

Laboratory Good Practice Guide



1.0 Purpose & Scope

This guide aims to instruct good practice within laboratory spaces of Birkbeck College, and pertains to all staff and students operating in such spaces. It has been divided into 7 relevant areas which cover procurement, inductions and departures, cold storage management, chemical and sample management, equipment utilisation, design and refurbishment, and waste.

2.0 Inductions and Departures

- Inductions: All staff and students utilising spaces for work should be inducted for good-practice alongside health and safety inductions. Such inductions should include basic good-practice measures such as closing fume cupboard sashes, appropriate waste management (bin colours and recycling options), responsibility lines for turning off equipment and lights, and rules surrounding labelling and ordering. Below are 5 critical points to include, and may be incorporated into H&S inductions for seamless integration.
 - Ensure fume cupboard sashes are lowered when not present. Put fume cupboards 'low-flow' mode at the end of the day unless otherwise required for added ventilation. Note low-flow modes still are sufficient for overnight ventilation if the sash is kept closed.
 - Ensure freezers + fridges are well closed and no frost has compromised the seals.
 - Turn off all lights and equipment at the end of the day (unless required for overnight reactions). Consider timers for equipment that is needed 'warmed up' at the start of the following working day.

-Use only necessary temperatures for equipment – don't put fridges and freezers colder unless required, and use ovens and drying cabinets at appropriate temperatures.

-Dispose of chemicals in an appropriate fashion – Discuss with local management what practices are appropriate.

- **Permanent Departures:** All departing staff and students who either have remaining samples or have purchased chemicals should fill-out an exit-policy for keeping with lab management. This document should include contact details and accompany the return of borrowed items (keys, lab coats). Such policies remove liability for disposal samples and aid in the organisation of remaining chemicals.
- **Daily Departures:** As staff and students exit the laboratories on a daily basis, several simple points should be affixed on the doors as polite prompts. They should include only relevant material to exiting the laboratory such as powering down equipment (or ensuring some are left on if necessary), closing fume cupboard sashes, turning off lighting, and ensuring no fridges/freezers are open.

3.0 Cold Storage Management

3.1 Liquid Nitrogen Storage Containers

- Minimise access times to containers
- Keep sample locations easily mapped on the lid of the vessel or nearby.
- Keep most accessed samples at the top of the racking to avoid exposing other samples to warmer temperatures and reduce LN2 boil off.
- Check lid seals to ensure they are not compromised regularly.

3.2 Purchasing tips

- Avoid purchase of domestic units for research spaces.
- Avoid purchase of mixed fridge-freezer units as they will have a lesser efficiency than separate units. Avoid the stacking of fridges on top of freezers.
- Note that larger models of fridges/freezers are typically more efficient in their utilisation of energy and space, and long-term requirements should be considered. For e.g. one 700+ litre ULT freezer will utilise less floor space and energy than two 350L models. Also avoid over-utilisation of under-bench fridges and freezers, which will reduce space afforded for other equipment and seating. Consider sharing a freezer before purchasing if space is available.
- Question efficiency ratings and seek secondary data sources for energy consumption where possible. Currently research grade cold storage equipment is not regulated for efficiency and manufacturers will utilise varying testing conditions to evidence efficiency.

3.3 Maintenance and Operation

- Ensure filters of ULT freezers are regularly cleaned (every 6-9 months).
- Avoid the blocking of heat exchange at the rear of cold storage units. Ensure air can freely pass to maintain efficient operation of the freezer.
- Standardise operating temperatures – Fridges typically should maintain 4°C, freezers maintain -20 °C, and ULT freezers operate at -70 °C. Note some users will prefer -80 °C for ULT freezers, though this discretionary. Operating at -70 °C will reduce energy consumption 25-30%, increase equipment lifespan, reduce excess heating, and was the standard storage temperature before manufacturers pushed temperatures down.
- Ensure freezers, particularly ULT freezers, are regularly defrosted. While whole-freezer defrosts require decant space and should only be conducted when freezers lose space, doors and seals should be scraped at least every 6 months.

3.4 Facilities

- Facilities housing cold storage devices, particularly ULT freezers, should consider the increased heat load. ULT freezers optimally operate between 12-22 °C, and temperatures should not exceed 25 °C.
- Facilities which contain only cold storage devices should utilise passive cooling first, with mechanical cooling as backup.
- Dehumidifiers in ULT freezer facilities will decrease frost build-up in areas where doors are frequently opened.

3.5 Alarming and Risk Assessment

- Ensure all ULT freezers have functional secondary alarm systems (beyond local door alarms). Also ensure that responses to any such alarms are appropriate.
- Any freezers with valuable materials should also possess secondary alarming.
- Secondary temperature mapping is recommended for any devices containing valuable materials – outside temperature displays are not always accurate as probes will vary on location.
- Perform a risk assessment for all cold storage devices – should one ULT freezer break down, will it require decant space and if so where? One backup can serve many freezers. Ensure security and after-hours staff are aware of such procedures.
- Post call-out numbers and details on how to react during a failure – for e.g. do not open freezer doors unless necessary.

4.0 Chemical and Sample Management

4.1 Chemical Management

- All chemicals ordered and present should be listed and accessible to all users, bar sensitive materials.
- A central chemical list should be consulted prior to ordering new unless there exists notable concern for contamination.

4.2 Long-term Samples

- All samples deemed long-term should possess clear labelling including ownership, date of storage, and any necessary relevant data.
- Ensure samples are stored at appropriate temperatures. For e.g. long-term cell lines may require liquid nitrogen storage as opposed to freezers, but DNA is stable at -20 °C.
- All samples stored should have records to indicate proprietorship and what studies they are associated with. This may be facilitated by a staff exit-policy. Such practice permits lab managers to store only what's necessary and avoid over purchasing of fridges and freezers. It also ensures consideration is given to storage requirements and removes liability from lab management.

5.0 Equipment Utilisation

- Label equipment at the socket level for improved ease of turning on/off at the socket.
- Shared equipment in high demand should utilise a booking system (pen and paper will suffice).
- Ensure users are appropriately trained on any equipment they are to utilise.
- Equipment which requires 'warm-up' times such as water baths, drying cabinets/ovens, and similar equipment types used regularly should be considered for timers. Note that set times for timers should include possible weekends, and should be set as to ensure they are on whenever users may require them. This will avoid users removing the timer and not reapplying. Also note that users should still be encouraged to turn off at the socket/controls.
- Ensure heating/cooling equipment is shut when not in use, such as chilled centrifuges (unless to dry out condensed water), fridges/freezers, ovens, etc..

6.0 Laboratory Design and Refurbishments

Lighting

All lighting should be installed on a sensor basis with LED systems preferred. Note sensors within laboratory spaces should have hours of which they are off sensor mode (for e.g. between 8am – 7pm) to avoid turning off with staff still present in the laboratory.

Fume cupboards and local ventilation

All retrofits and new installs should be in adherence with Birkbeck's Research Ventilation Policy.

Passive Cooling Options

In rooms containing only freezers, servers, or similar equipment which has significant heat loads and doesn't include bench space or fume cupboards, consider passive cooling options as alternatives to sustained air-conditioning. Air-conditioning may still be installed as a fail-safe for particularly hot days, but should only be triggered at certain pre-set temperatures. Large freezer rooms in the UK will typically not require supplemental cooling more than 20-50 days a year.

Environmentally Controlled Rooms

Consider the necessity of refurbishing or constructing new cold rooms (4 °C or -20 °C). Instead, the same space may be fitted with fit with fridges/freezers depending on necessity. Note most equipment requiring cooled environments may be fitted into fit-for-purpose fridges. This will reduce the risk of decanting entire cold rooms, and reduce repair fees as cold rooms are notoriously unreliable. Furthermore the cold rooms invite disorganisation and frequently become temporary storage points. Note if converting an old cold-room to being fitted with fridges/freezers; ensure there is appropriate ventilation for the space not to overheat.

7.0 Waste, Recycling, and Disposal (include equipment disposal/donation)

- Ensure all sharps are disposed of within sharp bins, but also ensure sharp bins are not utilised for all glass disposal. Winchester and unbroken glass may be recycled. Ensure any glass for recycling is actually glass – many beakers for e.g. will be made from pyrene.
- Uncontaminated plastics may be recycled. Consult with local lab management as to where the appropriate receptacles are located. Note plastic types (1-7), and consult which may be recycled through current waste services supplier.
- All paper and cardboard should be recycled unless contaminated.
- Batteries may be disposed of locally and should not be disposed of elsewhere. Contact the maintenance team for deposits.
- Polystyrene boxes typically are not recyclable, though may be reused

Record of Amendments

Version	Section	Amendment	Current Version
1.0			