Standard Operating Procedure:

(All users of the MS facility will need to confirm that they have read and agree to the mass spectrometry facility risk assessment and the Standard Operating Procedures before they are allowed to use any instrument within the facility)

Operation of mass spectrometry instruments in lab B121, during Covid-19 period.

Scope & Applicability	
Scope:	This SOP is specific to lab B121 and provides instructions to MS facility staff on management of routine MS analysis and instrument operation by trained users, during reopening after the Covid-19 lockdown easing period. This SOP will include detailed instructions on: - How trained users should perform routine low-resolution MS analysis. - How to arrange use of mass spec instrumentation by trained users. - Disinfection procedures between trained users. - Instrument maintenance and troubleshooting
Applicability:	This SOP is for use by MS facility staff only, but also gives instructions to relevant trained users.

Methodology & Procedures

Due to the dimensions of lab **B121**, the maximum occupancy at any one time (compliant with the 2m social distancing rules where it is possible, 1m+ meter will be followed when it is not possible) is **4 person**.

Therefore, to prevent maximum occupancy being exceeded, a booking system will be introduced to the routine procedures for: high resolution MS analysis on the Compact; and MALDI analysis on the Autoflex speed and Ultraflex extreme. Existing booking systems for some instruments will also be modified to accommodate the changes.

The OpenAccess system may return for routine MS analysis on 6130B and GC-MS by trained users, to accommodate the increase in number of students & researchers from the start of term. Each trained user will need to adhere to social distancing rules & PPE.

In addition, to reduce the risk of exposure between occupants, ample time must be given between trained users & MS facility staff. Enough time must also be allowed for surface disinfection after instrument operation, and the surface disinfection procedure must also be thorough. This will be covered by the new and modified booking systems.

Facilities for hand washing/sanitising will also be provided for each lab in the form of hand sanitiser dispensers (availability pending).

The considerations listed above will also have implications for instrument maintenance and troubleshooting instrument issues.

To adhere to the considerations listed above, procedures have been written up for the following:

- Routine low resolution MS analysis
- Arranging instrument (Compact and MALDIs) operation with trained users
- Disinfection
- Instrument maintenance and troubleshooting

Routine low-resolution MS analysis

Instrument used for routine low-resolution MS analysis specific to lab B121:

- Agilent 6130B LC-MS
- Agilent 5977B GC-MS

Originally, routine low-resolution MS analysis was performed by trained users themselves through open access. During the Covid-19 lockdown easing period this changed to MS facility staff performing all analyses at the request of trained users.

However due to the increased number of students & researchers from the start of term, an OpenAccess system for fully trained users will be reintroduced, with modifications to limit the frequency that trained users visit the MS lab.

PLEASE NOTE:

- Trained users can make a **MAXIMUM two trips to B121 per day**; for example, one to submit samples & one to view data.
- It is strongly encouraged that a research group nominates 1-2 people from each shift to submit all of the groups' samples on the instrument at the same time.

1. Samples requiring routine LR-MS analysis should be grouped together in batches and comply with the preparation guidelines (can be found on the LR-MS analysis form).
2. The maximum number of samples within one batch can be submitted is increased to 10.
3. Each user can submit one batch of samples per day, and can make a second trip to the lab to view result.
4. Before leaving your lab, please put your face covering on, bring your own lab coat and remember to take your own safety goggles.
5. Once outside B121, check how many people are inside, the maximum occupancy rate of this lab is 4. If there are 4 people already in the lab, please wait outside until someone leaves the lab.
6. After entering lab B121, please put on a new pair of gloves (and safety goggles if you forget to bring your own), Once inside the lab, please also put a lab coat on. Please keep your face covering ON at all times and maintain minimum 2 meters away from others.
7. Then you may submit samples/review data.
8. Once finished, please dispose of gloves in a solid waste bin in the lab (& if you borrowed a pair of safety goggles, drop these off in the provided container inside the lab) before leaving the lab.

Arranging instrument operation with trained users

Instruments to be used by trained users, specific to lab B121:

- Bruker Autoflex speed MALDI-TOF/TOF
- Bruker Ultraflex extreme MALDI-TOF/TOF
- Bruker Compact QToF MS

1. The trained user should discuss the intention for instrument use with a member of MS facility staff through email. Discussion should include:
    - **i.** Reason for use.
    - **ii.** Type of and number of samples (including all types of standards).
    - **iii.** Instrument conditions required (mobile phase/column/mobile phase cycle/etc.).
    - **iv.** Reminder of the Coronavirus guidance & Health and safety guidance on COVID-19, in particular Personal Hygiene & Hand Washing.
    - **v.** Reminder of PPE usage upon lab entry (including disposable gloves, will be provided outside of the lab B121).
    - **vi.** The usage of face covering
    - **vii.** Outline of social distancing & disinfection measures put in place.
    - **viii.** Guidance on how to inform MS staff of instrument issues.
    - **ix.** Referral to risk assessment for MS facility.
2. If Approval given, move on to step 3. (If approval declined, further discussion may be required).

3. Instrument booking will be made by MS facility staff. The booking time should cover instrument set-up, the total predicted run-time, and finishing time (removal of samples and waste etc.).
4. MS facility staff should consider the following before approval:
    i. Is there conflict with an approved booking for another instrument in the same lab?
    - If so, decline the new booking, and rearrange a new time with the user.
    ii. Is there conflict with an approval-pending booking for another instrument in the same lab?
    - If so, discuss priority with relevant users. If priority perceived to be equal, then decision may need to revert to a first-come-first-serve system.
    iii. Is there conflict with disinfection procedures for instruments in other labs?
    - If so, discuss modifying the booking time with the user.
5. When MS staff approve a new booking request (the user will automatically be informed upon approval):
    i. Timeslots 1hr before and after the booking should be blocked by MS staff (to allow for the disinfection procedure).
    ii. Corresponding timeslots for **other** instruments in the **same lab** must also be blocked by MS staff (to prevent bookings on those instruments, and to allow for the disinfection procedure).
6. On the day of the booking, MS staff should:
    i. Follow the Disinfection Procedure at least 1 hour before and 1 hour after operation by the trained user.
    ii. Check that the instrument is in good running order during these times.

Disinfection Procedure

High-frequency touch point/areas around the instrument should be disinfected, in order to reduce the risk of cross-contamination between users.

1. Instruments & areas around the instrument should be disinfected at the following times:
    i. 1 hour before use.
    ii. 1 hour after use.
    iii. At the end of the working day.
2. Before entry to the lab, MS staff must:
    i. Make sure that the lab has no more than the maximum allowed occupants (by referring to the online booking form, and physical check).
    ii. Disinfect the door handle & key card points with 70% IPA.
    iii. Wash hands with hand sanitiser and then enter the lab.
    iv. Dispose of the tissue upon lab entry.
3. Upon lab entry MS staff must wear PPE and comply with social distancing measures.
4. High-touch point areas around the relevant instrument should be disinfected, including:
    i. Benchtops
    ii. Chairs (plastic backs & arms).
    iii. PC: keyboard; monitor; mouse; desk; stationery left in the area.
    iv. Instrument: buttons; MALDI target carrier; syringes for sample introduction through direct infusion; auto-sampler drawers; mobile phase bottles & lines; column covers; waste containers. MALDI and compact sample preparation should be done before coming to B121.
5. Disinfection methods should be different for electronics vs surfaces:
    i. Electronics (instrument PC & instrument itself):
        i. Spray a tissue with 70% IPA.
        ii. Thoroughly wipe down one component and dispose of the tissue.
        iii. Use a fresh tissue between components to prevent cross-contamination (e.g monitor/keyboard/mouse, mobile phase bottles & lines/autosampler drawers/covers).
    ii. Surfaces (benchtops/desks/chairs, not close to electrical equipment):
        i. Spray a tissue with 70% IPA (or Virkon or Screen Disinfectant cleaner for Benchtops).
        ii. Wipe the surface down and dispose of the tissue.
        iii. Use a new tissue between surfaces.

6. MS staff should then check that the instrument is operating correctly.
7. When leaving the lab MS staff should follow steps **2.ii. → 2.iv.**

Instrument maintenance:

Operating issues may arise at any time during instrument use, either delaying operation or leading to system crash. The issue will need to be resolved while observing social distancing measures. If the operating issue occurs while the trained user is occupying the lab, the following steps may be advisable:

1. If possible, the user should pause or stop the run.
2. User should disinfect the area, leave the lab and inform MS staff of the issue via email or the telephone number listed on the front of the lab door.

Once aware of the issue MS staff should then:

3. Wait ~1hr before going into the lab if it is safe to do so.
4. Adjust the online booking form to reflect the delay and inform the next user of the delay.
5. Disinfect the area before fixing the issue (following the Disinfect Procedure).
6. Resolve the issue if possible. If not possible, inform the user, arrange a new booking time, and inform the next user that there may be a delay.
7. Restart/resume the run & inform the current and the following user.

Health and Safety

General Health and Safety:

The following PPE is required at all times in any MS facility lab:

- Lab coat (red lab coats available for non-MS staff)
- Goggles
- Gloves
- Face covering

Coronavirus Guidance:

In addition to the above PPE, individuals are also required to wear face coverings according to university guidelines: https://warwick.ac.uk/coronavirus/safety/social-distancing/face-coverings

Additional health and safety measures should also be consulted and followed. These can be referred to via:

- Coronavirus guidance
- Health and safety guidance on COVID-19

Equipment & Supplies

Generic health and safety equipment & supplies:

- Hand Sanitiser
- Virkon or Screen Disinfectant cleaner (Recommended by the university for wiping down benchtops Cleaning Procedures)
- 70% IPA (Refers to the IPA formulation recommended by the university for wiping down surfaces (Coronavirus FAQ, Cleaning Procedures))
- Tissues

Personal Protective Equipment:

- Lab Coat (red lab coats available for non-MS staff)
- Goggles
- Gloves
- Face covering

Instruments specific to lab B121:

- Agilent 6130B LC-MS
- Agilent 5977B GC-MS
- Bruker Compact QToF MS
- Bruker Autoflex speed MALDI-TOF MS
- Bruker Ultraflex extreme MALDI-TOF MS

Definitions	
Trained User/User:	Used interchangeably & refer to the individual (not part of the MS facility staff), who is trained on the operation of the instrument in question.
MS:	Abbreviation of “Mass Spectrometry”
LR-MS:	Abbreviation of “Low resolution-mass spectrometry”
LC-MS:	Abbreviation of “Liquid chromatography-mass spectrometry”
GC-MS:	Abbreviation of “Gas chromatography-mass spectrometry”
MALDI:	Abbreviation of “Matrix Assisted Laser Desorption Ionisation” (in this document, “MALDI” may be used in place of “MALDI-TOF”)
PPE:	Personal Protective Equipment
Virkon or Screen Disinfectant	Refers to the recommended formulations for wiping down benchtops (Cleaning Procedures)
70% IPA:	Refers to the IPA formulation recommended by the university for wiping down surfaces (Coronavirus FAQ, Cleaning Procedures)

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