THE UNIVERSITY OF SYDNEY

Core Research Facilities

Advice to applicants for ARC and NHMRC grants 2021

Planning for your research needs

Many research projects will incur costs in terms of training, instrument time, preparation materials and staff input.

The University of Sydney has a number of University-wide Core Research Facilities that provide access to high-end research infrastructure and services. Each facility has expert staff who provide training and can advise on research design, new data science and techniques to reveal new insights, and equipment use.

Core Research Facilities are funded through a combination of user fees and contributions from user faculties and, where possible, these costs should be planned for and included in the budget of research proposals.

Proposals to funding agencies require detailed costings in their budgets; for example, numbers of samples, estimated analysis hours and justification of why the techniques are required for the project. This guide shows how to incorporate the costs of accessing the University's Core Research Facilities into ARC and NHMRC applications.

Core Research Facilities are an important part of the research environment that you need to describe in your project and something you need to budget for.

Core Research Facilities

Specific information about instruments, expertise and pricing can be found on the Core Research Facility websites, or by contacting facility staff. The following facilities are available:

- **Research & Prototype Foundry:** Clean room, electron beam and laser lithography, nanofabrication, etching, deposition, metrology and prototyping
- **Sydney Analytical:** Raman, infrared and X-ray spectroscopy, X-ray diffraction, X-ray and light scattering, magnetic resonance spectroscopy (NMR & EPR), protein production and characterisation, and screening for early-stage drug development. We also assist with experimental design, data collection and analysis, report writing, and provide assistance with finding and using external equipment, including at the Australian Synchrotron.
- **Sydney Cytometry:** Cytometry instrumentation including analysers and cell sorters; experimental design, data acquisition, data analysis and interpretation; development of cytometry techniques and instrumentation
- **Sydney Imaging:** Clinical and pre-clinical imaging instrumentation, and the Hybrid Theatre; facilities include Artis Pheno C-arm, high field MRI, combined microCT and optical imager, high resolution ultrasound; image processing and analysis
- **Sydney Informatics Hub:** Artemis High Performance Computer, data science and analytics, Sydney Health Data Coalition, bioinformatics software and consultancy, environmental sensing and modelling, data visualisation, statistical consulting, and research data management
- **Sydney Mass Spectrometry:** A wide portfolio of mass spectrometers and data analysis packages for proteomics, glycomics, metabolomics, lipidomics, and mass spectrometry imaging applications; advice and assistance for experimental design, sample preparation and data analysis
- **Sydney Microscopy & Microanalysis:** Light and electron microscopy, scanning probe, atom probe instruments, x-ray and spectroscopy equipment, image analysis, 3D visualisation and data visualisation software
- **Sydney Manufacturing Hub**: additive manufacturing and materials processing. Capabilities for design, 3D printing, heat treatment, mechanical and topological characterisation and much more.

Core Research Facilities

sydney.edu.au/research/facilities

Director, Core Research Facilities:
Professor Simon P Ringer
T +61 2 9351 2353 | E simon.ringer@sydney.edu.au
Chief Operating Officer: Tim Dixon
T +61 2 8627 6132 | E timothy.dixon@sydney.edu.au
Strategic Engagement Manager: Emma Bastian
T +61 2 9351 7752 | E emma.bastian@sydney.edu.au

Research & Prototype Foundry
Academic Director: Professor Simon Fleming
T +61 2 9351 6050 | E simon.fleming@sydney.edu.au
Technical Director: Dr Nadia Court
T +61 2 8627 8671 | E nadia.court@sydney.edu.au

Sydney Analytical
Academic Director: Professor Peter Lay
T +61 2 9351 4269 | E peter.lay@sydney.edu.au
Deputy Director: Associate Professor Margaret Sunde
T +61 2 9351 6955 | E margaret.sunde@sydney.edu.au
Operations Manager: Dr Peter Southon
T +61 2 9351 4425 | E peter.southon@sydney.edu.au

Sydney Cytometry
Academic Director: Professor Nick King
T +61 2 9351 4553 | E nick.king@sydney.edu.au
Technical Director: Dr Adrian Smith
T +61 2 8627 1828 | E a.smith@centenary.org.au

Sydney Imaging
Academic Director: Professor Fernando Calamante
T +61 436 017 470 | E fernando.calamante@sydney.edu.au
Operations Manager: Elizabeth Blanchard
T +61 2 8627 7460 | E elizabeth.blanchard@sydney.edu.au

Sydney Informatics Hub
Acting Academic Director: Associate Professor Tom Bishop
T +61 2 8627 1188 | E Thomas.bishop@sydney.edu.au
Operations Manager: Michele Collins
T +61 2 8627 6553 | E michele.collins@sydney.edu.au

Sydney Mass Spectrometry
Academic Director: Professor Stuart Cordwell
T +61 2 9351 6050 | E stuart.cordwell@sydney.edu.au
Facility Manager: Dr Ben Crossett
T +61 2 9351 6010 | E ben.crossett@sydney.edu.au

Sydney Microscopy & Microanalysis
Deputy Director: Associate Professor Filip Braet
T +61 2 9351 7619 | E filip.braet@sydney.edu.au
Facility Manager: Eleanor Kable
T +61 2 9351 7566 | E eleanor.kable@sydney.edu.au

Sydney Manufacturing Hub
Deputy Director: Associate Professor Gwenaelle Proust
T +61 2 9036 5498 | E Gwenaelle.proust@sydney.edu.au
Operations Manager: Renee Barber
T +61 2 8627 7226 | E renee.barber@sydney.edu.au

THE UNIVERSITY OF SYDNEY
Core Research Facilities

ARC Project Costs example

Grant proposals to the ARC must be submitted in their online Research Management System (RMS). For ARC Discovery Project applications to be submitted in 2020, for instance, you should include a line item in the 'Project Costs' table (Part E) under 'Other' as shown below.

In this example, the project requires access to Sydney Imaging instrumentation in Year 1 - 217 hours of VEVO use @ $50/ hour plus $100 for induction and 200 hours use of the PET/MR at $150/hour plus $300 for induction. This comes at a total cost of $41,250 for Year 1 of the project.

Year 1 | Year 2 | Year 3 | Year 4 | Year 5

Description		Australian Research Council	Administering Organisation		Other Eligible Organisation		Partner Organisation	
		Cash	Cash	In-kind	Cash	In-kind	Cash	In-kind
Total		41,250						
Personnel	+							
Teaching Relief	+							
Equipment	+							
Maintenance	+							
Travel	+							
Fieldwork Expenses	+							
Other	+	41,250						
Sydney Imaging Equipment Use - VEVO (225 hrs @$50/hr), PET/MR (200 hrs @$150/hr)		41,250	0	0	0	0	0	0

The host university maintains substantial infrastructure and the value of this is transmitted to research projects at a level at least equivalent to the instrument usage charges to the individual user, so that the same total value as the request to the ARC for Imaging should be added to the Administering Organisation column.

Step 1: Click on the plus adjacent to the 'Other' row in the table. In the resulting text box, type 'Sydney Imaging Equipment use [plus description]', then press the 'Add Item' button.

Step 2: Click on the ARC column of the new 'Sydney Imaging equipment' row and enter the required amount, $41,250 in our example above.

Step 3: Click on the next year, Year 2, above the budget table and then repeat, with the requested amount adjusted for the higher or lower facility usage needs of the different years of the project.

Step 4: Click on additional years and repeat the process.

Please contact facilities directly for information about equipment and services, specific advice about your project and to confirm project costs.

THE UNIVERSITY OF SYDNEY
Core Research Facilities

NHMRC Project Costs example

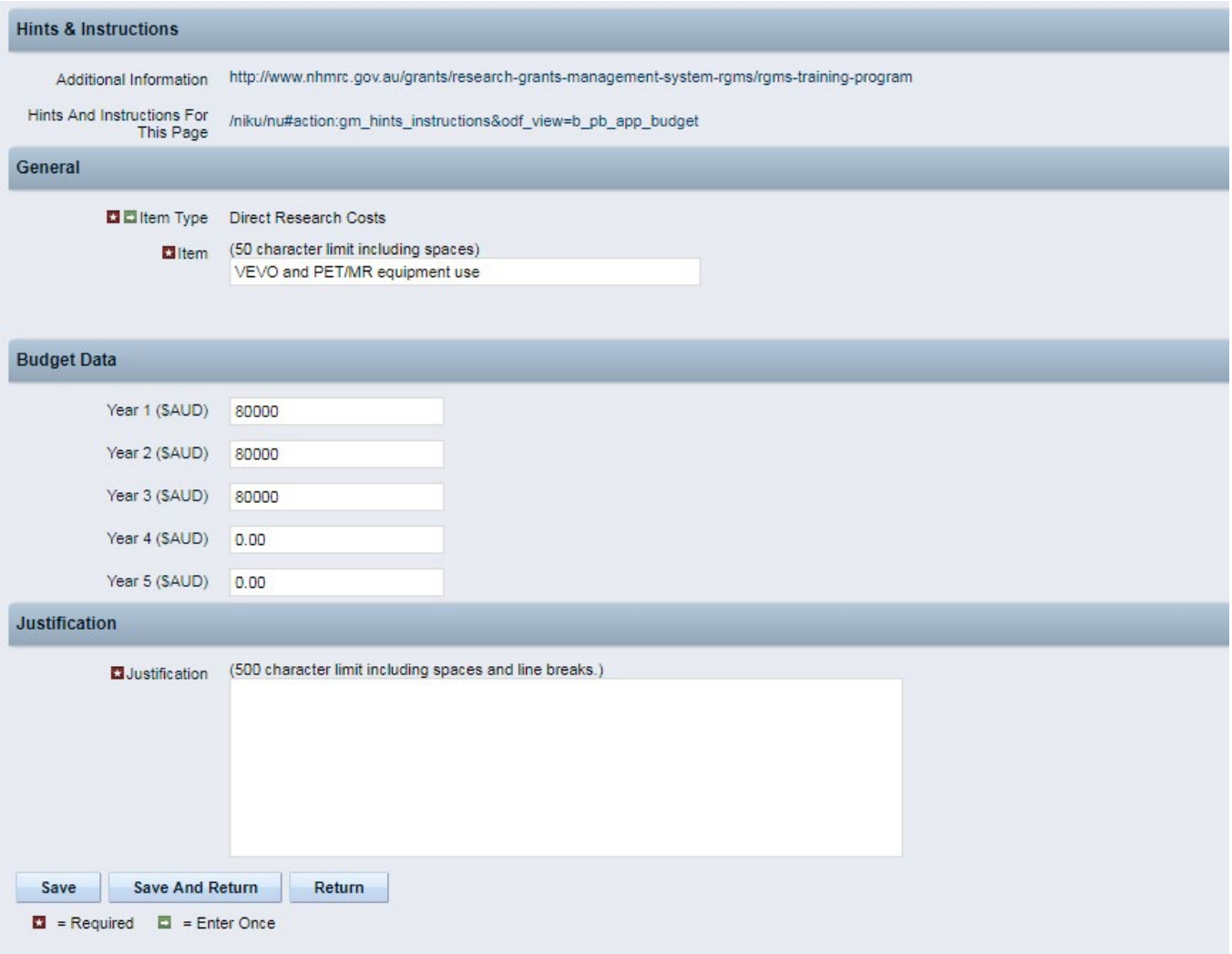
Grant proposals to the NHMRC must be submitted in their online Research Grants Management System (RGMS). Applicants should consult with our facilities to ensure that the services they require can be provided and that the charges included in the research budget are accurate.

For NHMRC applications to be submitted in 2019, **letters of support from participating facilities (detailing expenses and confirming facility availability) are required to be uploaded as part of each application.** Failure to provide a letter of support regarding the proposed research facilities may lead to the reviewing panel making changes to the budget if the items requested are not adequately justified for the research to be successfully undertaken. Applicants should select 'Yes' from the dropdown menu in the 'Using research facilities' section, and upload CRF support letters in PDF format.

Add your calculated access fees for each year to the corresponding direct research costs and insert the total into the appropriate year box as below. For example, assume $36,619 of other direct research costs for year 1. The facility access fees total $41,250 (as per the ARC example). Adding these costs gives a total direct research cost of $77,869 for Year 1 ($80,000 when rounded up to the nearest $5,000 quantum). This is entered in the relevant year of the RGMS form (Proposed Budget under Part B).

Proceed in a similar manner for each year of the application, with the requested amount adjusted for higher or lower equipment needs, and other direct costs, as required by the different stages of the project.

Please contact facilities directly for information about equipment and services, specific advice about your project and to confirm project costs.



THE UNIVERSITY OF SYDNEY
Core Research Facilities

Example 'Justification' text for applications

Advanced instruments (microscopy example)
"This research project requires the examination of N samples per week/month/year [as appropriate] with the advanced microscopy and/or microanalysis [as appropriate] technique/s of [specify; e.g. atom probe tomography]. The estimated time required for characterisation of each sample is X hours, at a cost of $Y per hour of instrument time." You should add further specific explanation of why the chosen technique/s is/are necessary for the research, for example: "Atom probe tomography is a unique characterisation tool that is able to reveal elemental and structural detail at the atomic scale and is essential for exploring the structure-function relationships in these alloys with nanometre-sized grains" with a reference to further detail elsewhere in the application.

Advanced instruments (mass spectrometry example)
"This research project requires the analysis of N samples per week/ month/year [as appropriate] by a discovery/targeted proteomics/metabolomics [as appropriate] technique/s. The estimated time required for characterisation of each sample is X hours, at a cost of $Y per hour of instrument time." Typical discovery proteomics projects require 24 hrs/sample, whereas a targeted metabolomics project may only require 20 min/sample. You should add further specific explanation of why the chosen technique/s is/are necessary for the research, for example: "The Sciex 6600 Triple TOF coupled with Eksigent 415 UHPLC system and the ProteinPilot SWATH software enables the data independent, label free analysis of complex proteomes" with a reference to further detail elsewhere in the application.

Software, data analysis and expert assistance (bioinformatics example)
"Access to bioinformatics advice and software (CLC Genomics) will be required to analyse the data collected in this research project. This can be obtained through a $1500 per user annual subscription to the Sydney Informatics Hub at the University of Sydney. The project will use the University of Sydney's high performance computing (HPC) service, which comprises 4264 cores, 136 standard compute nodes, 3 nodes with 6TB of RAM, 5 GPU nodes with 2 GPUs each, 56 Gbps FDR Infinibanc interconnect and a 232 TB Lustre file system. Compute on Artemis is available at no cost to the project. You should add further specific explanation of why the equipment is necessary and how it adds value to your research, for example: "Because of the large amount of next-generation genome sequence data generated in this project it will require both detailed analysis using CLC Genomics workbench and considerable computational power as provided by the new HPC service" with a reference to further detail elsewhere in the application.

THE UNIVERSITY OF SYDNEY
Core Research Facilities

Examples of costs for Core Research Facilities 2020

Sydney Analytical		
Instrument type	**University of Sydney**	**External University Users & Publicly Funded Research Organisations[1]**
Vibrational Spectroscopy instruments	$ 50/hour	$ 130/hour
Infrared and Ramen spectrometers		
Portable instruments	$25/hour $200/day $1000/week	$65/hour $440/day $2000/week
Staff assistance	$100/hour	$100/hour
Instrument training	$50/person/ instrument	$130/person/ instrument
X-ray spectroscopy		
X-ray or ultraviolet photoelectron spectroscopy (XPS/UPS)	$50/hour	$130/hour
X-ray fluorescence *	$25/hour	$64/hour
Portable XRF and Artax	$25/hour $200/day $1000/week	$65/hour $440/day $2000/week
Staff assistance	$100/hour	$100/hour
Instrument training	$50/person/ instrument	$130/person/ instrument
Magnetic Resonance		
Electron paramagnetic resonance	$25/hour	$65/hour
Nuclear magnetic resonance		
200-500MHz*	$5/hour	$10/hour
600MHz*	$10/hour	$20/hour
800MHz*	$15/hour	$30/hour

X-ray techniques for structural determination		
Powder diffractometers, including controlled environment accessories *	$ 25/hour	$65 hour
Small and wide-angle X-ray scattering (SAXS/WAXS) *	$50/hour	$130/hour
Single crystal X-ray diffraction (SCXRD)	$12/hour	$30/hour
SAXS analysis	$300 (4 hrs) $560 (8 hrs) $960 (16 hrs)	
Computers for data analysis	$12/hour	$12/hour
Drug Discovery		
Protein production	Contact us	Contact us
Protein NMR, metabolomics NMR and SPR services	$50/hour	$80/hour
Primary fragment-based drug screen and validation	$15,000	$15,000
Cyclic peptide ligand screen	$3,000	$6,000
Training	$50/hour	$80/hour
SPR and other equipment	$10/hr or $70/day	
Sample preparation	Contact us	Contact us
Rock thin section		
Hard material cutting & polishing		

Research Group Cap *for University of Sydney researchers on instrument time only:* ***$5,000 per calendar year*** *for research groups with up to 5 members, plus $250 per additional group member.*

** Special rates apply for School of Chemistry and School of Life and Environmental Sciences researchers – see the Sydney Analytical website for more details*

THE UNIVERSITY OF SYDNEY

Core Research Facilities

Research and Prototype Foundry	
Instrument	**Cost**
*Coater Brewer Science CB-200	$15/hour
Dicing Saw ADT	
*Die Bonder Fine Tech Lambda	
Dry Film Laminator Fortex FL-0305-01	
Ellipsometer JA Woollam M2000	
*Fibre Draw Tower	
Lamp Annealer ULVAC MILA 5000	
*Microscope Nikon Eclipse LV100ND	
O2 Plasma Asher South Bay RIE3000	
*PDMS Process Tools	
*Probe Station PM 5	
*Reactive Ion Etcher South Bay RIE3000	
*Spin Dryer Delta 15	
*Sputter Coater DC Emitech K550	
Wire Bonder TPT HB 100	
Stylus Profilometer DekTak XT	
3D Microscope Leica DCM8	
Atomic Force Microscope Bruker Icon	
Atomic Layer Deposition Picosun R200	
E-Beam Thermal Evaporator AJA	
ICP RIE Oxford Plasmalab 100	

*Laser Writer Heidelberg DWL 66+	$45/hour
Mask Aligner EVG 610	
Maskless Aligner Heidelberg MLA100	
*Rite Track SVG88	
Sputterer DC/RF AJA	
*Wet Benches	
EBL Elionix ELS-F125	$60/hour
FIB-SEM Zeiss Crossbeam 550XL	
NanoFab Helium Ion Beam Microscope Zeiss	
*i-line Stepper ASML PAS 5500/100	
**ANFF supported tools*	
Prototyping tools: 3D printers, laser cutter (min. 1 hour booking)	$5/hour
Training	$50/hour
Staff Assistance	$100/hour

THE UNIVERSITY OF SYDNEY
Core Research Facilities

Sydney Microscopy and Microanalysis	
Service (Internal Users)	**Cost**
Up to 8 consecutive hours per session per instrument	$48/hour
Each consecutive hour over 8 hours per session per instrument	$12/hour
Specimen preparation and image analysis equipment	$3/hour
Individual user cap *Not included in the cap:* *$280 one-off registtration fee for new users* *$200 per hour for platform scientist instrument operation* 3View Serial Block Face Scanning Electron Microscope usage	$1650/calendar year *Contact Facility Manager for costs*
Service (External Users)	**Cost**
Registration and training fee per new user	$280
Publicly funded research organisations Instrument per hour (up to 8 hours)* Platform scientist per hour	 $140 $200
Commercial Instrument per hour (up to 8 hours)* Platform scientist per hour	 $350 $200
**After 8 hours the hourly rate drops to 25% of the listed rate for the remainder of the session*	

Sydney Informatics Hub		
For all projects requiring SIH project support and/or significant compute resources please contact SIH no less than two weeks prior to grant submission deadline for an accurate costing and written quote.		
Service	**Cost**	**In Kind**
Project support (Data Science, Statistics, Bioinformatics) (2 days to 12 FTE weeks) Project management overheads	$2240/FTE week	$560/FTE week $280/FTE week
Short project support (up to 2 days)		Up to $1120
6 month subscription to CLC Genomics Workbench and CLC Server	$750	
12 month subscription to CLC Genomics Workbench and CLC Server	$1500	
Ingenuity Pathways Analysis software	Free for users	
Next-generation sequencing analysis	Free	
Artemis Performance Computing Access Preferential Access – standard Preferential Access – GPU	TBA	

THE UNIVERSITY OF SYDNEY

Core Research Facilities

Sydney Mass Spectrometry		
Category/Instrument	**Cost (internal user)**	**Cost (external academic user)**
Registration including training		
- 2D gel course	$300/person	$300/person
- Mass Spectrometry	$500/person	$500/person
Bench Fees		
- LC systems	From $1/hour	From $2/hour
- LCMS & MS imaging systems	$10/hour	$20/hour
Contract research		
- sample clean up	$30/sample	$45/sample
- deuteration analysis	$75/sample	$75/sample
- MALDI QTOF analysis (including peptide mass fingerprinting and intact protein mass)	$75/sample	$110/sample
- 1D LCMS (protein identification in simple mixtures or intact protein mass)	$110/sample	$165/sample
- Plasma targeted metabolomics	$110/sample	$165/ sample
- Mass spec imaging (lipids)	$500/slide	$750/slide
- Mass spec imaging (peptides	$750/slide	$1125/slide
- Quantitative proteomics	$750/slide	$1125/sample
Consumables		
- ZipTips	$250/box	$250/box
- ABGene 96 well plates incl seal	$7.50	$7.50
- Indium Tin Oxide slides	$15	$15
- Vials (box of 100)	$110	$110
- PCR strips (8 tubes) incl seal		$2
Please contact us for a quote for metabolomics, lipidomics and other services		

Sydney Imaging	
Preclinical	
Service	**Cost**
3T MRI	$150/hour + $300/person induction training (2 hours), any additional training will incur a $50/hour technical assistance fee
7T MRI	$150/hour + $300/person induction training (2 hours), any additional training will incur a $50/hour technical assistance fee
IVIS Spectrum	$50/hour + $100/person induction training (2 hours), any additional training will incur a $50/hour technical assistance fee
VisualSonics Ultrasound (Vevo2100 + VevoLAZR, Vevo3100)	$50/hour + $100/person induction training (2 hours), any additional training will incur a $50/hour technical assistance fee
microCT	$50/hour + $100/person induction training (2 hours), any additional training will incur a $50/hour technical assistance fee
echoMRI	$20/hour + $20/person induction training (1 hour), any additional training will incur a $50/hour technical assistance fee
PET MR	$150/hour plus tracer consumables + $300/person induction training (2 hours), any additional training will incur a $50/hour technical assistance fee
Dual-Energy X-ray Absorptiometry (DXA)	$40/hour + $20/person induction training (1 hour), any additional training will incur a $50/hour technical assistance fee
Computer Analysis Computer/VRD	$2/hour
	Note: all prices are charged in 30 minute blocks

Hybrid Theatre

Please contact us for a bespoke quote for Hybrid Theatre projects.

THE UNIVERSITY OF SYDNEY
Core Research Facilities

Sydney Cytometry			
Instrument	**Cost/hour (unassisted)**	**Cost/hour (operator assisted)**	**Notes**
Cell sorter: basic (2 lasers)	$36	$80	*FACSJazz*
Cell sorted: advanced	$54	$95	*FACSAria IIu, Influx, FACSMelody*
Sort set up	$48		*"flag-fall" each session*
Cytometers: basic (<4 lasers)	$36	$80	*FACSCantoII, FACSVerse, Aurora (3 laser)*
Cytometers: advanced (>4 lasers)	$54	$95	*LSRFortressa, LSRFortessa X-20, LSR II 5L, LSR X, Aurora (5 laser)*
Image Cytometer: plates	$35	$80	*PE Opera Phenix. Rebates apply after first 6 hours of continuous use*
Image Cytometer: ImageStream	$50	$95	*Imagestream XmkII*
Mass Cytometer - Suspension	$60	$100	
Mass Cytometer - Imaging	$60	$100	
Additional operator assistance		$50	
AutoMACS Pro	$30	$80	
Analysis Computers	$4	$54	
Group Training (per person, per hour)		$30	
Individual training		$50	
Software maintenance fees (including FlowJo, Imaris, Volocity) will be charged on a usage basis			
Used vs booked time reconciliation will be applied to all instruments (ie user will be charged the longer of the two (unless someone else uses some of the time)			

A charge of 50% of usage rate will be applied to late cancellation of bookings (where the slot has not been used by someone else). Cut off time will be set at 12 hours
External Academic rates = 2x Base Internal Rate
External Commercial Rate = 3x Base Internal Rate

THE UNIVERSITY OF SYDNEY
Core Research Facilities

Sydney Manufacturing Hub	
Instrument	**Cost (Internal Users)**
Furnaces	$15/hour
Salt baths	
Oil baths	
Extruders (Polymers lab)	
3D Polymer Printers (FFF printers)	
3D Metal Printers- Mlab, M2, A2X & SpectraH	$40/hour
3D Ceramic Printer – CeraFab 7500	
Pre & Post Fabrication Equipment	
Nanoindentation System	
3D Confocal Microscope	
Vickers Hardness Tester	
Technical Staff Assistance	$100/hour
Consumables – Metal powders, ceramic slurry, polymer resins and filaments will be charged to the researcher per weight/volume used	Quotation Required- Contact Facility
Individual user cap *Not included in the cap: Staff time & Consumables*	$1000/calendar year (Excluding 3D metal and ceramic printers) $1500/calendar year (if using all equipment)
External Academic rates = 2x Base Internal Rate	
External Commercial Rate = 3x Base Internal Rate	