Welcome to the Biology Teaching Labs.

- Please read through this booklet before you start your project.

- The labs are open between 9-6. If working outside of these hours your will need to complete an out of hours form enclosed in this booklet.

- Jen and Nikki will be the technicians on hand for any questions/help. We will be around from 9-5. Alternatively email on jen.lee@york.ac.uk and nikki.begg@york.ac.uk

- Lab coats should be worn at all times and safety specs if needed.

- The preparation/balance area should be kept clean and tidy at all times.

- Any used glassware should be placed in the tray by the sink in the lab or prep area.

- Definitely **NO** eating or drinking in the labs.

Enjoy your project.

General laboratory rules

- Dress properly and appropriately in the lab (see next section on personal protective equipment). Take all precautions to reduce the amount of any substance that you are exposed to during your work. Work efficiently to reduce the duration for which you are exposed.
- Do not embark on a new or unfamiliar procedure until you have been fully trained. Ensure that you understand what precautions are necessary for the safe conduct of any piece of work. Do not start the work if you are not satisfied with the provision of safety equipment or training. If in doubt at any stage, stop work and ask for advice.
- **Good housekeeping** is essential
- Ensure benches and floors are tidy and free of unnecessary equipment
- Work in an orderly and organised manner
- Plan your experiments so that you use the minimum amounts of all chemicals and so that you minimise your exposure at all stages
- Avoid shaking stock containers of chemicals (e.g. to remove lumps) - these can rupture, especially if old, leading to chemcial exposure
- Avoid inhalation of hazardous dusts, aerosols, gases and vapours by working in a fume cupboard wherever necessary
- Avoid ingestion of hazardous substances by mouth by ensuring that you:
  - Do not pipette by mouth
  - **Do not eat, drink or smoke**
  - Do not lick labels, chew pencils, chew your nails, etc
  - Do not store food or drink for human consumption in the laboratory or in refrigerators used for laboratory purposes
- Remove your laboratory coat and any other protective equipment, and wash your hands before leaving the laboratory
- Be conscious of the safety of cleaning and maintenance staff. Never leave chemicals or equipment in a dangerous condition
- Before you start an experiment, think about the possible consequences of something going wrong
- Make provision for spills etc before they occur
- If an accident occurs, keep calm and take any remedial action
- If necessary shout for assistance

Personal protective equipment

- **Lab. Coats:** When working with chemicals, laboratory coats should be worn and fastened at all times. They should be changed and laundered regularly. Those working alongside those using chemicals should also wear lab-coats, hence it is expected that all

people working in biochemical, microbiological and cell biological type labs will be wearing lab coats.

- **Safety Glasses** must be available for all laboratory workers and should be worn for all activities presenting a risk of eye injury, e.g. dispensing hazardous liquids, working with high pressure systems, or glassware operated under vacuum. In certain circumstances, equipment should be operated behind a protective screen or, where practicable, in a fume hood.
- **Footwear** that properly protects the foot from chemical splashes and sharp objects (i.e. closed shoes) is strongly recommended and should be worn at all times in the laboratory; open-toe shoes and sandals are not considered suitable footwear.
- **Appropriate gloves** should be worn when handling very hot, very cold, sharp or otherwise dangerous objects.

Any problems please see a technician.

A FEW SIMPLE RULES FOR THE USE OF THE AUTOCLAVES

1. All items to be autoclaved should be placed on the "non-sterile" bench in the autoclave room.

2. Please bulk together as many media items as possible-this will reduce the impact that running the autoclave multiple time for the odd item has on the environment.

3. Bottles to be autoclaved should only be half full.

4. Tops/caps should be loose. We will tighten them after they have been autoclaved.

5. Everything should be labelled with the contents and your name.

6. **AGAR** – If you wish your agar to be kept molten, Label the top "60°C" and it will be put in the oven in lab 3.

7. Only use autoclave tape to stick on bottles and bags. Use sparingly as it's EXPENSIVE.

8. Flasks should be bunged with non-absorbent cotton wool and a double layer of foil over the top.

9. If you need anything in a particular time please see a technician.

10. **WASTE:-**

a) Bottled waste should be labelled "WASTE". DO NOT put into autoclave bags.

b) Waste plates and contaminated waste should be put into autoclave bags and placed in a metal tin. These bags should not be more than half full. Do not tie the tops and do not place any other waste i.e.: paper, empty boxes, food wrappers, etc. We have cardboard recycling in lab 1.

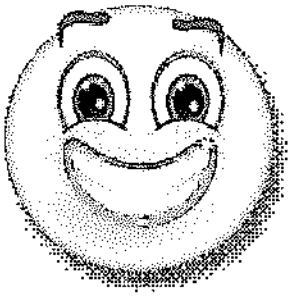
All other waste should go into the safe waste or non-hazardous waste. See a technician if you have any problems.

c) Waste after autoclaving will be placed on the sterile bench and needs to be disposed of ASAP. We dispose of plastic waste.

11. **The final autoclave run is at 12.30pm.** Sometimes later depending on lab schedules. Please ask and we'll be able to tell you if there is a later run.

12. **Please try and bulk media items together for autoclaving.**

If you have any problems or question please see a technician.
We're happy to help.



Waste Disposal

In the plant area of lab 4 there is a recycling and waste station. Please dispose of waste correctly.

Co-mingled recycling bin:
Uncontaminated waste paper, eppendorf bags
Card
Cans
Plastic bottles
Rinsed out, empty plastic chemical containers (blank out hazard labels)

Safe waste bins (thin black bags):
Paper towels
Plastic packaging

Non-hazardous waste (thick black bags):
Everything **except**: for waste that's been autoclaved, Syringes, Waste agar plates that have not had cultures on.

Autoclave bags:
Waste infected with hazardous micro-organisms eg: from microbiology and cell culture work.

Broken glass bins (red bins):
Clean, uncontaminated glass.

Sharps bin:
Sharps
Contaminated glass slides
Cocktail sticks

Please try and dispose of your waste in the correct way. Any questions please ask.

LABORATORY WASTE DISPOSAL
Summary of key segregation and disposal practices

Waste Disposal Route/Container	Typical Contents	Notes
 **Non-Hazardous Lab. Waste (incl: general waste & non-hazardous lab consumable waste items)**	**General Waste Items:** • Paper (can also be recycled) • Card (can also be recycled) • Packaging from laboratory consumables and equipment • Uncontaminated paper towels / tissues **Non-Hazardous Lab. Consumable Waste Items** • Uncontaminated gloves and gloves contaminated with residual chemicals only • Empty plastic chemical containers (rinsed out & labels removed — can also be recycled) • Uncontaminated pipettes and pipette tips ◊ **only** from labs not handling hazardous bio-agents incl: GM ◊ may be contaminated with residual chemicals e.g. buffers containing chemicals at non-hazardous levels*) • Weigh boats • Centrifuge tubes / fraction collection tubes • Petri dishes (unused plastic dishes **not** containing agar) • Micro-titre plates • NOT syringes	• Label bins **'Non-Hazardous Lab. Waste Only'** • Use thick gauge black bags only and secure full bags with bag ties • Do not overfill bags — replace when approx. ¾ full / ~5kg • Labels, black bin bags, bag ties and black bins available from Biology Supplies • Paper and card should be put in the recycling bins provided • Items contaminated with residual chemical can be disposed of as 'non-hazardous waste' if they do not contain hazardous concs. of chemicals. Specifically, the concentration of each residual chemical in the total weight of each waste item (i.e. % wt / wt) must be below relevant hazardous waste threshold levels*. In reality most items contaminated with residual chemical should be OK to dispose of in 'Non-Hazardous Lab. Waste' bags. • Items contaminated with biological agents must not be disposed of via the 'non-hazardous lab waste' bags. • Full bags to be secured with a cable tie and left for collection by cleaners. • Labs handling GM/hazardous biological agents should dispose of both contaminated and uncontaminated pipettes / pipette tips in the autoclave bags to avoid accidental disposal in general waste stream. • Labs not handling GM / hazardous biological agents can dispose of pipettes / pipette tips in the 'Non-Hazardous Lab. Waste' bags. • To minimise chances of bags splitting it is recommended that before disposal in to 'Non-Hazardous Lab. Waste' bags both: ◊ pipette tips are disposed of in plastic disposal jars (available from Biology Supplies) ◊ pipettes are contained in a primary bag
 **Autoclave Bags (hazardous biological waste)**	• Waste contaminated with all GM microorganisms (Class 1 GMMs or above) • Waste contaminated with Hazard Groups 1 – 3 microorganisms • GM soil and plant material • Imported soil from outside EU • Tissue culture contaminated waste • Uncontaminated and bio-contaminated pipette tips / pipettes from labs handling hazardous bio-agents incl: GM	• Use double bags to reduce chances of bags being punctured • Waste must be treated by validated autoclave cycle • All bins used to hold autoclave waste bags to be labelled **'Autoclave Waste Only'** (labels available from Biology Supplies) • Autoclaved (inactivated) waste must be disposed of via the **'offensive waste' (tiger bag)** disposal route (apart from autoclaved waste from CL3 labs containing HG3 organisms which is sent for incineration in yellow clinical waste bags) • Solid plastic bins must only be used to hold autoclave bags if the waste is: ◊ GM plant & soil material ◊ from CL1 labs. handling non-pathogenic organisms • Recommended that pipette tips are disposed of in plastic disposal jars (available from Biology Supplies) before disposal in to bags when full.
 **'Offensive Waste' / 'Tiger Bag' Waste'**	• Autoclaved waste (apart from autoclaved waste from CL3 labs containing HG 3 organisms) • Uncontaminated animal bedding • Syringes	• Bags and bag ties are available from Biology Supplies • Secure full bags with bag ties • Do not overfill bags — replace when approx. ¾ full / ~5kg • Take waste bags to Biology Supplies for disposal in the waste collection bins ('LX' waste bins (for non-hazardous lab. waste, EWC 180104))
 **Yellow 'Clinical Waste' / Incineration Bags**	• Human / animal tissue (anatomical waste) • Blood and other bodily fluids (contained in a primary container to prevent leakage) • Autoclaved waste from CL3 labs • Syringes	• Bags and bag ties are available from Biology Supplies • Do not overfill bags — replace when approx. ¾ full / ~5kg • Use solid plastic yellow incineration bin (see below) for materials that may puncture bags or leak from bags • Bags to be taken to Biology Supplies for disposal in the waste collection bins ◊ 'LX' waste bins (for non-hazardous lab. waste, EWC Code 180104) ◊ 'LI' waste bins (for infectious lab. waste, EWC Code 180103) ◊ 'VA' waste bins (for infectious and non infectious animal waste, EWC code 180202)
 **Yellow 'Clinical Waste'/ Incineration Bins**	• Pipettes & pipette tips contaminated with hazardous concs. of chemicals • Sample collection tubes contaminated with hazardous concs. of chemicals* • EtBr waste material • Human / animal tissue (anatomical waste) • Blood and other bodily fluids • Materials (e.g. paper tissue / absorbent pads used for chemical spills) contaminated with hazardous concs. of chemicals	• Bins to be taken to Biology Supplies for disposal in the waste collection bins ◊ 'LX' waste bins (for non-hazardous lab. waste, EWC Code 180104) ◊ 'LI' waste bins (for infectious lab. waste, EWC Code 180103) ◊ 'VA' waste bins (for infectious and non infectious animal waste, EWC code 180202) • Do not overfill bins — replace when approx. ¾ full / ~5kg
 **Sharps Bins**	• Needles (+ syringes if syringe + needle combination used) • Glass slides & cover slips • Scalpels / knives • Glass Pasteur pipettes • Cocktail sticks • Pipettes & pipette tips contaminated with hazardous concs. of chemicals* • Small glass vials and ampoules	• Never re-sheath needles or detach from syringe before disposal • All Hazard Group 3 organisms must be inactivated before disposal • Sharp material that is suspected of being infected should be rendered safe by autoclaving before incineration by contractors. If not, infected sharp material must be classed as 'infectious lab. waste' ('LI' waste, EWC Code 180103). • Bins to be taken to Biology Supplies for disposal in the waste collection bins ◊ 'LX' waste bins (for uncontaminated sharps, EWC Code 180104) ◊ 'LI' waste bins (for infectious sharps, EWC Code 180103)
 **Red Bins**	• Uncontaminated Broken Glass	• Bins emptied in to large glass recycling bins located in Biology Supplies compound area • Broken glass contaminated with hazardous biological material must be autoclaved before disposal • Broken glass contaminated with hazardous chemicals must be disposed of in a sharps bin
 **Sink (Sewer)**	• Biological agents: ◊ inactivated wild-type biological agents (Hazard Groups 1 & 2 and above) ◊ inactivated GMM organisms (Class 1 or 2 organisms and above) • Chemicals: solutions from experiments containing residual/ low levels of organic or water soluble chemicals • Small amounts (<100g) of hazard level 1 & 2 chemicals	• Organisms MUST be inactivated by validated autoclave or disinfectant protocol before disposal down the sink • All liquid cultures of Hazard Group 3 organisms must be autoclaved (as opposed to disinfectant treatment only) before disposal down the sink • Residual / low levels of organic or water soluble chemicals must be flushed down with plenty of water • However, there are certain chemicals which MUST NEVER be disposed of through the sewerage system**
 **Hazardous Stock Chemicals/Solvents**	• Old / unwanted stock chemicals • Water miscible solvents (e.g. acetone, acetonitrile, ammonia, ethanol, methanol) • Halogenated (e.g. chloroform) • Ethereal (e.g. diethyl ether) • Hydrocarbon (e.g. xylene, toluene, hexane, pentane)	• Dispose of through the chemical disposal route via Biology Supplies. A chemical waste Internal Transfer Note form (available for download from the Forms and Documents section of the Biology Safety website) will need to be completed • Dipose of all old / unwanted chemical stocks. Group leaders are responsible for organising disposal of chemical stocks from their laboratories before leaving the Department • Waste solvents to be collected in **labelled, plastic coated glass bottles.**

*Chemical Waste Threshold Levels

Some hazardous chemicals have threshold levels, below which they can be classified as non-hazardous (these are called 'mirror entry wastes', i.e. depending on the concentration they can be either hazardous or non-hazardous). To determine whether a 'mirror entry' waste is hazardous the chemical composition of the waste and the hazardous properties of the chemicals must be identified. It must be determined if the concentration of these chemicals are sufficient to render the waste hazardous. **Threshold values are given as percentage of weight for weight i.e. the percent by weight of the hazardous component in the total weight of the waste item.**

LABORATORY CONSUMABLES CONTAMINATED WITH RESIDUAL CHEMICALS (E.G. MICRO-TUBES) CAN BE DISPOSED OF IN THE 'OFFENSIVE WASTE' BAGS PROVIDED THE WEIGHT OF THE HAZARDOUS COMPONENT(S) IN THE TOTAL WEIGHT OF THE WASTE ITEM IS BELOW THE FOLLOWING RELEVANT THRESHOLD LEVELS:

- **HARMFUL:** the conc. of a harmful substance must be **<25%** for it to be classed as non-hazardous
- **IRRITANT:** the conc. of a irritant substance must be **<20%** (R36, R37, R38) or **<10%** (R41) for it to be classed as non-hazardous
- **CORROSIVE:** the conc. of a corrosive substance must be **<5%** (R34) or **<1%** (R35) for it to be classed as non-hazardous
- **TOXIC:** the conc. of a toxic substance must be **<3%** for it to be classed as non-hazardous
- **VERY TOXIC:** the conc. of a very toxic substance must be **<0.1%** for it to be classed as non-hazardous
- **Cat. 1 & 2 Carcinogens & Mutagens:** the conc. of Cat. 1 & 2 Carcinogens & Mutagens must be **<0.1%** to be classed as non-hazardous
- **Cat. 3 Carcinogens & Mutagens:** the conc. of Cat. 3 Carcinogens & Mutagens must be **<1%** to be classed as non-hazardous
- **Cat. 1 & 2 Toxic for Reproduction (Teratogens):** the conc. of substances toxic for reproduction (Cat. 1 & 2) must be **<0.5%** to be classed as non-hazardous
- **Cat. 3 Toxic for Reproduction (Teratogens):** the conc. of substances toxic for reproduction (Cat. 3) must be **<5%** to be classed as non-hazardous
- **ECOTOXIC:** the conc. of ecotoxic subs must be **<25%** (R50, R52,R53); **<25%** (R52 & R53); **<2.5%** R51 & R53); **<0.25%** (R50 & R53); 0.1% (R59) to be classed as non-hazardous
- **EXPLOSIVES:** explosives do not have a threshold level (i.e. automatically classified as hazardous) unless:
  - ◊ the waste has been modified to the extent that it is not explosive & / or
  - ◊ the waste is not more explosive than dinitrobenzene

****Waste contaminated with the following should never be disposed of through the sewerage system:**

Antimony (*10mg/l)	Chloroform	Hexachlorobenzene	Pentachlorophenol and compounds	Trichloroethylene
Arsenic (*10mg/l)	Chromium (*10mg/l)	Hexachlorobutadiene	Petrol Selenium (*10mg/l)	Trifluralin
Aldrin	Copper (*10mg/l)	Lead (*10mg/l)	Petroleum spirit	Triphenyl-tin compounds
Atrazine	DDT1,2-Dichloroethane	Malathion	Silver (*10mg/l)	Vanadium (*10mg/l)
Azinphos-ethyl	Dichlorvos	Mercury and compounds	Simazine	Zinc (*10mg/l)
Azinphos-methyl	Dioxins	Nickel (*10mg/l)	Tetrachloroethylene	
Beryllium (*10mg/l)	Drins (aldrin, dieldrin, endrin)	Organo-halogen compounds	Tin (*10mg/l)	
Cadmium and compounds	Endosulfan	Parathion	Tributyl-tin compounds	
Calcium carbide	Fenitrothion	Parathion-methyl	Trichlorobenzene	
Carbon disulphide	Fenthion	PCBs (polychlorinated biphenyls)	Trichloroethane	
Carbon tetrachloride	HCH (gamma hexachlorocyclohexane)			

* At point of discharge to the public sewer

University of York
Department of Biology

Permission for Undergraduate Students to Work Outside of 'Normal Working Hours'

Out of hours periods can typically be defined as any time outside 8.00 – 18.00 weekdays, and any time at weekends

Workers safety must always be carefully considered, especially for work activities taking place outside normal hours when other colleagues are unlikely to be present to assist in an emergency. Such emergencies may arise due to fire, accidents and unauthorised intruders.

Student's Name: _____
User name: _____

Project Director: _____

Location of Proposed Work:
e.g. Biology Teaching Lab. no. / Project Director's Lab. wing + floor (e.g. D1):

_____

Brief Description of Proposed Work Activity:

Describe any restrictions on 'out of hours' working that have been agreed with your Project Supervisor e.g. no weekend work, specific times:

Start date for out of hours working:

End date for out of hours working:

Declaration:

Student:

- I have discussed 'out of hours' working with my Supervisor and agree to limit work to inherently low risk activities
- I understand the need to be accompanied by another responsible adult for out of hours work who must also be familiar with necessary safety precautions

Signed..... Date.....

Project Director:

- I am satisfied that this student is competent to work alone and is familiar with all relevant health & safety requirements. These activities involve clearly defined procedures presenting a low and acceptable level of risk .

Signed..... Date.....

Please present this completed form at Biology Reception to arrange changes to your swipe card access arrangements for the period requested above. It would be helpful if Biology Reception is given at least 24 hours notice to avoid last minute problems.

Out of Hours FAQs

Q. When am I allowed to work out of hours on my project?

A: If you need to take samples which involves the weekend, e.g. every two days; or if you have organisms/cells which require maintenance or change of conditions at the weekend. Another situation may involve a particularly long experiment which cannot be completed during a normal working day. Then you can stay later in the evening to finish the work.

Q. When should I apply for permission for out of hours working?

A: If you know you need to work out of hours, arrange it as early as possible.
A notice period of at least 24 hours is desirable.

Q. How do I go about obtaining permission?

A: Talk to your project director about what you need to do. Then, download and print a copy of the 'Out of Hours Form' for Undergraduates. Complete it ensuring your project director has signed it. Take it to Biology Reception who will arrange for your swipe card to be modified temporarily for the period of permission.

Q. Can I obtain out of hours permission if I am just late starting an experiment which could be done in a normal day?

A: No; out of hours is for exceptional circumstances and not there as a regular option for compensating for when you want to stay in bed a bit longer! However, things do go wrong with experiments and they take longer than you planned. If you are having difficulty, then it is possible to asking for some time.

Q. What safety precautions do I need in place to work out of hours?

A. You need to be accompanied in the lab by another responsible adult preferably someone who is familiar with the situation. Ensure you are aware of all relevant safety precautions / local rules before you start your work.

ACCIDENT & INCIDENT REPORTING

Accidents

- Accidents are unplanned events which cause harm (illness or injury) or damage to, or loss of, property.
- If you have an accident it is your responsibility to report the nature of the accident using the **on-line accident / incident report form**.
- A copy of the form will automatically be sent to:
  - The Departmental H & S Advisor
  - Biology Infrastructure
  - University H & S Department

Notification of the accident will also be sent to the **Line Manager/Supervisior** of the person involved in the accident to ensure they are aware of the accident, and are able to take appropriate and timely action to minimise similar accidents occurring in the future.

- If for any reason you are unable to use the on-line accident report form:
  - a hard copy of the accident report form is available from Biology Reception, or
  - the **accident report form** can be downloaded

  These must be signed off by the Line Manager before sending to Biology's 'Infrastructure Office', Area 4 for further distribution.

- The purpose of reporting all accidents is to see if there is anyway that the Department or the University can learn from the accident and try and avoid it happening again. It is not system designed to proportion blame. Don't be reluctant to fill it in because you feel the accident is minor and maybe due to your own carelessness.

Incidents

- Incidents are events which could have caused harm but they did not do so i.e. near misses.
- For example, you drop a large instrument and it hits the floor but not your foot; you fall off a stool but manage to break your fall by your brilliant athletic prowess, even though you could have hurt yourself. In such cases we need to know what happened, not to blame you, but to think how we might avoid an accident next time.
- The **on-line accident report form** should also be used to report all incidents, as described above.

If while working in Teaching you have an accident or incident please find a technician and a list of first aiders is by every first aid box.