must be replaced every 5 years or every 2 years if being used with corrosive gases. Regulators should be inspected annually.

Annual inspection and testing of gas regulators is organised by the Department.

If regulators are marked as FAILED they MUST BE REPLACED.

For guidance on the use, handling and storage of gas cylinders refer to the College Code of Practice "Safe Handling, Use and Storage of Compressed Gases" available on the following web page:
http://www3.imperial.ac.uk/safety/subjects/gasesandcryo#gases

All high pressure gas-lines must be constructed by competent persons. No gas-line may be used on an experiment or connected to a piece of apparatus until it has been checked by a competent person. For advice see the Departmental Safety Team.

11.5. Chemical Spillages

In the event of a chemical spillage:

- If the substance is not harmful or the spill is small, clean it up immediately in order to avoid a slip hazard.
- If the substance is harmful or the volume of the spill is large, contact the Departmental Safety and Services Manager, Pim Amrit, Bone 321, ext. 45600 or the Departmental Safety Officer, Severine Toson Bone 321, x 42225.

For small mercury spills, sulphur powder is available in the Departmental Stores.

11.6. Use of Fume Cupboards

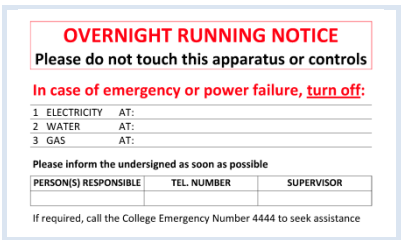
Anyone using a fume cupboard must check to see if it is working EVERY TIME they use it.

Annual testing and maintenance of the fume cupboards is organised by the Department. Your fume cupboard should carry a sticker with the date of the last test.

Any defects should be reported immediately to Pim Amrit or you can report the defect directly to Facilities Management helpdesk on ext. 48000.

11.7. Overnight Running of Apparatus

Any experiment or piece of apparatus that is left running overnight must be registered with the Departmental Safety Team. An "Overnight Running" notice must be displayed near the apparatus to indicating the safe shutdown procedure. Blank notices can be downloaded from the Departmental Safety web pages.



OVERNIGHT RUNNING NOTICE

Please do not touch this apparatus or controls

In case of emergency or power failure, turn off:

1	ELECTRICITY	AT:
2	WATER	AT:
3	GAS	AT:

Please inform the undersigned as soon as possible

PERSON(S) RESPONSIBLE	TEL. NUMBER	SUPERVISOR

If required, call the College Emergency Number 4444 to seek assistance

11.8. Eye Wash Showers

Eye wash showers, where they are fitted in laboratories, should be flushed out weekly to prevent the build-up of contaminated water. A weekly inspection log, similar to those used for fume cupboards, should be kept nearby recording when the shower was last flushed out.

11.9. Working with Liquid Nitrogen

Splashes from liquid nitrogen can cause very significant burns and serious damage to eyes. When transferring liquid nitrogen it is very important that the correct PPE is worn i.e. a face shield, to protect the face not just the eyes, and appropriate gloves for handling very cold substances to protect your hands and arms. Eye protection should always be worn when working near liquid nitrogen vessels, e.g. cold traps, in case of splashes.

Please ensure that these protective measures are followed to avoid serious injury.

Transport of Liquid Nitrogen in Lifts

The safe transport of cryogenic gases in lifts can only be carried out in the Bone goods lift. The procedure is a two-person operation and the lift is controlled by the use of a key from the Departmental Stores

To send a full container from level 1 to another floor

(1) From level 1, call the lift in the normal way.

(2) When the lift arrives, turn the “Control Panel” key switch to the “on” position

(3) Load the Liquid Nitrogen container into the lift. DO NOT ALLOW ANYONE TO ENTER THE LIFT

(4) Send the lift to the desired floor, to be received by a colleague.

(5) Allow sufficient time for the container to be unloaded. Once the container has been unloaded the key switch can be returned to the “off” position to return the lift into normal operation

An intercom connection has been provided by the Bone lift on level 1 in order to aid communication between Staff/ Students carrying out these operations.

“Empty” cryogenic containers should be treated as full, in case of residual liquid, i.e. all containers are subject to these rules.

11.10. Waste Disposal

A poster is provided on the Departmental Safety Handbook page, summarizing the waste disposal procedures for most laboratory items:

- Chemicals and chemically contaminated waste
- Empty Chemical Bottles
- Broken Glass and Sharps
- Electrical Laboratory Equipment
- Biological Waste and biologically contaminated waste.

http://www3.imperial.ac.uk/chemicalengineering/aboutcect/healthandsafetyinformation/safetyhandbook

All waste routes and procedures are detailed on the Imperial College Waste Directory:
http://www3.imperial.ac.uk/estatesfacilities/services/wasteandrecycling

General Details

Most **waste containers** (waste bags, autoclave bags and containers, sharps bins,…) and the **Yellow Chemical Waste Labels** are available from the Chemical Engineering Stores. You may need to purchase special items yourself.

The **College Blue Numbered Waste Tags** are available from the Departmental Safety Team (ce-safety-team@imperial.ac.uk).

Chemicals and Contaminated Items (gloves, bottles, glassware,…)

NO CHEMICALS, GLASS OR SYRINGE NEEDLES MAY BE PUT DOWN THE DRAINS OR PLACED IN THE DOMESTIC WASTE BINS.
It is ILLEGAL to dispose of organic solvents down the drains.

Storing Waste Solvents in the Lab

Waste solvents should be stored in special polythene containers marked either **"Chlorinated"** or **"Non-Chlorinated"** prior to disposal. Empty containers can be obtained from the Departmental Stores.

Waste solvents mixed with **more than 10% water or acid** should be stored in glass Winchesters.

The Case of Gloves

Gloves can go through different waste routes, depending on their level of contamination:

Gloves Contaminated with…	Place in…
Non-hazardous substance	Laboratory bin
Volatile solvent which **HAS EVAPORATED**	Laboratory bin
Non-volatile hazardous, flammable,… substance	Chemical Waste
Biological substance	Refer to Biological Waste part of the poster

Disposal Procedure for Chemicals

Make sure you set up a detailed list of the chemicals you wish to dispose of – you will need it later. You should download the official file from http://www3.imperial.ac.uk/safety/subjects/hazwaste/chemicalwastedisposal and fill in the table.

The grey highlighted rows and columns need to be completed as fully as possible

From:		Campus:					Tel. No:			WASTE No:
Department:		e-mail Address:					Imperial College Grant Code:			
TEF Numbers:		EA Registration No:					NHS Trusts - Invoice to:			
Item No.	Chemical Name or Material:	Product Code	Hazard Class	H Code	UN Nos	Size	Quantity	Packed In	R&RM Use Only	R&RM Use Only
1										

[1] Contact the Facilities Management Helpdesk:

Call x 48000 or

email estates-help@imperial.ac.uk or

Go to the online form:
http://www3.imperial.ac.uk/facilitiesmanagement/helpdesk/defects

You will be asked to provide the following information:

- Your contact details (Name, Email, Department, Contact Number)
- Location where the Waste Chemicals come from – **generally your lab** : building, floor, Room
- Type of Job: Chemical Waste Disposal
- A brief description of the waste (solvents, lab smalls etc.)
- Priority of the job: Waste-hazardous

[2] You will receive a confirmation email for your request

Your recent defect reported to the FM Customer Services Centre on 08/09/2011 00:00:00, has been received and will be processed shortly.

Building = **ACE – Bone Building B227 Pyrolysis Laboratory**

Description: Chemical Waste Disposal - Please specify the request

Disposal of 2 x 25 litre containers of chlorinated solvent waste, one small bottle of mercury and 1 box with silica gel impregnated with chromium.

Thank you

FM Customer Services Centre, 5th floor Sherfield Building, South Kensington Campus.

Phone Internal 48000 - External 020 7594 8000

e-mail fm.csc@imperial.ac.uk

web defect form http://www.imperial.ac.uk/customerservicescentre

[3] You will receive a **SECOND** Confirmation Email the following day with a task and **4 DIGIT WASTE NUMBER**

Your recent defect reported to the FM Customer Services Centre on 08/09/2011 00:00:00, has been given a unique task number **WASTE: 3117**. Please quote this number if you contact the helpdesk for any updates on progress or require amendments to your call.

Your task has been allocated a priority of **Waste – hazardous**

Our records indicate that the defect recorded is as detailed below, please check and contact us if there are any errors.

Building = **ACE – Bone Building B227 Pyrolysis Laboratory**

Brief Description = **Disposal of 2 x 25 litre containers of chlorinated solvent waste, one small bottle of mercury and 1 box with silica gel impregnated with chromium.**

[4] You will then receive an email from the College Waste Manager asking you to fill in and send him the table described above

⇨ YOU WILL NEED THE 4 DIGIT WASTE NUMBER WASTE: XXXX

⇨ You will need to provide a Departmental cost code (It will look like this: CEXXX XXXXX) to pay for the disposal

See next page for the table.

The grey highlighted rows and columns need to be completed as fully as possible

From: Pedro Arcelus Arriaga		**Campus:**		**South Kensington**			**Tel. No:**	**12345678910**		**WASTE No:**
Department: Chemical Engineering		**e-mail Address:**		**name@imperial.ac.uk**			**Imperial College Grant Code:** **CEXXX XXXXXX**			**3117**
TEF Numbers:		**EA Registration No:**					**NHS Trusts - Invoice to:**			
Item No.	**Chemical Name or Material:**	Product Code	Hazard Class	H Code	UN Nos	**Size**	**Quantity**	**Packed In**	R&RM Use Only	R&RM Use Only

1	Chlorinated solvent waste					large	25L	Plastic drum		
2	Chlorinated solvent waste					large	25L	Plastic drum		
3	mercury					small	10 kg	Glass bottle		
4	Silica gel impregnated with chromium					small	3kg	Cardboard box		

Please Note: Laboratory chemicals in containers of less than 5 litres capacity are normally termed "lab smalls".

[5] Once this has been completed and the Waste Manager has all the required information, pack your chemicals appropriately (see poster).

Label your containers / boxes with the YELLOW Chemical Waste Labels:

Use a pencil rather than a pen to fill in the labels in order to avoid the ink running

[6] Bring your packed chemical waste to the Chemical Engineering Stores, where you can arrange for it to be placed in the Departmental Chemical Waste Store, where it will be collected.

If you decide to pack your labelled items into one big box, label it with a list of the waste chemicals – you can print the table you produced in step [4].

Gas Cylinders

See Waste poster for the disposal procedure.

Empty Chemical Bottles - CLEAN

See Waste poster for the disposal procedure.

Broken Glass, Sample Tubes and Sharps

See Waste poster for the disposal procedure.

Electrical Laboratory Equipment

It is recommended that you use the online form for the disposal of electrical equipment:

http://www3.imperial.ac.uk/facilitiesmanagement/softservices/rechargedservices/weee

You will be asked to provide the following information:

- Contact information
- Account number to pay for the disposal
- Location of items (they will pick them up for you)
- Inventory of items to be disposed of

If you are disposing of laboratory equipment, you will be required to provide an EQUIPMENT DECONTAMINATION CERTIFICATE

This can be found on the following web page:
http://www3.imperial.ac.uk/safety/formsandchecklists/decontamination

You can decontaminate the equipment yourself - just make sure you remove all traces of harmful substances.

You will be required to provide the following information:

- Location of Equipment
- **TO:** Guy Foley, Soft Services Supervisor, x57650, g.foley@imperial.ac.uk
- **FROM (Person responsible for the equipment):** Yourself or your supervisor
- Equipment Details
- **Purpose of Decontamination:** Disposal of equipment
- Details of Contamination
- Details of decontamination procedure
- If decontamination is incomplete: nature of contamination and precautions to be taken when handling the equipment

All types of Biological Laboratory Waste (also known as Healthcare Waste)

See Waste poster for the disposal procedure.

Autoclave Availability

The Departmental Autoclave is located in the BSE area, ACEX 115 - Please contact Prof Mantalaris or Prof Stuckey or Dr Kontoravdi if you wish to use it.

It is recommended that biological waste be autoclaved at 126°C in order for the contents to reach 121°C sterilisation temperature.

Make sure that your autoclave bags and containers are SUITABLE for this temperature.

Other autoclaves available in the College are listed below – **Please make sure you contact the person in charge to ask for permission.**

Department of Biochemistry	Barry Crook	x 54251	b.crook@imperial.ac.uk
	Heather Combe	x 43070	h.combe@imperial.ac.uk
Department of Bioengineering	Ken Keating	x 45170	k.keating@imperial.ac.uk
	Dominic Smith	x 41617	dominic.smith@imperial.ac.uk
Sir Alexander Fleming Building	Ian Morris	x 4 5352	i.w.morris@imperial.ac.uk

Clinical Waste Compound

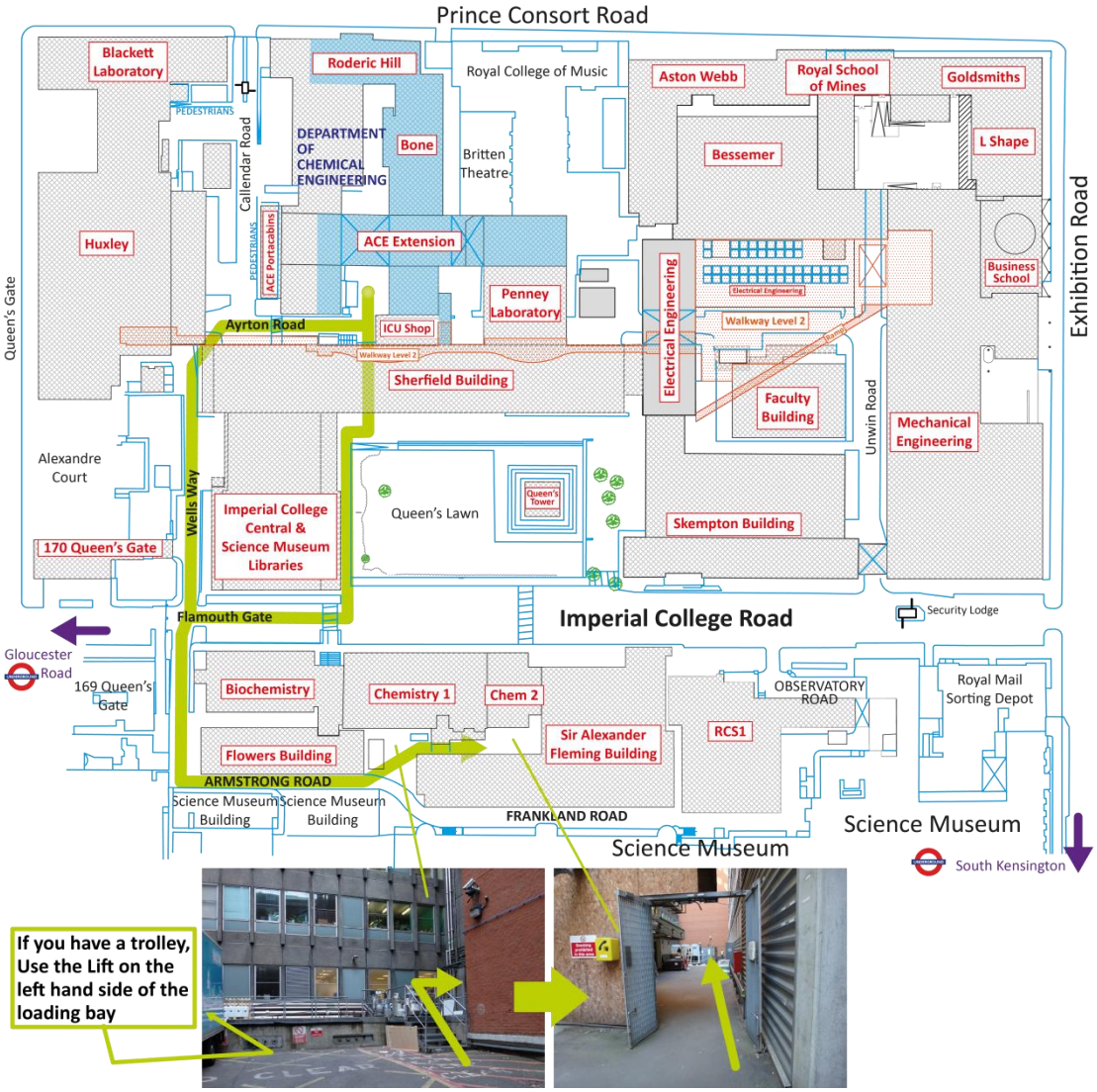
The Clinical waste compound is located behind the Chemistry Building at the beginning of Frankland Road as indicated on the map below.

Each supervisor who disposes of biological waste should have a key to the Clinical Waste Compound. Keys can also be borrowed from the Departmental Safety Team.

Carrying biological waste bags across the campus by hand is not permitted.

Clinical "biological" waste may only be transported across campus inside a closed wheeled cart.

The Clinical waste compound is accessed through a loading bay.



Recycling of Printer Cartridges and Toners

Used HP Cartridges and Toners can be brought to Keith Walker in the Chemical Engineering Stores in order to be recycled.

Please see the link below for information on recycling other brands of printer cartridges and toners.
http://www3.imperial.ac.uk/facilitiesmanagement/softservices/wasteandrecycling/wastedirectory/southkensington/printerconsumables

Radioactive Waste

Departmental Radiation Supervisors are listed below:

Mr Pim Amrit	General Departmental Radiation Supervisor	x 45600	p.amrit@imperial.ac.uk

Dr Colin Hale	WASP rig: X-Ray tomography system, Ba133 and Am241 sealed sources		c.hale@imperial.ac.uk
Dr Ivan Zadrazil	WASP rig: X-Ray tomography system, Ba133 and Am241 sealed sources		i.zadrazil06@imperial.ac.uk
Dr Daryl Williams	X-Ray Diffraction, X-Ray (Skyscan 1074), Na-22 Open Source, Co-60 source	x 45611	d.r.williams@imperial.ac.uk

One of them should be should be notified of any radioactive waste and will arrange for its disposal.

11.11. Chemicals Not in Use

Chemicals that are not currently being used and have not been assessed under COSHH must be kept in a separate store or cupboard within the laboratory that is clearly marked as a store. Any chemicals removed from this store for use must be assessed before being used.

11.12. Storage of Flammable Liquids

There are legal requirements governing the storage of flammable liquids; some of the more important points are as follows:

Limits of Quantity

No laboratory should store more than 50 litres of flammable liquids. Any operations involving the storage or use of large quantities of flammable liquids should be discussed with the Departmental Safety Team. Large quantities of solvents should be kept in the Solvent Store, see Keith Walker in the Departmental Stores for details.

Type of Storage

By law containers of flammable liquids of greater than 500 ml capacity must be stored in approved, fire resistant storage cabinets or cupboards when not in use. The cupboard should be suitably labelled. Labels are available from the Stores. Flammable liquids may be stored in fume cupboards only if they are contained in a suitable steel cabinet.

Where to Store

Flammable liquid storage cabinets should not be sited in those parts of the laboratory where there is a high rate of movement of personnel. They should also be sited away from gas cylinders and ignition sources, e.g. naked flames and high temperature surfaces.

ALL FLAMMABLE SUBSTANCES SHOULD BE STORED APART FROM OXIDISING AGENTS.

12. Manual Handling

Many injuries are caused by incorrect manual handling during lifting and carrying of objects. Before carrying out manual handling tasks, risk assessments should be made and, if possible, mechanical handling equipment should be used instead.

For more information on Safe Manual Handling and good Lifting Technique see the relevant Occupation Health web page at the following link: http://www3.imperial.ac.uk/occhealth/guidanceandadvice/manualhandling

If you anticipate that your work will involve a large amount of manual handling, the college provides a training course called **Manual Handling and Lifting for Users**. More details can be found on the course page: http://www3.imperial.ac.uk/staffdevelopment/safety/index/manualhandlingcourses

13. For Computer Users: Computer Health

More and more people are using computers and inevitably we are seeing people in College who are experiencing health problems, notably affecting the hands, arms and back. This is usually caused by prolonged use of the keyboard and mouse coupled with unsatisfactory workstation layout and/or poor keyboard or mouse technique.

The College has web pages dedicated to the healthy use of computers and work stations:
http://www3.imperial.ac.uk/occhealth/guidanceandadvice/computerhealth

Before you start work at your computer, ensure your workstation is suitably set up by carrying out an assessment. Guidance and a checklist are available to assist you in this task:

The **Workstation Checklist** can be found in Appendix 3 or downloaded from the relevant Occupational Health web page:
http://www3.imperial.ac.uk/occhealth/guidanceandadvice/computerhealth/computerchecklist

Please see the guidance provided in order to complete this checklist:
http://www3.imperial.ac.uk/occhealth/guidanceandadvice/computerhealth/computerhealthgeneralguidance

Staff

Any member of staff who uses a computer regularly in their normal work can have eye test carried out by an optician, paid for by their department. For more information, contact your local OH Service or see the "Eye Tests for Computer Work" web page:
http://www3.imperial.ac.uk/OCCHEALTH/guidanceandadvice/eyetests/eyetestsforcomputerwork

APPENDIX 1 Departmental Health and Safety Policy

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Section A - Organisational Arrangements

[1] The Head of Department (HoD) is accountable to the Principal of the Faculty of Engineering for ensuring that effective local arrangements are in place for the implementation of College health and safety policies, procedures and codes of practice.

[2] Principal Investigators (PI) and Heads of Services (HoS) are accountable to the HoD for the implementation of College health and safety policies, procedures and codes of practice.

[3] Under the Health and Safety at Work etc Act 1974, the HoD is responsible for and committed to providing a safe and healthy workplace. To this end, the HoD has appointed various safety personnel, including a Departmental Safety Officer (DSO), and gives them adequate resources (time and finance) and supports decisions and actions taken by them. The safety personnel are part of the management team, and a departmental safety management structure is attached. The Department complies with the College's Safety Management System.

[4] The HoD appoints competent safety personnel to fulfil specified functions. These are fully documented in the appointment letter signed by the Head of Department and the relevant safety personnel. All such staff must attend all relevant College training courses. Specific safety personnel include a Department Radiation Protection Supervisor (DRPS), Laser Safety Officer (LSO) and a Biological Safety Officer (BSO). The HoD ensures that there is a COSHH Advisor, display screen equipment (DSE) assessor, Manual Handling Assessor, Emergency Wardens (Fire Marshals) and appropriate numbers of people trained in first aid.

[5] The Department has a safety committee that meets at least four times a year. A senior academic chairs the Committee; the DSO acts as advisor, and minutes are taken. Membership is representative of the entire department and includes staff and students. The function of the Safety Committee is to receive information, make decisions based on reports of safety inspections, formulate policy and advise the HoD. A fixed agenda is used; minutes are displayed on the

internal web site. In addition, health and safety is an agenda item at all Executive Committee and Academic Staff meetings.

[6] Staff and students are expected to attend relevant health and safety training at a variety of levels; local induction training is given on the first day of employment by the supervisor, DSO or other nominated person, using the "Day One" safety induction checklist. All undergraduates attend Safety Events and other relevant training before working in the laboratories. Local rules are issued in conjunction with training in laboratory work and specific hazards such as lasers before work begins and is fully documented. HoSs or PIs are responsible for training their staff and students in the various work methods and for documenting such training.

[7] The safety of short-term Visitors to the Department (under 5 day's duration), including contractors and engineers, is the responsibility of the member of staff they are visiting. If the visit is longer than 5 days, "Day One" induction training is carried out by the supervisor, DSO, or other nominated person.

[8] First aid arrangements are known to all staff and visitors, and details of these and emergency contact numbers are posted on the safety notice board and in each corridor. Any accidents and near misses are reported, investigated and remedial measures carried out as soon as reasonably practicable.

[9] Staff members are required to complete a pre-employment occupational health (OH) assessment; but during their employment, if their work direction changes, it is the supervisor's responsibility to ensure that any additional OH requirements are identified, and arrangements made to fulfil them. Staff members are informed of any symptoms of exposure associated with their work, and asked to contact supervisors immediately if exposure is ever suspected.

Section B - Risk Assessment and Monitoring of Risk Control Procedures

[10] Research Supervisors and HoSs are responsible for all risk assessments carried out by their staff and students.

[11] Research Supervisors and HoSs ensure that staff and students undertake and are competent in making risk assessments of all work they are responsible for, including conducting reviews of such work annually and as circumstances dictate. All staff and students carrying out risk assessments should complete the Risk Assessment Foundation Training (RAFT) course and pass the test. Departmental standard forms should be used for all risk assessments. Wherever College formats for such assessments exist (e.g. liquid nitrogen, cylinder gases, manual handling, DSE, GM, biological etc,) these should be used in the absence of any other format.

[12] The hierarchy of control measures is practised (e.g. elimination, reduction, suppression, enclosure, training etc). Control measures are monitored and reviewed. Evidence of servicing, testing and efficacy is kept by the Technical Services Manager (TSM).

[13] Personal Protective Equipment (PPE) is identified by risk assessment and issued free of charge for those requiring it. Such persons are trained in use, maintenance, and fault reporting, together with adequate storage and record keeping.

Section C - Communication and Consultation Arrangements

[14] Safety communications are primarily by email and via the departmental web site. The DSO keeps a record of safety-related notices. The department has a safety section on its web-site and two safety notice boards and all staff and students are informed of their location; safety notices, posters and warnings are in place, and checks are made to ensure that these are up-to-date.

[15] Staff and students have a forum for consultation and discussion on health and safety issues via the safety committee. Minutes of department safety committee meetings are available on the Departmental Safety web pages.

[16] Trade union representatives are invited to attend safety committees and safety inspections. Trade union safety representatives are allowed sufficient time to attend safety training and the department complies fully with all aspects of the Trade Union Safety Representatives Regulations.

Section D - Training and Competence Assurance Procedures

[17] Training needs for staff and postgraduates are identified and recorded and are reviewed regularly. Training is supplied as induction training on the first day, local laboratory and specific procedures before such work begins,

hazardous research procedures before such work begins, attendance of staff and students at relevant training at departmental and College levels. Training records are signed and kept by the DSO, Research Supervisors or HoSs.

[18] The DSO keeps departmental training records for at least 10 years. HoSs and Research Supervisors keep training records for specific procedures. Copies of safety training records are available to individual staff or students, upon request.

Section E - Safety Performance and Measurement

[19] The Department has performance measurements in place with regard to Departmental safety standards. Data are obtained and reported during the annual safety audit carried out by the DSO.

Section F - Document Management

[20] Safety-related documents are actively managed and reviewed by the DSO, on the safety notice board and the web site. The DSO holds copies of all documentation/certificates for departmental assets, statutory calibration and maintenance. The DRPS keeps all radiation acquisition, use, disposal, dosimetry and monitoring and monitor calibration records. The BSO keeps a copy of each approved GM project held in the department. The LSO keeps records of all lasers and laser users.

Section G - Audit, Inspection and Review

[21] Members of the Safety Committee use a laboratory inspection checklist to conduct "spot" safety inspections of the department and their findings are reported at the next safety committee meeting.

[22] The DSO, together with members of the Safety Committee, conducts annual inspections of the entire department. A report is sent to the Head of Department. Findings are acted upon as soon as reasonably practicable, or immediately if the risk necessitates it.

[23] This policy is reviewed each year by the DSO, approved by the Safety Committee and signed by the Head of Department. It is displayed on the Safety notice board, and put on the departmental web-site.

Documents and records held in the Department, and who they are held by, include

(1) Safety management structure diagram giving named individuals and showing how safety responsibilities are devolved in the department. (held by the DSO)

(2) Contact details of first aiders. (DSO and First Aid Coordinator)

(3) Department local rules. (DSO)

(4) Department safety handbook, procedures and guidance issued. (DSO)

(5) Risk assessments carried out (including COSHH, DSE, manual handling, liquid nitrogen etc). (DSO)

(6) Safety Inspection reports. (DSO)

(7) Minutes of every safety committee meeting. (Chair of the Safety Committee)

(8) All accident or near miss reports. (DSO)

(9) Staff radiation dose monitoring records if appropriate (DRPS)

(10) Isotope acquisition, use and disposal records if appropriate, monitoring and monitor calibration certificates. (DRPS)

(11) Staff health surveillance screening reports; records of exposure to substances hazardous to health. (DSO)

(12) Top sheet of all GM project proposals held in department. (BSO)

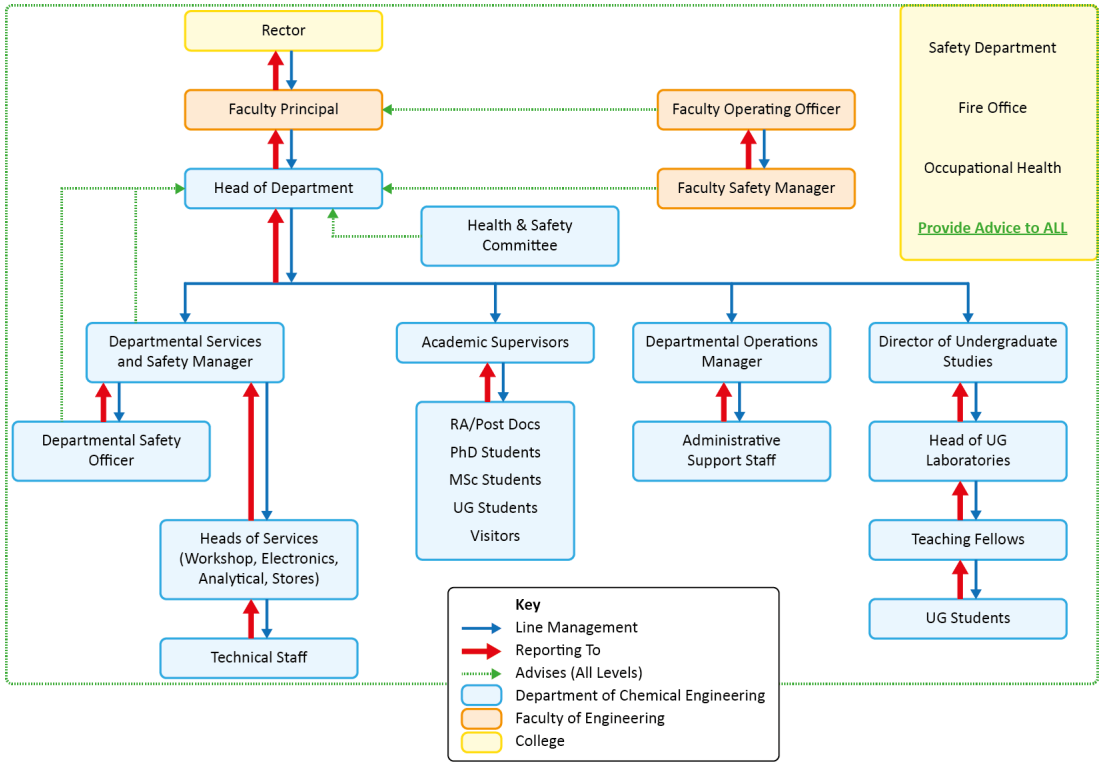
(13) Details of waste routes. (DSO)

(14) Safety training records - induction, local rules, procedures, Safety Department, Departmental. (DSO)

(15) Statutory test/validation reports for autoclaves, safety cabinets, fume hoods, pressurised dewars or other pressure vessels or systems; maintenance logs for hazardous equipment such as centrifuges. (DSO)

(16) Letters/reports from enforcing bodies (e.g. EA, HSE) (DSO)

Section H – Safety Management Structure - Diagram



Head of Department

Professor Andrew G. Livingston

September 2011

Review August 2012

APPENDIX 2 Departmental Safety Committee Terms of Reference

Role and Purpose

[1] The Chemical Engineering Department Safety Committee is integral to the advisory and monitoring framework in the department. It supplements the arrangements for the management of health and safety but does not substitute them.
[2] The remit of the Departmental Health and Safety Committee is to advise and assist the Head of Department in the effective discharge of his or her health and safety responsibilities and in this respect to:

a. Promote a positive health and safety culture by, for example:
   (1) Ensuring effective communication of health and safety information through Department-wide emails and regular updates of the Departmental Health and Safety web pages and notice boards
   (2) Disseminating best practice across the Department
   (3) On an occasional basis, conducting its own safety inspections and audits

b. Monitor, review and advise on:

- The local arrangements for the implementation of College health and safety policies, procedures and codes of practice.
- The Department's Health and Safety Risk Register, which sets out the principal hazards and risks present in the Department/ Division.
- The induction and specialist training provided for all Departmental staff, students, visitors and contractors.
- The inspection and audit programme of the Department/ Division's health and safety performance, receive the resultant reports and recommend action as appropriate.
- The arrangements for dealing with emergencies and the provisions for emergency evacuations, evacuation drills, first aid and reporting accidents, incidents and non-compliances.

c. Monitor new initiatives and grant proposals being proposed by the Department, consider the health and safety implications of any new hazards which have been identified, and advise on the appropriate mitigating action.
d. Act as the Departmental forum for consultation with staff and students on health and safety matters
e. Ensure that there is proper coordination, cooperation and communication with other users of shared and/ or adjacent space, for example through the consideration of reports from building user groups.
f. Receive reports of accidents, near misses and work related health problems and monitor follow up action as appropriate.
g. Consider reports from trades' union and employee safety representatives.

Membership

[3] The committee membership will be determined by the HoD and will include adequate representation of the interests of management and all staff and students:

- The Chairman will be a senior member of the Department
- The Departmental Safety Officer
- The Departmental Services and Safety Manager
- The Departmental Laser Safety Officer
- The Departmental Biological Safety Officer
- The Departmental Radiation Protection Supervisor

- A Departmental Technical Services Representative
- An Academic Related Staff Representative
- A Trade's Union Safety Representative
- A Clerical Representative
- A CPSE Representative
- Postgraduate Representatives
- Undergraduate Representatives – years 1 to 4
- MSc Representatives

Arrangements and Organisation

[4] The committee will meet regularly, usually termly, on dates fixed in advance, or more frequently, at the discretion of the Chairman. Notice of meetings will be given at least one week in advance of the meeting, that notice to be accompanied by the agenda and supporting papers. A record will be kept of:

- those attending and those who have presented their apologies
- the discussions and of the decisions reached
- any dissenting opinion where agreement cannot be reached
- actions to be taken and the name of the person responsible for them.

[5] The committee shall report:

- Regularly to the HoD: The Chairman of the Health and Safety Committee will report to the Departmental Executive Committee
- After each meeting by sending a copy of its minutes to the Faculty Principal, the Safety Director and the Director of Risk Management within two weeks of the date of the meeting or its adjournment if any adjournment is needed. The minutes will also be made available on the Departmental Health and Safety Web pages to all Departmental members.
- Annually through the HoD to the College Health & Safety Management Committee

Imperial College London

iCare

DAY ONE SAFETY INDUCTION - http://www3.imperial.ac.uk/staffdevelopment/safety/induction

This form is to be used for all staff, students and visitors on site for greater than 5 days. You should be given (or request if not automatic) a further induction for each building you will be occupying.

The inductor must:

☐ **Inform** new starter of the building evacuation procedures and alarm system

☐ **Inform** them of the campus emergency telephone number 0207 589 1000 giving the extension with STD code in case call made from a mobile. Instruct them to call this number to obtain the Emergency Services instead of dialling 999

☐ **Inform** of frequency of fire drills/testing alarms

☐ **Show** location of:

- Fire alarm call points
- Emergency exits
- Evacuation routes
- Assembly points
- Fire extinguishers (and fire blankets where present)

☐ **Show** safety notice board (which should give much of this information)

☐ **Give** list of department safety personnel, Divisional/Departmental Safety Advisor

☐ **Inform** of local first aid arrangements, giving names and location of first aiders

☐ **Inform** of procedure for notifying accidents, near misses and occupational ill health

☐ **Inform** of function of Safety Department, Occupational Health and Security

☐ **Show** Staff home page indicating, sites for staff or student safety/personnel issues, Occupational Health, Safety Department, Estates Helpdesk, HR, Divisional/Departmental website

☐ **Inform** of department's normal working hours and building access hours. Explain lone working/outside normal working hours procedures (eg signing-in book, buddy system, informing Security, swipe card system)

☐ If the person is required to work at different locations, **advise** on travelling safely between sites (i.e. cycle safety, areas to avoid if known to be unsafe, safe parking when dark)

☐ **Inform** of any known significant hazards or health risks in work environment e.g. Laboratories, Workshops, Plant Room etc.

☐ **Inform** of any Personal Protective Clothing/Equipment (PPE) required – if appropriate.

☐ **Inform** of frequency and function of department/divisional safety committees

☐ **Inform** of how to obtain local induction safety training (via Line manager or Dept Safety Officer), and of Month One Safety Training (automatic to all new staff)

☐ **Inform** of requirement to enrol onto Risk Assessment Foundation Training (RAFT) if in control of areas, personnel, equipment, or processes

☐ **Conduct or arrange** for training needs analysis / enrolment onto other relevant health and safety courses http://www3.imperial.ac.uk/staffdevelopment/safety

EXAMPLES OF SAFETY SIGNS

Yellow triangle
Hazard warning
e.g Bio Hazard

Blue circle
Mandatory –
e.g you must wear safety specs

Red circle
Forbidden/ prohibition
e.g No Entry

Black and yellow
Hazardous locations
e.g low headroom

Green and white
Safe condition
e.g fire exit

Red square
Fire equipment

Orange square
containers of dangerous substances
e.g flammable

Red circle
Access restrictions

Amber circle
Access restrictions

Yellow circle
Access restrictions

REQUIRED INFORMATION

Name of New Starter	**Signature**	**Date**
Department Name	**Faculty**	**CID NO:**
Sates: STAFF	STUDENT VISITOR	CONTRACTOR OTHER
Name of Inductor	**Signature**	**Date**

SECURITY will require this form, appropriately signed, along with other types of identification before they will issue a College Swipe Card http://www3.imperial.ac.uk/facilitiesmanagement/security/services/idcard

APPENDIX 3 Departmental Asset Management Policy

I. Introduction

The Asset Management Policy (AMP) will apply to ALL equipment and items of any nature, new and existing, whether purchased or manufactured from Departmental or Research Funds and therefore forms part of the Department of Chemical Engineering assets. It will also apply to all equipment brought onto the site on loan or trial. The AMP forms part of the Department's **Asset Accounting System (AAS)**. It is therefore incumbent on all staff to comply with this policy.

PLEASE NOTE

All queries and relevant forms should be sent to ce-safety-team@imperial.ac.uk

Definitions

Asset

Piece of equipment or assembly which plays an important/substantial role in departmental research and/or teaching activities. These include fume cupboards, safety cabinets, autoclaves, any type of mechanical control, gas detection systems, experimental rigs, piped gas systems, high performance computing grids, departmental file servers, etc…

Department Asset Register (DAR)

Departmental database containing information records for all departmental assets, including all related risk assessment forms, training records, maintenance records and relevant information. The DAR is held and maintained by the Departmental Safety Officer (DSO) who centralises all the information by liaising with the Asset Managers (AM).

II. Assets/Equipment covered by this policy

- Laboratory, X-Ray, High pressure, Analytical and Mechanical equipment, engineering controls such as fume cupboards, safety cabinets, and any other local exhaust ventilation, autoclaves, detection systems, monitors etc
- Computing Equipment
- Loan / Trial / Demo Equipment
- Other Equipment not included above

Exclusions

Consumable Materials and Disposables

Note: This list is not definitive. Should there be any doubt about equipment then advice should be sought from the DSO (ce-safety-team@imperial.ac.uk).

III. Policy Objectives

To facilitate the overall management of all assets within the Department, by the following:

- Identifying ownership

- Improving asset utilization
- Identifying asset location
- Ensuring training and competency on selected assets
- Ensuring that all assets are periodically maintained
- Ensuring that legal, statutory, safety and audit requirements are met in relation to purchasing, installing, commissioning, maintaining, inspecting and training requirements
- Ensuring that all assets deemed obsolete are decommissioned in accordance with College Policies

IV. Asset Management Policy Statement

Assets must be:

a) suitable for their intended purpose and location

b) installed and used in an appropriate manner

c) used only by users who are suitably trained and authorised

d) maintained in a safe and serviceable condition and removed from service if unsafe

e) meet and comply with regulatory and College safety standards (**NOTE:** sometimes the College requires higher standards than the statutory requirement)

f) properly and correctly disposed of, either at the end of their useful working life, or at replacement in accordance with College Policies – funding must be allocated to cover the costs of equipment disposal

g) provided with adequate resources for inspections, testing and maintenance as applicable, which have been accounted for

All movements of assets, including permanent transfers, acquisitions and disposals, will be in accordance with the procedures laid down in within this Policy and will be documented, so that **the Department Equipment Asset Register (DAR), held by the DSO, may be correctly updated.**

V. Roles and responsibilities

Staff and students

- All staff and students using an asset have a duty to ensure that they are properly and adequately trained in its use prior to using such asset.
- They are also responsible for ensuring that all accidents, incidents and damage are immediately reported to the relevant persons.

Departmental Safety Officer (DSO)

Maintaining and updating the DAR with all notified assets

Departmental Services & Safety Manager (DSSM)

Assisting the DSO in monitoring if assets are compliant with College Policies and statutory requirements.

Academic Staff and Service Managers (AS & SM)

The AS & SM (mainly research groups and Departmental Services: Electronics, Analytical Lab, UG Labs, Workshop etc) are responsible for the equipment purchased with the research funds under their control. They must:

- If an asset has been purchased in common, agree who is to be responsible for control of it.
- Ensure assets under their remit are maintained and comply with College Policies and statutory requirements
- Ensure that all assets are fit for purpose and location, that users are competent to use the asset, and that sufficient resources for service support are provided.
- Nominate a suitable (**competent**) Asset Manager (AM). The AM must be competent in the use of the asset, understand its hazards, risks, limitations, controls, and any associated emergency procedures, and be able to train others in its use. This will include any equipment on loan to the Department.
- In the case of failure to nominate an Asset Manager, the duties will revert back to the AS & SM.

Duties of the Asset Manager

Note: the responsibilities remain with the AS and SM

- Logging all assets under the control of their groups or service into the DAR by completing and returning the Asset Registration Form (ARF) to the DSO.
- Conducting, reviewing and updating any associated risk assessments (in conjunction with other group members), after attending the relevant Risk Assessment Foundation Training (RAFT), and obtaining approval and sign-off from the AS or SM.
- Preparing / developing Training Manuals or Standard Operating Procedures to ensure assets are used / operated consistently.
- Arranging for users to attend relevant College training sessions (when necessary)
- Conducting user training in the use of the asset, supervising and checking their competency
- Keeping associated training records
- Recording training on technical equipment and keeping an up-to-date list of trained, authorised, persons on the equipment
- Ensuring the asset is kept in good condition, maintained, inspected, tested, repaired and taken out of use if damaged (see daily checks)
- Keeping records of maintenance, testing, inspection and any other services carried out for the equipment assets under their responsibility.
- Booking in equipment for the regular maintenance service and collection of this afterwards
- Organising for mandatory electrical safety testing via Electronics Services.
- Arranging for area induction, permit to work or supervision of visiting engineers (as appropriate)
- Notifying the DSO of any accidents, near misses or loss of control incidents relating to the equipment

VI. Code of practice

Checking Equipment

AMs must make routine checks on assets, equipment and associated consumables, particularly those used by several persons (including those from other departments), and in particular, those located away from the main laboratories which are more likely to be forgotten about or missed. In some cases, daily checks will be required. Some equipment requires routine checks which are determined by the manufacturer's requirements. See user manuals for guidance. Any checks must be documented and signed by the person carrying them out.

Statutory tests and inspections

Some assets contain hazards which require particularly stringent control measures. The effectiveness of these controls is determined by statutory testing and inspection to ensure the controls continue to function to their design standard. The AM will need to be familiar with the standards, test and inspection requirements and ensure that these take place at the required frequency – and maintain the test and inspection records.

Failure of equipment, repairs and routine maintenance

Should the equipment or control fail, it must be immediately withdrawn from use, a notice attached saying 'out of order' with a brief description of the fault. The AM will need to arrange routine services and repairs by the manufacturers - or the relevant departmental service when they will need to book a maintenance appointment. For example, the mandatory 'electrical safety testing' is organised through Electronics Services.

Record keeping

The AM must keep up-to-date records of all maintenance and repairs – in a log book and folder.

Equipment decontamination

Before equipment is repaired or maintained, in some circumstances, the AM will need to decontaminate it in accordance with the College policy, and complete a decontamination certificate. This will be necessary if there is any likelihood that the equipment has been contaminated with biological materials, chemicals or radioactive substances. If the asset is required to be sent away, a decontamination certificate should accompany it and the equipment must be suitably packaged.

Meeting and supervising visiting engineers

If an engineer is to visit the laboratory or area, the AM must make arrangements for them to be met, and either supervised during the visit, or allowed to work in the area under a permit-to-work (in which case a Day One induction and possibly an area induction may be required).

Training needs

Some assets will contain hazards which have particular training requirements. For example, compressed gases and asphyxiant and cryogenic liquids, high pressure, biological substances, and use of ionising radiation (ie X-Ray generating equipment), would all require attendance at the relevant College course. The AM will need to check these requirements and arrange as necessary.

In addition to training in the use of the asset, the AM will need to ensure that the asset user undergoes an area induction, procedures training, training in the use and monitoring of any engineering controls, what could cause a failure of control, and any related emergency procedures training. For particularly high risk procedures, the AM will need to ensure the user is competent to undertake the procedures and competent in the emergency procedures, before permitting them to work unsupervised. This may take place over a given period of time and a demonstration of competency may be required. This is why it is essential that the AS & SM appoint a competent AM – they can delegate the duties but never the responsibility.

Conducting Risk assessments

It is essential to conduct, record and review risk assessments associated with the asset, associated hazards, research and support procedures. This is best done in conjunction with other group members, so that new members can learn, and the range of experiences can be included. It promotes better buy-in if controls are pragmatic and agreed upon by the group, and subsequently policed by the group.

To produce a "suitable and sufficient" risk assessment, the person conducting the risk assessment must understand the item, process or area they are assessing and its hazards and risks; they must be able to determine whether controls are effective and sufficient, and understand the limits of those controls; they must be able to determine sensible, effective emergency procedures. They must understand what and why certain statutory checks are required as well as the relevant standards these must meet and frequency of occurrence.

In addition, they must also understand and be competent to apply the principles of risk assessment.

Therefore, staff and students who conduct risk assessments must attend and pass the College Risk Assessment Foundation Training course "RAFT" and completed risk assessments must be approved and signed-off by the AS or SM.

Accident and incident reporting

It is essential that all accidents and incidents (a near miss, loss incident, failure of a control, unauthorised use etc), are reported so that lessons can be learnt, and changes made to ensure there is no repeat. Follow the department system for reports.

VII. Implementation

This Policy will be placed in the Department's central data base and onto the Department intranet site which can be accessed via the Imperial College London Chemical Engineering web page.

APPENDIX 4 Computer Health and Safety Checklist

Name of User: _____ **Location:** _____

Department/Section: _____ **Date of assessment:** _____

Average amount of time spent using computer per working day: _____

Please read these instructions before answering the checklist:

A. Before you carry out the assessment you should read through the general guidance for computer users on the Occupational health pages on the College intranet, Spectrum. Lap top users should also read the Guidance for laptops. The full list of guidance notes are at https://www.imperial.ac.uk/spectrum/occhealth/advice/computerhealthindex.htm

B. Please answer all questions. The table below each question lists the different points you need to consider first. The comments on the left hand side give suggestions on how to resolve problems. You'll find more details and diagrams in the guidance notes

C. If you are unable to correct a problem yourself, ask your local DSE Assessor for assistance. Your manager/ supervisor should know who this is or check on Spectrum at https://www.imperial.ac.uk/spectrum/occhealth/advice/computerhealthdseassessor.htm .

D. Once you have completed your assessment, pass it on to your DSE assessor.

1. Have you positioned your equipment to allow you to work comfortably?

Points to check	Solutions to try out yourself if 'No'
Chair ..... **Yes ❑ No ❑**	
Chair height set so your arms are approximately horizontal when typing. Seat tilt adjusted to support your thighs without pressure. Back adjusted to support the small of your back. Chair arms shouldn't stop you getting close to your desk. Feet able to rest on the floor – may need foot rest	See Tip A1 and B3 of Guidance notes for information on Chair **height**. See Tip B4 and B5 of Guidance Notes for information on **back support** from your chair. Remove or lower chair arms if they are in the way. A different chair may be required in some cases.
Monitor ..... **Yes ❑ No ❑**	
Should be set 'face on' to you – Set the top of screen at your eye height when seated Screen should be at least 40 cm from the desk edge	Lift or lower the screen and use swivel & tilt mechanism to achieve correct viewing angles. Place your screen on a stand or PC Base to achieve correct height if necessary See Figure 2 in guidance notes.
Keyboard ..... **Yes ❑ No ❑**	
Positioned to be directly in front of you when using it. Is there space in front to rest your hands?	Try pushing the display screen further back, to create more room for the keyboard, hands and wrists.
Mouse ..... **Yes ❑ No ❑**	
Use a mouse mat Place your mat immediately adjacent to keyboard. Is there free space to operate without stretching your arm or your cables snagging? Do you have good mouse technique?	Read through guidance note, The Mouse Trap, for tips on how to use your mouse.

2. Do you have sufficient work space to be comfortable?

Chair ..... **Yes ❑ No ❑**	
Is there room to fit and move your legs under the table?	Move obstructions from under your desk.
Desktop ..... **Yes ❑ No ❑**	
Is there sufficient desk space to place papers for reference without having to twist your body? Is there sufficient space in front of keyboard to rest hands. Other **frequently used** equipment (telephone, etc.) should be within easy reach.	See Figure 1 and 2 for diagrams on desk layout. File away or clear off your desk any unnecessary paperwork, books etc.

3. Can you read your screen easily? ..... Yes ❒ No ❒

Your Screen should have: Legible, stable characters (no flickering)…….. No distracting reflections off the screen or glare from surrounding environment …… Ability to adjust screen brightness and contrast A clean surface Adequate desk lighting	If you have distracting reflections from the screen position the screen so that it is at 90 degrees to the source of the reflection. See Tip A6 in the Guidance notes for diagrams and more information Adjust the brightness and contrast controls to give you the best picture. See Tip B8 of Guidance Notes for information. To avoid glare problems do not place your screen directly facing a bright window Avoid touching the screen surface and periodically clean it. If you feel that your eyesight is the reason for not being able to view your screen easily, we advise that you have your eyesight tested. See the 'Eligibility for eye tests' page of the guidance notes for further information.

4. Is your working environment comfortable?

Temperature, Ventilation & Humidity ....**Yes ❑ No ❑** Is the room temperature comfortable for working in? Do you get enough fresh air? Does the room humidity appear comfortable (ie. Not to dry, not to damp)	A portable fan may be required for warm environments. One or two potted houseplants may help to control low humidity, in addition to making the room seem pleasant. See Section C1 of Guidance Notes for information on temperature & humidity.
Noise .....**Yes ❑ No ❑** Are noise levels low enough not to interfere with your concentration?	Noise levels experienced at a work station should not be sufficiently high as to cause unreasonable distraction. See Tip C2 of Guidance Notes for information on noise levels.
Light .....**Yes ❑ No ❑** Is the room lighting bright enough to move around safely? Is the lighting for your desk adequate to allow you to read documents and your keyboard?	A desk lamp may be required if the lighting in the office is insufficient for the tasks you are performing. See Section C3 of Guidance Notes for information on lighting.
Layout of office area .....**Yes ❑ No ❑** Is equipment safely positioned to avoid people knocking into it?	If you find that you frequently bump into certain items they should be repositioned so this does not occur. See Section C4 of Guidance Notes for information.

5. Do you know how to use your software? ..... Yes ❒ No ❒

No, I don't.	You should discuss your training needs to your line manager/Supervisor who will be able to organise the necessary training for you.

6. Have you organised your work to avoid periods of uninterrupted use? ..... Yes ❒ No ❒

Avoid doing screen based work for longer than 1 hour without a break	Intersperse computer work with other tasks. See Tip B1and B2 in Guidance Notes for more information.

Once completed pass on your form to your DSE assessor
(see https://www.imperial.ac.uk/spectrum/occhealth/advice/computerhealthdseassessor.htm for details.

For DSE assessor use:

Actions required: _____

_____

_____

_____

_____

❒ Action Completed **Signed:** _____ **Date:** _____