





Future Industries Institute:

Mass Spectrometry and Proteomics Facility

Information Handbook

A collection of open access instruments co-funded by UniSA, Government of South Australia, and Bioplatforms Australia







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1 Introduction

Bioplatforms Australia enables Australian life science research by investing in state-of-the-art infrastructure and associated expertise in the specialist fields of genomics, proteomics, metabolomics and bioinformatics. Bioplatforms' proteomics partners offer leading edge infrastructure, expertise and advanced protein discovery services. A broad range of services are offered including mass spectrometry, monoclonal antibody production and drug screening.

<u>Vision:</u>

Bioplatforms Australia will foster the capacity and capabilities of the Australian life sciences sector to boost its contribution to Australia's health, environmental, economic and social wellbeing.

Mission:

Bioplatforms Australia will support world class research and innovation in the life sciences by:

- ensuring broad and efficient access to state-of-the-art biomolecular ('omic) platform capabilities;
- facilitating greater multi-disciplinary integration in basic and translational bioscience;
- contributing to research collaborations that address scientific challenges of national significance;
- supporting industrial applications of biomolecular technology and scientific collaborations between researchers and industry;
- expanding international research networks; and
- sustaining a national intellectual capability and capacity.

2 Mass Spectrometry and Proteomics (MSP) at the Future Industries Institute

<u>Mission:</u>

MSP provides expertise for biological Mass Spectrometry imaging and tissue proteomics analyses. We set the benchmark for global best practice in the preparation, analysis and reporting of results. We undertake both fundamental and applied research to achieve tangible outcomes, which can be provided to industrial partners with the highest scientific standards of transparency and reproducibility.

This handbook provides a reference for users and supervisors who wish to access the Mass Spectrometry and Proteomics facility located within the Future Industries Institute (FII), at the University of South Australia (UniSA). While every effort has been made to ensure that the information contained within this document is correct and current, the policies outlined below are subject to change in line with University policies and procedures.







3 Laboratory Access Procedure

All users are required to complete compulsory UniSA and FII work health and safety (WHS) online modules listed below. After completion users must send copies of their completion certificates to FII Technical Services Team (<u>FIITechRequests@unisa.edu.au</u>). No independent work in any laboratory can be commenced until these are complete.

UniSA Compulsory Modules

Safety and Wellbeing at UniSA

FII Compulsory Modules

Respectful Behaviour
Manual Handling Safety
Office Ergonomics at UniSA
 Slip and Trips Hazard Guide
Slips, Trips and Falls
 Chemical Spills Management
Environmental Awareness
Chemical Safety
FII Good Laboratory Practice (GLP)

Please access the UniSA online safety and wellbeing training modules through the following steps:

- 1. Click on the following link: Induction and Training.
- 2. Select **'Learnonline Safety and Wellbeing Training'**, followed by the **'Learnonline**' link (beneath the title).
- 3. When prompted, provide your username and password.
- 4. After you have logged in you will see a list of modules. Please select and complete those that are listed above. *Note: When clicking into a module, please click 'Enrol me' to access the course.*
- 5. In particular, the FII Good Laboratory Practice (GLP) module is located on a separate page from the others. Find the link to access the GLP module here: https://lo.unisa.edu.au/enrol/index.php?id=12164
- 6. When you have successfully completed a module you will automatically be issued with a certificate. If you do not receive a certificate, that means you have not completed the course. Please save this certificate in your files.

If you are new to an academic role, please view the following <u>Work Health and Safety for Academics</u> aimed to provide a level of understanding of Work Health and Safety responsibilities at the University of South Australia. You may need to provide your UniSA username and password when prompted. Please click on 'Enrol me'.







Please send the completed certificates to the Future Industries Institute Technical team: <u>FIITechRequests@unisa.edu.au</u>. You must complete all online modules prior to accessing FII labs.

Short term equipment users should be shown the above requirements and asked to provide their evidence of equivalent training. This evidence is forwarded to the Tech Team Manager / Operations Manager by the UniSA host to request that they review the certification and provide advice as to whether they think the evidence is an acceptable alternative to FII's compulsory WHS modules. If the certification is acceptable, then the host will be advised to provide specific lab and equipment training before the equipment is used.

If the user has not completed acceptable training, then they will be asked to complete the external facing UniSA Laboratory Safety Induction.

3.1 External Visitors

To enrol in UniSA Safety & Wellbeing (External) you will need to follow the online help instructions.

You must create an External Moodle account (<u>Step 1</u>) via <u>https://e.unisa.edu.au/my/</u> before you can enrol in your course (<u>Step 2</u>).

(<u>Note</u>: External Moodle accounts are created automatically for UniSA staff or enrolled students so this step can be omitted.)

After you've created your account, you can use the following link to enrol in <u>https://e.unisa.edu.au/course/view.php?id=129</u>.

When prompted, you will need to enter the following enrolment key.

USaWE2019!

Once you've enrolled in the course, you can access it on subsequent visits using the instructions in <u>Step 3</u>.

For students at UniSA:

Please note that all work requires the permission of your supervisor prior to submitting a request

3.2 New User Access and Work request Procedure

For all internal and external access and work requests, please send an email to <u>msp.bioplatforms@unisa.edu.au</u>. For internal and external students, please ensure your supervisor is cc'd and has approved your request for access and/or work. You will receive an email response letting you know how to proceed. You may be invited to attend a short meeting to discuss your needs, or you may be directed to a staff member to begin training or analysis.

There are two ways to carry out research using our instrumentation, either by getting trained and running the instrument yourself, or by having one of our staff members assist you. This is dependent on the platform you require to use as well as the 'omics' methodology you wish to employ. Please note that to qualify for training on some instruments, a minimum training session may be required, and this will be charged as a minimum number of hours as required.







4 Instrument Charges and Costings

A schedule of costings is provided as an appendix of this document and may change periodically. For specific workflows, such as Mass Spectrometry Imaging and label-free LCMS quantitation, pricing has been defined to account for required setup and replicate runs, respectively. Instruments supported by NCRIS funds are available to both internal and external academics in South Australia at the same cost, and staff time is only costed for sample preparation, data analysis, and reporting, as required. Commercial work is invoiced at full cost recovery, and this costing will be provided up-front before work begins. South Australian industry partners will have priority access to the facility as required.

5 Guests, Visitors and Tour Groups

Anyone who is entering the laboratory for the sole purpose of passive observation are allowed temporary access to the area under direct supervision of a FII staff member. Any PPE requirements of the laboratory must be adhered to while visiting the laboratory. No guests, visitors or tour groups should be left alone in the laboratory.

Tour group supervisors should review the FII "Tour Safety Instructions" and risk assessment and follow the accompanying SOP to ensure tours are carried out safely and professionally as outlined in the FII PPE Policy.





6 Equipment and Laboratory Usage

6.1 Sample Preparation and Storage

Samples prepared by MSP staff will be stored in appropriate conditions within the MSP laboratories. After analysis, samples will be stored for <u>36 months</u>, after which will be discarded. Samples brought into the instrument laboratory should be taken away by the researcher when their analysis is complete. Any samples left in MSP laboratories that have been brought in by a user may be disposed of if MSP staff haven't been informed to retain.

6.2 Instrument User Etiquette

- It is a laboratory requirement to be polite and courteous to our staff, as well as other laboratory users.
- You must follow all procedures and instructions, no exceptions.
- You must follow the data indexing system on each system used
- You must fill in the log book for any system before you begin work.
- Instruments that can be used independently must not be modified by the user. The instrument PC must not be modified in any way except for the specific purpose of storing the data obtained by the instrument.
- Samples are not to be left in the laboratory or instrument.







7 Booking Instruments

For MS systems that do not require MSP staff to operate (e.g. MALDI-ToF MS, LC-Qq-ToF MS), all instrument bookings are made online using a system known as EZBooking. You will need to have a UniSA account to be able to use this booking system. For external users please email <u>msp.bioplatforms@unisa.edu.au</u> to help you make a booking. Please note that you will not be able to make a booking until you become an approved user in our facility. Please follow this link to access the booking system:

https://ezbooking.unisa.edu.au/EZBooking/EZbooking/cgi-bin/ezb frameset.cgi?goToAction=default

7.1 EZBooking Rules

The booking etiquette is as follows:

- Please attend the start of your session on time
- Do not book a session for someone else in your name. The person named on the booking calendar must attend. Other students and staff may also attend the experiment if they wish, but they must all be authorised to enter the laboratory.
- Do not use an instrument if you have not booked it.
- Do not use an instrument if you have not been trained on it.

Please note that we use the booking system to count how many hours each instrument is used. This is extremely important because without an adequate level of usage, we cannot justify the expense of keeping all of our instruments running. Failure to use the booking system with integrity will result in a warning in the first instance, and in the second instance the Node Director may choose to remove your booking privileges.

7.2 Priority Booking

We are happy to provide additional assistance with extra bookings if you have some time pressure. Examples of reasons that we may grant you a priority booking include:

- Having family commitments.
- If you are restricted to business hours.
- If you have time-sensitive experiments in progress.
- You are visiting us from another Institution.

7.3 Safety

It is a UniSA policy that all tasks are risk assessed before they are undertaken. It is the responsibility of researchers and their supervisors that this is carried out to an appropriate standard. The MSP staff require a risk assessment to be provided for all material being studied is a medium or high-risk material. Please discuss with MSP staff prior to use to ensure your sample/s can be analysed safely.







Laboratories with FII are classified based on the inherent hazards within, this has been determined by a risk assessment-based approach by Laboratory Coordinators and the Ops group. Clear signage at the entrance to each lab and/or appropriate colour coded lines on the floor indicate the status of a lab and areas within a lab. Labs with mixed risk level will have both requirements described on signage at the entrance

Laboratory classification:

- **GREEN** hazards are similar to an office environment no specific PPE requirements, no hazardous chemicals (beyond what would be found in a kitchen, etc)
- ORANGE general lab
- RED lab or area within a lab with a higher level of hazards, which has the potential to cause serious injury or death. – i.e. HF, LN2, radiation, etc. that requires specific PPE above that of an Orange lab.

Fully enclosed footwear with a broad, low heel must be worn AT ALL TIMES in ALL laboratories green, orange and red. This applies to laboratory users and tour groups. Wearing gloves may be required to protect the skin and may also be required to keep samples clean while they are being handled. In all cases, the choice of gloves, and when they are to be used, should be indicated by your risk assessment in consultation with the instrument co-ordinator.

Breaches of safety are quite serious. UniSA policy stipulates that all safety breaches and near misses are reported at <u>http://w3.unisa.edu.au/safetyandwellbeing/default.asp</u>. Any staff member can ask a researcher to stop-work-for-safety. It is procedural that any user's online booking privileges be temporarily suspended during a stop-work-for-safety. You will be able to recommence your work when you have satisfied all UniSA policy requirements.







6.3.1 Building Emergency Evacuation

If you hear a continuous alarm bell or tone or are requested by an Emergency Warden /Security to evacuate the building, you must:

- follow their instructions
- leave the building immediately by the nearest safest exit stairs do not hesitate
- you are not allowed to use the lift, you must use the stairs and keep to the left
- proceed to the assembly point
- remain at the assembly point until advised the emergency is over
- **DO NOT re-enter the building** until advised it is safe to do so by the Emergency Evacuation Officer / Security. Do not try to re-enter just because the alarm has stopped.

In the event of a fire –

- all equipment must be left behind
- all doors must be closed to prevent spread of fire

Unless instructed otherwise stay with the group at the assembly area after reporting to the Building Evacuation Officer. The ALL CLEAR to return to the building will only be issued via Building Evacuation Officers or Deputy Building Evacuation Officers (Security or campus services may give the message but only if the Evacuation Officers are not available) with a direct message - do not re-enter the building unless this has been given. As part of your laboratory induction the closest emergency assembly area will be pointed out to you. These are as follows:

Building	Assembly Point	Assembly Number	Point
MM	Grassed area south of building MM	7	
X	Grassed area between Q & R	23	
HB	SAHMRI Courtyard, North Terrace	3	
	Corner North Tce and Morphett St (outside Convention Centre)	8	

6.4 After Hours Access

FII defines after hours as: weekdays before 7 am and after 7 pm, weekends, public holidays and other periods when the university is closed. After-hours access may be permitted to UniSA staff and students and requires permission from both the Technical Services Manager and the Instrument Co-ordinator. All requests for after-hours access must be submitted in writing using the *Afterhours Access Request Form (WHS47B)*. For an updated version of WHS47B please contact the FII Technical Services Team via email (FIITechRequests@unisa.edu.au).







8 Instrument Damage and Malfunction

In the event of an instrument malfunction, or if you are unsure if the instrument is functioning normally, please contact a MSP staff member by phone, email (<u>msp.bioplatforms@unisa.edu.au</u>) or direct contact. Staff details can be found in section 12.5 Staff Contacts. Staff will instruct you with what to do next. Please <u>do not</u> attempt to fix, reboot or modify the instrument. Record your observations in the logbook.

Any repair costs for damage cause by willful misuse by a researcher will be charged back to the research group or company of which the user is a member.

9 Data Management and Integrity

Instrument users are responsible for the archiving of their data. Users are strongly encouraged to retrieve their data during the booked hours. The loss of any data is not the responsibility of the instrument co-ordinator or MSP/FII staff.

It is the responsibility of the user to ensure academic and scientific integrity of all data, data analysis and interpretation. Although Instrument Co-ordinators and other staff may provide some advice regarding analysis and interpretation, all responsibility for scientific accuracy and integrity remains with the individual researcher.

10 Acknowledgement

All users are required to acknowledge use of the instrument in any research output derived from the images and data obtained. For the purpose of collecting the research output obtained from the facility, all users must report any research output involving use of these instruments.

Acknowledgement:

"The authors acknowledge Bioplatforms Australia, the University of South Australia, and the State and Federal Governments, which co-fund the NCRIS-enabled Mass Spectrometry and Proteomics facility at the University of South Australia."







11 Instruments and Locations

11.1 Instrument Locations

Instrument/Service	Building - Room
Autoflex MALDI-ToF/ToF MS (Biotyper)	MM2- 08
UltrafleXtreme MALDI-ToF/ToF MS	MM2- 08
Agilent 6550 LC-Qq-ToF MS	HB8- 48
Thermo Orbitrap exploris480 MS	HB8- 48

Campus maps are provided in the Appendices of this document.

11.2 Autoflex speed MALDI-ToF/ToF MS (with Biotyper capability)

The autoflex speed matrix assisted laser desorption/ionization (MALDI) Time of Flight (ToF) is a highly sensitive technique that allows multiple applications for comprehensive analyte characterization. The system allows analysis for multiple analytes, including (but not limited to), small molecules, metabolites, lipids, peptides, proteins, and polymers. This MS system is configured as a Biotyper platform to allow Fast and reliable identification of microorganisms. MALDI Biotyper systems provide high-speed, high-confidence identification and taxonomical classification of bacteria, yeasts, and fungi. Classification and identification are based on proteomic fingerprinting using high-throughput MALDI-ToF mass spectrometry. Numerous studies have demonstrated the higher accuracy, faster time-to-results, and lower costs provided by MALDI Biotyper systems compared to classical methods.







11.3 Ultraflextreme MALDI-ToF/ToF MS

The ultrafleXtreme MS system is designed for and excels in application areas such as Top-Down Proteomics, LC-MALDI, MALDI Imaging, Protein Quantification, Post-Translational Modification Analysis and naturally, Protein Identification. As the MS imaging node of Bioplatforms, the system is supported by the latest hardware for sample preparation (including a Bruker ImagePrep and iMatrixSpray systems) and software (Bruker flexImaging and SCiLS lab Pro MVS) for image generation and statistical evaluation. In MALDI MS Imaging, Images are generated by collecting MALDI data in a virtual grid pattern applied to a sample surface. Thin sections of samples (e.g. fresh frozen or formalin fixed, paraffin embedded tissue) are mounted onto conductive glass slides and a layer of MALDI matrix is applied, typically by aerosol. Defined areas of measurement are established by the user to using a digital image of the sample. The size of the virtual grid establishes the image resolution and is tailored for the experimental question to be answered.









11.4 Agilent 6550 LC-Qq-ToF MS

The 6550 LC-Qq-ToF MS provides high accurate mass analysis of complex samples. Agilent's proprietary iFunnel technology combines the high-efficiency ESI ion generation and focusing of Agilent Jet Stream sample introduction with unique hexabore sampling capillary and dual stage ion funnel assemblies. Agilent iFunnel technology provides a level of robustness unmatched in the industry by combining true orthogonal electrospray orientation with a heated, off-axis funnel geometry to prevent transmission of uncharged species. The approach offers qualitative and quantitative characterization of samples, including metabolites, lipids, and peptides. The system is supported by Agilent's MassHunter software to allow streamlined metabolite and lipid identification. The system can be configured for low (nano) or high (analytical) flow rates to deal with various sample types and amounts.









11.5 Thermo Orbitrap Exploris 480 MS

The Orbitrap Exploris 480 mass spectrometer joins the family of next-generation Thermo Scientific mass spectrometers built on a common architecture with the guiding principle of ultimate performance and ease of use. Combined with the Thermo UltiMate RSLC nanoLC and ProtemeDiscoverer software, the platform is the latest generation of accurate mass, high resolution technology for proteomics analysis. The system is configured for label-free nLC-MSMS of complex protein samples and can be used for high-throughput characterization of serum, plasma, and other complex sample types. The system is equipped with the Thermo Scientific[™] FAIMS Pro[™] interface, which minimizes co-isolation of isobaric peptides, increases the number of unique peptides identified, and improves signal-to-noise to sample low-abundance peptides.



12 APPENDICES

12.1 FAQs

I don't know if my samples are compatible with the system or will work, who should I talk to?

Please contact any MSP staff, who will advise you about the system and sample compatibility. We prefer people to ask questions, rather than waste their time or damage an instrument. If in doubt, please ask us to help you out.

Who should I contact for training?

Please contact MSP staff directly or FII Technical Services Team (FIITechRequests@unisa.edu.au).

If I usually contact an operator who is away, or I don't know who is in charge of the instrument I need, who should I contact?

Please contact the FII Technical Services Team (<u>FIITechRequests@unisa.edu.au</u>), they will be able to help you find the Instrument Co-ordinator or delegate.

How do I gain laboratory access?

All UniSA users are required to complete compulsory UniSA and FII WHS online modules that are listed below. After completion, users must send copies of their completion certificates to the FII Technical Services Team (<u>FIITechRequests@unisa.edu.au</u>). No activity in any lab can commence until these modules are complete. You will then need to complete a local laboratory specific induction before we can grant you access.

My access card stopped working, what do I do?

Please contact the FII Technical Services Team (FIITechRequests@unisa.edu.au) detailing your problem.

Can I use equipment myself?

For certain MS infrastructure, including the MALDI-ToF MS and LC-Qq-ToF MS platforms, you can be trained to use the system yourself. Specific equipment, such as the Exploris480, is managed by MSP staff and not setup to be used independently.

12.2 Fee Schedule

The instrument access fee schedule below is subject to change. Pricing is reviewed on an <u>annual basis</u>. Although every effort is made to update the information below please contact MSP for an official quotation. *NOTE: For all South Australian Universities and Institutes, the internal rates apply*.

MSP Pricing Structure – Main services

SERVICE	Information	Sample no.	INTERNAL RATES*	EXTERNAL ACADEMIC*	INDUSTRY RATES*
MALDI-TOF/TOF for Protein Identification (from gel spot)	Trypsin digestion, zip tipping clean-up and concentrating samples, MS data acquisition, database search and report	1-5	\$160	\$215	\$285
		6+	\$120	\$160	\$215
nanoLC ESI MS/MS for Protein Identification	Trypsin digestion, reverse phase nanoLC ESI MS/MS data acquisition, database search and report	1-5	\$160	\$215	\$285
		6+	\$120	\$160	\$215
Mass Analysis of Purified Intact Protein	MS data acquisition and report	1-5	\$120	\$160	\$215
		6+	\$100	\$135	\$180
MALDI Biotyper	Microbial identification of isolates, no report, no sample preparation	1-50	\$100 (\$2 per sample)	\$100 (\$2 per sample)	\$250 (\$5 per sample)
MALDI Imaging	Sample preparation, matrix deposition, acquisition, analysis, reporting	Per slide (PoA for large cohort)	\$750	\$1000	\$1350

Effective 01 January 2020

QUANTITATIVE PROTEOMICS					
MRM/SRM assay development and analysis	Method development for targeted proteins or peptides, using the developed method to acquire data for the targeted proteins or peptides, data analysis, report	1-5	\$160	\$215	\$285
		6	\$120	\$160	\$215
Label free quantitation using nLC-MS (triplicate analysis)	Trypsin digestion, C18 cleanup, reverse phase nanoLC ESI MS/MS data acquisition, database search and report, replicate analysis		\$480	\$640	\$850
MSP staff time	Data analysis, specialised sample preparation, reporting	Per hour	\$60	\$100	\$170
Tryptic digestion of protein samples	Staff time for tryptic digestion (including protein quantitation determination, C18 cleanup)	1-12	\$60	\$80	\$105
		13-24	\$120	\$160	\$210
		25-36	\$180	\$240	\$315
Q-ToF/Orbitrap New Method Development	\$2000				
Protein quantitation using stable isotope label	PoA				
PTM PoA					

*All prices below are ex. GST. Prices include UniSA Levies where applicable. Formal quotes are available upon request.

Some instruments have a 1 hour minimum booking time.

Technician time may be charged to external and industry users in addition to the access costs. Typical Technical Charges:

- o Training: \$170 / hour
- o Technical Services: \$170 / hour

Repairs due to instrument damage resulting from operation without due care and attention will be charged to the users' organization

Bioplatforms Australia (UniSA node) Information Handbook. Version 1.4

12.3 Mawson Lakes Campus Map

12.4 HB Building Level 8 layout

12.5 Staff Contacts

UniSA Node Director of MSP Professor Peter Hoffmann Email: <u>Peter.Hoffmann@unisa.edu.au</u> Office: Building X – X1-10 Phone: +61 8 302 5563

UniSA Node Facility Manager of MSP Dr Mark Condina Email: <u>Mark.Condina@unisa.edu.au</u> Office: MM3-01F Phone: +618 8 302 5508

MSP staff member Dr Clifford Young Email: <u>Clifford.Young@unisa.edu.au</u> Office: Building MM (MM3-01) Phone: +61 8 8302 3622

MSP staff member Dr Matthew T Briggs Email: <u>Matthew.Briggs@unisa.edu.au</u> Office: Building MM (MM3-01) Phone: +61 (0) 420767848

If you have any enquiry, and do not know who to contact, the best place to start is the MSP email <u>msp.bioplatforms@unisa.edu.au</u> or the general Institute technical support mailbox <u>FIITechRequests@unisa.edu.au</u>.