

Rules for using each laboratory of UNIST Central Research Facilities (Eng)

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Rules for using the UNIST Materials Characterization Lab(UMCL)

(UMCL, Apr. 2021.)

Article 1. Access

- ① A person who wishes to be authorized to access the UMCL must obtain approval from the operator in charge after applying for access permissions application of participation space menu on UCRF homepage(<http://ucrf.unist.ac.kr>).
- ② A person who wishes to access without access authority shall be accompanied by the operator in charge or shall obtain approval for access from the operator in charge.
- ③ Unauthorized or simultaneous access by using a pass in the name of another person is not permitted, you must enter/exit individually using a pass in your name.
- ④ A person who use the UMCL at night(18:00 ~ 09:00 the next day) or holiday must enter after establishing personal safety and protection rules(Accompanying 2 or more people, emergency contact measures, etc.) in case of a safety accident.
- ⑤ A person who violates above clause ①~④ regarding access to the UMCL shall be obligated to compensate for all safety and property damage caused by the violation.

Article 2. Use of space

- ① A person who enter the UMCL must understand and follow the common safety rules for the laboratory(Attachment 1).
- ② A person who enter the UMCL on weekends or holidays must fill out the laboratory daily checklist(Attachment 2) provided in each laboratory, and must submit it receiving the signature of the principal investigator(advisor) within 3 days from the date of use.

- ③ A user should clean up the surrounding area after the end of the experiment, and must promptly notify the operator in charge if there is a problem with the equipment or the environment. Violation of the notification obligation may result in restrictions on the use of the equipment.

Article 3. Use of Equipment

- ① A person who wishes to use the equipment of UMCL must reserve and use the equipment after completing the training of the equipment operator, passing qualification evaluation, and acquiring unsupervised use rights. (Analysis or process request is irrelevant to equipment training and qualification evaluation)
- ② A person who completes regular and occasional training(including practice) by the equipment operator can receive practical training from the senior person of the laboratory to improve your proficiency. the qualification of the senior person (who used it 5 times or more within the previous 6 months) must be at least 1 year of experience in using the equipment.
The laboratory is responsible for all safety and property problems arising from practical training conducted by the senior person of the laboratory.
- ③ If there is no record of equipment use in the last 90 days, the qualification for unsupervised use is canceled. A person who reacquire the unsupervised user qualification must pass equipment training and qualification evaluation conducted by the equipment operator. the application for unsupervised user rating adjustment can be made through the website of UCRF. (<http://ucrf.unist.ac.kr>)
- ④ Equipment reservations or requests can be made through the UNIST Portal System and the website of UCRF, and the reservation time should not be unnecessarily occupied for a long time so as

not to damage others.

- ⑤ A user should be familiar with the safety rules for each equipment before using equipments, and use equipments after wearing appropriate safety gear.
- ⑥ Bringing in chemicals and other items for personal use is possible after prior consultation with the operator in charge.
- ⑦ A user must check that there is no problem before using equipment, chemicals, etc, and contact the operator promptly if there is problem before and after use.
- ⑧ A user must thoroughly fill out the performance records after using the equipment
- ⑨ A user must take safety measures by posting the contents of the experiment to deliver accurate information to others if you inevitably leave your seat during the experiment.
- ⑩ The laboratory(in case of outsiders, affiliated institution) of self-user shall be obligated to compensate for all safety and property damage such as accidents (equipment damage, breakdowns, losses, etc.) caused by the negligence of the self-user.

Article 4. Cancellation after equipment reservation

- ① A self-user can cancel equipment reservation by himself up to 2 hours before equipment reservation time. However, TEM (HR-TEM, FE-TEM, Normal TEM, Bio-TEM) can be canceled up to 4 hours before. (※ Cancellation is not possible after the cancellation deadline has passed.)
- ② If a user has reserved an analysis request but wants to cancel it, he must notify the equipment manager at least 24 hours in advance. (However, in the case of NMR, notification would be allowed up to 1 hour left.) A user who does not appear at the reservation time without prior notice will be charged a usage fee

for the reservation time.

Article 5. Laboratory safety and user management

- ① A person who harms the safety of the laboratory or violates the rules of using the UMCL and damages the equipment use of other person, can be awarded penalties according to [Attached Table 1] and be taken appropriate action.
- ② If the violation of the rules is deliberately determined, the sanctions may be strengthened. and If you voluntarily declare after violating the rules, the sanctions may be eased.
- ③ If it is judged that the sanctions are difficult to be properly implemented due to reasons such as graduation or resignation of the violator, the person may be suspended to access the UMCL.
- ④ A person who damage to the property and facilities of the UMCL by violating the rules shall be held liable to compensate for the damage.
- ⑤ If a violator does not follow the sanctions, the advisor of the violator will be held jointly responsible. (In the case of an outsider, the supervisor in charge of the affiliated institution)

[Attached Table 1]

Criteria for Awarding Penalty Points and Actions Taken against Users of the UMCL

1. Criteria for awarding penalty points

① Penalty points shall be awarded in the event that any inappropriate behavior by a research worker falls under the following. Each penalty score item may be incurred multiple times. (The expiration of penalty points is 1 year from the date of imposition)

No.	Description	Penalty points
1	Equipment is used by a user without obtaining permission to directly use the equipment concerned	5
2	Equipment is used without booking it (Including excessive use of equipment without additional reservation)	3
3	A feature is operated without permission during equipment use	3
4	An equipment abnormality or malfunction discovered before/after using the equipment is not immediately communicated to the operator in charge	3
5	Equipment is damaged or malfunctions or loss due to user negligence * The user is responsible for all costs incurred due to the above actions. *	5
6	Equipment is damaged or malfunctions due to failure to provide the operator in charge with sample information essential for maintaining the normal operation and safety of the equipment or facility concerned	3
7	A person causes the leakage of a harmful substance or gas, or any risk of fire	5
8	In the case of using, owning or occupying public items and other person's items without prior consent	1
9	A person leaves the laboratory without switching off the lights, locking the doors, tidying the surrounding areas, etc. after using equipment	1
10	A person do not follow the common lab safety rules(including clothing, prohibition of eating, etc.)	1

2. Actions taken after awarding penalty points

① If the cumulative penalty points exceeds a certain criterion, a sanction corresponding with the action taken will be imposed.

- ② When prohibition of use is implemented, an official letter is sent to the department or institution(in case of an external institution) which the violator belongs.
- ③ Even if the following actions occur due to the sum of the penalty points above the standard, the penalty points within the validity period are effective. (Even if a penalty point has been taken, it does not expire within the validity period.)

Type	Penalty points	Action taken
Total penalty points awarded to the individual	5 points or more	<ul style="list-style-type: none"> - The user is prohibited from using the equipment for 1 month. - When the prohibition period is finished, the user must complete the training and assessment again.
	8 points or more	<ul style="list-style-type: none"> - The user is prohibited from using the equipment for 3 months. - When the prohibition period is finished, the user must complete the training and assessment again.
Total penalty points awarded to students affiliated with the same laboratory for 1 equipment	12 points or more	- Notify the user and the advisor(supervisor) by e-mail that "If the penalty score is more than 15 points, the members of your laboratory are prohibited from using the equipment for 1 month."
	15 points or more	<ul style="list-style-type: none"> - The members of the laboratory are prohibited from using the equipment for 1 month. - Send an official letter of action to the affiliated department(institution).

Common Lab Safety Rules

(Safety team, 20th June 2016)

- ▷ Wear the proper lab clothes in the lab. Do not wear slippers.
- ▷ It is prohibited to smoke, eat, drink and/or wear make-up in the lab.
- ▷ Leave your workstation clean and in good order before leaving the lab.
- ▷ It is forbidden to carry out any goods that are not necessary for the purpose of the experiments.
- ▷ Perform only the experiments, according to the standards and procedures, authorized by the person in charge. I.
- ▷ The laboratory manager shall conduct a pre-safe training on any hazards that may occur during experiments.
- ▷ The experimenter shall read thoroughly all the safety rules prior to doing the experiment, with the appropriate safety gear or apparatus.
- ▷ Experiments shall only be conducted at the designated locations and shall always remain in those designated location. If inevitable, the experimenter shall obtain approval from the person in charge and have a substitute person for their experiment, before leaving.
- ▷ Inspect all apparatuses, reagents, and hazardous substances before using, while using and after using.
- ▷ Heating equipment and gas appliances are not allowed in the lab.
- ▷ The final check of the lab before leaving should be carried out by the last person in the lab. This person should make sure all of electrical appliances are powered off, all chemicals are properly stored, and all glass containers are locked up. They should also do any cleaning that is left to do inside the lab.

[Attachment 2] Laboratory Daily Checklist

Laboratory Daily Checklist

Name of Lab		Room no.		Inspection date	
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Section	Inspection point	Check
General Safety	Clean and tidy laboratory	
	Smoking and food intake in the laboratory	
	Safety rules, safety signs, personal protective equipment, and laboratory equipment (fume hood, etc.) management status	
	Publish a preliminary hazard analysis report	
	Attach danger index sticker or Safety/warning sheet	
	Turn off the power after using the equipment(Excluding equipment that is kept on standby)	
	Equipment emergency alarm	
Electrical Safety	Check the power-on status of electrical appliances that are not in use and whether to use octopus outlets	
	Using a grounding type outlet, damage to the insulation coating of electrical wiring and wiring arrangement	
	Grounding the device's enclosure or grounding to prevent electrostatic failure	
	Whether loading of foreign substances around the electric distribution board is prohibited	
Fire Safety	Fire extinguisher sign, proper fire extinguisher installed, and regular fire extinguisher inspection status	
	Securing emergency exits and evacuation routes, and whether obstacles are loaded in the passage	
	Whether it is prohibited to load foreign substances around fire hydrants and fire extinguishers	
Gas Safety	Storage of gas containers in designated places outdoors, prevention of fall and ventilation	
	Corrosion, deformation of the gas container exterior, nozzle lock condition, and excess gas container filling limit	
	Installation of brackish water leakage detection and alarm device, backflow/backfire prevention device, neutralizing agent poisoning device, and operation status check	
	Attachment of piping labeling, warning/warning of gas facilities, operating status of regulators and valves	
	Whether to handle such as maintaining a separation distance from nearby firearms	
Chemical Safety	Hazardous factor handling and management ledger, MSDS	

	Classification of chemical substances by nature and storage in a safe place such as reagent storage	
	Whether a warning sign is attached to a container, a container of chemical substance, or a container used after taking a small amount	
	Experimental waste liquid and waste management status (waste liquid classification mark, use of appropriate container, waste container cover closed, etc.)	
	Whether to store in quarantine and use a locking device for hazardous chemicals such as carcinogens and toxic substances	
Daily checklist Confirmation	Checker signature	
	Laboratory manager signature	

Rules for using UNIST Nano Fabrication Center (UNFC)

(UNFC. June 4. 2021)

Article 1. Access

- ① The UNFC is open 24 hours a day. Only research workers who have completed safety training and passed the assessment can enter the UNFC.
- ② A person can apply for a 1 day or 1 to 6 months access on the UCRF website. The users who applied for access can enter (exit) using their pass after approval by the person in charge. The entrance fee is charged according to the access period, and it is non-refundable.
- ③ Each user must enter (exit) individually using the pass card with their own identity. It is prohibited to enter using another person's pass or to enter together without permission.
- ④ A person who uses the UNFC at night (PM18-AM09 on the next day) or on holidays must enter after establishing personal safety and protection rules (accompanying 2 or more people, preparing for an emergency contact, etc.) for lab accidents.
- ⑤ A person who violates Article 1 section 1-4 stated above regarding to the access of UNFC shall be obligated to compensate for all safety and property damage caused by the violation.

Article 2. Use of Space

- ① Only a person who has experience at UNFC for more than 6 months can use the equipment at night, on weekends, and on holidays.
- ② A UNFC user on weekends or holidays must fill out the UNFC holiday safety sheet (Attachment 2) provided in each laboratory

room, and submit it to equipment manager, with the signature of the professor (or supervisor) within 3 days from the date of use.

③ A UNFC user must understand and follow the general safety rules for the cleanroom.

1) In the cleanroom, entering with make-up and smoking is prohibited. The room must be kept quiet and tidy up at all times.

2) A user of the cleanroom must comply with the following.

A. To maintain the “clean class”, only authorized items (non-dusting paper, coated paper, etc.) should be used. (Prohibited from pencil, water-based pen, etc.)

B. Only items (parts, equipment, etc.) approved by the equipment manager can be brought in after cleaning.

C. Prohibited from sitting on a workbench, leaning on equipment, running, or sitting on the floor.

3) Before starting the analysis and process, you should familiarize yourself with the safety rules for each equipment.

4) A user must wear appropriate safety protection before the experiment.

5) A user must check that there is no problem before using equipment, chemicals, etc., and if there is a problem, a user should promptly report to the equipment manager.

6) A user must thoroughly fill out the “Performance Records” after using the equipment.

7) UNFC holiday safety sheet must be submitted to the cleanroom person in charge after obtaining the approval of the principal investigator of the user.

8) A user must take safety measures by posting the contents of the experiment to deliver accurate information to others if he inevitably leaves his seat during the experiment.

9) A final user must leave the cleanroom after tidying up the

area and checking up for any problem in the cleanroom.

- ④ A user must wear the blue dust-proof clothes (not allowed personal items) provided in the smock room, follow the order of wearing. A user must not wear or soil another person's clothes and tidy up when undressing.
- ⑤ A user should clean up the area after finishing the experiment and must promptly notify the equipment manager if there is a problem with the equipment or environment. Violation of the notification obligation may result in restrictions on the use of the equipment.

Article 3. Use of Equipment

- ① A person who wishes to use the equipment of UNFC must reserve and use the equipment after completing the training of the equipment manager, assessment test, and acquiring self-user qualification. (Analysis or process request is irrelevant to equipment training and qualification test.)
- ② A user who completes regular or occasional training (including practice) by the equipment manager can receive practical training from the senior student of their laboratory to improve proficiency before the assessment test. The qualification of the senior must be at least 1 year of experience (more than 5 times in the previous 3 months) in using the equipment. The laboratory (in the case of an outsider, affiliated institution) is responsible for all safety and property issues arising from the practical training conducted by the senior student.
- ③ If there is no record of equipment used in the last 90 days, the qualification for self-use ends. A person who wants to reacquire the self-user qualification must receive equipment training and pass the assessment test conducted by the equipment manager.
- ④ Equipment reservations or requests can be made on the UNIST

Portal System and the website of UCRF (<http://ucrf.unist.ac.kr>), and the reservation time should not be unnecessarily occupied for a long time, so it does not affect the opportunity for others.

- ⑤ Bringing chemicals and other items for personal use should be consulted with the equipment manager. After submitting an application form for importing chemical and material safety data sheets (MSDS), they can be brought in with the approval of the equipment manager. (refer to attachment 1)
- ⑥ A user must notify the equipment manager of any special matters before and after using the equipment.

Article 4. Cancellation after equipment reservation

- ① A self-user can cancel equipment reservation by himself up to 2 hours before equipment reservation time. However, E-Beam lithography can be canceled up to 24 hours before. (※ Cancellation is not possible after the cancellation deadline has passed.)
- ② In the case of a process request, a user who does not appear at the reservation time without prior notice to the equipment manager will be charged a processing fee for the reserved time after the process reservation.

Article 5. Laboratory safety and user management

- ① A person who harms the safety of the laboratory or violates the rules of using UNFC and damages the equipment use of another person can be subject to penalties according to [Attached Table 1] and be taken appropriate action.
- ② If the violation of the rules is deliberately determined, the sanctions may be strengthened. If a user voluntarily declares after violating the rules, the sanctions may be eased.
- ③ If it is judged that the sanctions are difficult to be properly

implemented due to the status of the violator (graduation or resignation), the user may be blocked from accessing UNFC.

- ④ A person who damages the property and facilities of UNFC by violating the rules shall be held liable to compensate for the damage.
- ⑤ If a violator does not follow the sanctions, the advisor of the violator will be held jointly responsible. (In the case of an outsider, the supervisor in charge of the affiliated institution)

[Attached Table 1]

Criteria for Issuing Demerits and Actions Taken against Users of the UNFC (Cleanroom)

1. Criteria for issuing demerits

① Penalty points shall be awarded in the event that any inappropriate behavior by a user falls under the following. (When resuming use after sanctions, the previous penalty points are maintained for 1 year, and additional sanctions can be applied according to the accumulated points.)

Type		Penalty points
Class A Violation	A person causes the leakage of a harmful substance such as toxic gases or toxic substances	10
	A person causes fires and accidents	10
	The act of intentionally damaging the equipment	10
	Not notifying the manager when the amount of waste tank storage is more than 1/2	10
	Not wearing safety equipment(goggles, gas mask, apron, protective gloves, face mask, etc.) when using wet station or working related to waste tank treatment	10
	Incorrect classification of waste liquid	10
	Arbitrarily changing the chemical bath designated for each type (acid, organic, alkali)	10
	Operate electricity, gas, firefighting and other utilities without prior consultation with the manager	10
	Other acts that may damage the safety of others	10
Class B Violation	Equipment is used without booking it or Equipment is used in excess of the booking time without permission	5
	A person accesses using someone else's pass	5
	Use of equipment by making a reservation(login) in someone else's name	5
	Excessive use of equipment without prior consultation	5
	A person uses or steals the personal items(consumables, equipment, and materials for processes) of another person without prior consent	5
	Use of chemicals not approved by the manager in the cleanroom (including non-submission of application form for importing chemical)	5
	A person causes accidents or neglect it after using a chemical substance	5
	A person leaves a seat without leaving a note containing information such as chemical information in use, expected use time, affiliation, name, and contact information during the wet station experiment	5
	Other acts that may endanger safety or damage equipment, or violate the cleanroom rules	5

Class C Violation	After using the equipment, the act of not entering the usage record or entering false information	3
	Violation of how to wear dust-proof clothing and acts that affect cleanliness (make-up, etc.)	3
	A person uses items that are not permitted in the cleanroom	3
	A person uses hot plates and chemicals other than the specified hood	3
	A person neglects replaced equipment parts, used process consumables, specimens, etc. for a long time	3
	A person helps other person who has not completed safety training to access the cleanroom without the consent of the manager	3
	A person leaves chemical substances in an unspecified place	3
	A person violates the rules for bringing in goods and equipment(except for experimental purposes such as laptops and iPads)	3
	A person runs, leans on equipment, or sits on the floor in the cleanroom	3
	A person may be judged to require sanctions by damaging the laboratory safety of the cleanroom and the use of other person's equipment	3

2. Actions taken after issuing demerits

- ① If the cumulative penalty points fall under any of the following, appropriate sanctions will be taken.
- ② When sanctions are enforced, the relevant contents are notified by e-mail to the violator and the principal investigator(advisor) of the laboratory, and an official letter is sent to the department which the violator belongs. The content will be posted on the cleanroom bulletin board.

Type	Penalty points	Action taken
Total penalty points awarded to the individual	10 points or more	The use of the equipment is prohibited for 1 month.
	20 points or more	The use of the equipment is prohibited for 3 months or the access of the cleanroom is prohibited for 1 month in case of damage to the environment of the cleanroom
	30 points or more	The access of the cleanroom is prohibited for 3 months.
Total penalty points awarded to students affiliated with the same laboratory	40 points or more	All members of the laboratory is prohibited from using the equipment for 1 month.
	50 points or more	All members of the laboratory is prohibited from accessing the cleanroom for 1 month.

[Attachment 1] Application form for importing chemical (UNFC)
Application form for importing chemical (UNFC)

Importation	(Date : Month, Day, Year)			
Exportation	(Date : Month, Day, Year)			
Applicant	Department		E-mail	
	Name		Advisor	
Contents of chemicals	No.	1	2	3
	Name of chemical			
	Classification (Acid/Alkali/Organic)			
	Quantity			
	Volume/Weight			
	Expiration Date			
Reference	1. Fill in information based on MSDS and submit MSDS from maker. 2. Classification : Acid, Alkali, Organic (Waste chemical: HF, SPM, Acid, Alkali, PR etc.) 3. Check expiration date. 4. Mark name of chemical and owner on bottle. 5. Shelf life (1 year-PR/Solvent, 6 month-Acid, Alkali)			
I comply with regulations of UNIST for environment and safety management. In addition, I confirm the contents of chemicals. And I agree to joint responsibility for accident from incorrect information of chemicals.				
			Applicant :	(Signature)
			Advisor :	(Signature)

Chemical	Ex. Acetone	Chemical	
Import (Date)	Ex. 21. 01. 01	Import (Date)	
Export (Date)	Ex. 22. 12. 31	Export (Date)	
Property	Ex. Solvent	Property	
Department	Ex. UNIST UCRF	Department	
Name	Ex. Kang O Kim	Name	
Contact No.	010,****,**** (#4182)	Contact No.	

[Attachment 2] UNFC Holiday Safety Sheet

UCRF Unist Nano Fab Center(UNFC) Holiday Safety Sheet

Building(Room)	Laboratory name	Date	Daily participator for research		
			Department	Student	Professor
NSB108(B101)	UNFC	2021. . .		(Sign)	(Sign)

※ Only for the bluish square should be checked for users. (The rest of them is for the UNFC managers)

Appendix : Normal(O), Abnormal(X), Need to be repaired(△)

Contents		Method	Check	Significants
Conventional safety	Cleanness index of laboratory	Visual		
	No smoking, food, eating	Visual		
	Emergency contact number and guidance for urgent state	Visual		
	Management of experimental waste	Visual		
	Danger index sticker or safety/warning sheet	Visual		
Fire safety	Recognition for fire extinguisher position	Visual		
	Setting state of fire alarm and positions	Visual		
	Management of furnace/annealing devices	Visual		
Smock room	Operational state of positive pressure damper	Operational		
	Normality of automative entrance door	Operational		
	Operational state of air shower	Operational		
White room	Device alarm or abnormal state check	Operational		
	Leakage of gas(Gas alarm state)	Visual		
Photo room	Operational state of air shower	Operational		
	Device alarm or abnormal state check	Visual		
Wet station	MSDS	Visual		
	Chemical stocks or other storage position	Visual		
	Classification of chemicals in the stock	Visual		
	Management of ventilation system(fume hood, exhaust etc)	Operational		
	Level of waste bottles(acid)	Visual		
	Level of waste bottles(HF)	Visual		
	Level of waste bottles(CMOS)	Visual		
	Level of waste bottles(Alkali)	Visual		
Protection stuffs for individual users	Visual			
Electric safety	Insulation, peel of sheath, grounding of electronic devices	Visual		
	Electronic code with normal capacity and standard regulation	Visual		
	Combustibles near the heating devices	Visual		
	Normality of electronic short circuits	Operational		
Mechanical safety	Guidance for high temperature/pressure experimental devices	Operational		
	Operational state of optical devices(lasers etc)	Operational		
Sub-Fab	Gas, water, oil leak	Visual		
	Operational state of burn scrubber	Operational		
	Operational state of power drain	Operational		
	Pump noise(alarm) and oil leak	Visual		
	Waste water tank	Visual		
	Operation of solvent wasting device	Operational		
Gas room safety	Alarm of gas cabinets(Write the number of cabinet)	Operational		
	Oxygen concentration measurement(Normal range 20.9%)	18-23.5%		
	Operational state of burn scrubber or water leakage	Operational		
	Stationary of gas cylinder and gas valve/pipe state	Visual		
	Protection caps for the unused gas cylinder	Visual		
	Expiration date check for the high pressure gas cylinder	Visual		

※ For emergency situation, both diagnosis date and specific contests should be written on the column.

Rules for using UNIST Environmental Analysis Center(UEAC)

(UEAC, Apr. 2021)

Article 1. Access

- ① A person who wishes to be authorized to access the UEAC must obtain approval from the operator in charge after applying for access permissions application of participation space menu on UCRF homepage(<http://ucrf.unist.ac.kr>).
- ② A person who wishes to access without access authority shall be accompanied by the operator in charge or shall obtain approval for access from the operator in charge.
- ③ Unauthorized or simultaneous access by using a pass in the name of another person is not permitted, you must enter/exit individually using a pass in your name.
- ④ A person who use the UEAC at night(18:00 ~ 09:00 the next day) or holiday must enter after establishing personal safety and protection rules(Accompanying 2 or more people, emergency contact measures, etc.) in case of a safety accident.
- ⑤ A person who violates above clause ①~④ regarding access to the UEAC shall be obligated to compensate for all safety and property damage caused by the violation.

Article 2. Use of space

- ① A person who enter the UEAC must understand and follow the common safety rules for the laboratory(Attachment 1).
- ② A person who enter the UEAC on weekends or holidays must fill out the laboratory daily checklist(Attachment 2) provided in each laboratory, and must submit it receiving the signature of the principal investigator(advisor) within 3 days from the date of use.

- ③ A user should clean up the surrounding area after the end of the experiment, and must promptly notify the operator in charge if there is a problem with the equipment or the environment. Violation of the notification obligation may result in restrictions on the use of the equipment.

Article 3. Use of Equipment

- ① A person who wishes to use the equipment of UEAC must reserve and use the equipment after completing the training of the equipment operator, passing qualification evaluation, and acquiring unsupervised use rights. (Analysis or process request is irrelevant to equipment training and qualification evaluation)
- ② A person who completes regular training(including practice) by the equipment operator can receive practical training from the senior person of the laboratory to improve your proficiency. the qualification of the senior person (who used it 5 times or more within the previous 6 months) must be at least 1 year of experience in using the equipment. The laboratory is responsible for all safety and property problems arising from practical training conducted by the senior person of the laboratory.
- ③ If there is no record of equipment use in the last 90 days, the qualification for unsupervised use is canceled. A person who reacquire the unsupervised user qualification must pass equipment training and qualification evaluation conducted by the equipment operator. the application for unsupervised user rating adjustment can be made through the website of UCRF. (<http://ucrf.unist.ac.kr>)
- ④ Equipment reservations or requests can be made through the UNIST Portal System and the website of UCRF, and the reservation time should not be unnecessarily occupied for a long time so as not to damage others.

- ⑤ A user should be familiar with the safety rules for each equipment before using equipments, and use equipments after wearing appropriate safety gear.
- ⑥ Bringing in chemicals and other items for personal use is possible after prior consultation with the operator in charge.
- ⑦ A user must check that there is no problem before using equipment, chemicals, etc, and contact the operator promptly if there is problem before and after use.
- ⑧ A user must thoroughly fill out the performance records after using the equipment
- ⑨ A user must take safety measures by posting the contents of the experiment to deliver accurate information to others if you inevitably leave your seat during the experiment.
- ⑩ The laboratory(in case of outsiders, affiliated institution) of self-user shall be obligated to compensate for all safety and property damage such as accidents (equipment damage, breakdowns, losses, etc.) caused by the negligence of the self-user.

Article 4. Cancellation after equipment reservation

- ① A self-user can cancel equipment reservation by himself up to 2 hours before equipment reservation time. (※ Cancellation is not possible after the cancellation deadline has passed.)
- ② If a user has reserved an analysis request but wants to cancel it, he must notify the equipment manager at least 24 hours in advance. A user who does not appear at the reservation time without prior notice will be charged a usage fee

Article 5. Laboratory safety and user management

- ① A person who harms the safety of the laboratory or violates the rules of using the UEAC and damages the equipment use of other

person, can be awarded penalties according to [Attached Table 1] and be taken appropriate action.

- ② If the violation of the rules is deliberately determined, the sanctions may be strengthened. and If you voluntarily declare after violating the rules, the sanctions may be eased.
- ③ If it is judged that the sanctions are difficult to be properly implemented due to reasons such as graduation or resignation of the violator, the person can be suspended to access the UEAC until sanctions are implemented
- ④ A person who damage to the property and facilities of the UEAC by violating the rules shall be held liable to compensate for the damage.
- ⑤ If a violator does not follow the sanctions, the advisor of the violator will be held jointly responsible. (In the case of an outsider, the supervisor in charge of the affiliated institution)

[Attached Table 1] Criteria for Awarding Penalty Points and Actions Taken against Users of the UEAC

1. Criteria for awarding penalty points

- ① Penalty points shall be awarded in the event that any inappropriate behavior by a research worker falls under the following. Each penalty score item may be incurred multiple times. (The expiration of penalty points is 1 year from the date of imposition)

No.	Description	Penalty points
1	Equipment is used by a user without obtaining permission to directly use the equipment concerned	5
2	Equipment is used without booking it (Including excessive use of equipment	3

	without additional reservation	
3	A feature is operated without permission during equipment use	3
4	An equipment abnormality or malfunction discovered before/after using the equipment is not immediately communicated to the operator in charge	3
5	Equipment is damaged or malfunctions or loss due to user negligence * The user is responsible for all costs incurred due to the above actions. *	5
6	Equipment is damaged or malfunctions due to failure to provide the operator in charge with sample information essential for maintaining the normal operation and safety of the equipment or facility concerned	3
7	A person causes the leakage of a harmful substance or gas, or any risk of fire	5
8	In the case of using, owning or occupying public items and other person's items without prior consent	1
9	A person leaves the laboratory without switching off the lights, locking the doors, tidying the surrounding areas, etc. after using equipment	1
10	A person do not follow the common lab safety rules(including clothing, prohibition of eating, etc.)	1

2. Actions taken after awarding penalty points

- ① If the cumulative penalty points fall under any of the following, appropriate sanctions will be taken.
- ② When sanctions are enforced, an official letter is sent to the department or institution(in case of an external institution) which the violator belongs.

Type	Penalty points	Action taken
Total penalty points awarded to the individual	10 points or more	- the use of the equipment is prohibited for 1 month. - When resuming use of the equipment, training and evaluation must be completed again.
	20 points or more	- the use of the equipment is prohibited for 3 months. - When resuming use of the equipment, training and evaluation must be completed again.
	30 points or more	- the access of the UEAC is prohibited for 3 months.
Total penalty points awarded to students affiliated with the same laboratory	40 points or more	- all members of the laboratory is prohibited from using the equipment for 1 month - When resuming use of the equipment, training and evaluation must be completed again.
	50 points	- all members of the laboratory is prohibited from using

	or more	the equipment for 3 months. – When resuming use of the equipment, training and evaluation must be completed again.
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Common Lab Safety Rules

(Safety team, 20th June 2016)

- ▷ Wear the proper lab clothes in the lab. Do not wear slippers.
- ▷ It is prohibited to smoke, eat, drink and/or wear make-up in the lab.
- ▷ Leave your workstation clean and in good order before leaving the lab.
- ▷ It is forbidden to carry out any goods that are not necessary for the purpose of the experiments.
- ▷ Perform only the experiments, according to the standards and procedures, authorized by the person in charge. I.
- ▷ The laboratory manager shall conduct a pre-safe training on any hazards that may occur during experiments.
- ▷ The experimenter shall read thoroughly all the safety rules prior to doing the experiment, with the appropriate safety gear or apparatus.
- ▷ Experiments shall only be conducted at the designated locations and shall always remain in those designated location. If inevitable, the experimenter shall obtain approval from the person in charge and have a substitute person for their experiment, before leaving.
- ▷ Inspect all apparatuses, reagents, and hazardous substances before using, while using and after using.
- ▷ Heating equipment and gas appliances are not allowed in the lab.
- ▷ The final check of the lab before leaving should be carried out by the last person in the lab. This person should make sure all of electrical appliances are powered off, all chemicals are properly stored, and all glass containers are locked up. They should also do any cleaning that is left to do inside the lab.

[Attachment 2] Laboratory Daily Checklist

Laboratory Daily Checklist

Name of Lab	Room no.	Inspection date
Section	Inspection point	Check
General Safety	Clean and tidy laboratory	
	Smoking and food intake in the laboratory	
	Safety rules, safety signs, personal protective equipment, and laboratory equipment (fume hood, etc.) management status	
	Publish a preliminary hazard analysis report	
	Attach danger index sticker or Safety/warning sheet	
	Turn off the power after using the equipment(Excluding equipment that is kept on standby)	
	Equipment emergency alarm	
Electrical Safety	Check the power-on status of electrical appliances that are not in use and whether to use octopus outlets	
	Using a grounding type outlet, damage to the insulation coating of electrical wiring and wiring arrangement	
	Grounding the device's enclosure or grounding to prevent electrostatic failure	
	Whether loading of foreign substances around the electric distribution board is prohibited	
Fire Safety	Fire extinguisher sign, proper fire extinguisher installed, and regular fire extinguisher inspection status	
	Securing emergency exits and evacuation routes, and whether obstacles are loaded in the passage	
	Whether it is prohibited to load foreign substances around fire hydrants and fire extinguishers	
Gas Safety	Storage of gas containers in designated places outdoors, prevention of fall and ventilation	
	Corrosion, deformation of the gas container exterior, nozzle lock condition, and excess gas container filling limit	
	Installation of brackish water leakage detection and alarm device, backflow/backfire prevention device, neutralizing agent poisoning device, and operation status check	
	Attachment of piping labeling, warning/warning of gas facilities, operating status of regulators and valves	
	Whether to handle such as maintaining a separation distance from nearby firearms	
Chemical Safety	Hazardous factor handling and management ledger, MSDS	

	Classification of chemical substances by nature and storage in a safe place such as reagent storage	
	Whether a warning sign is attached to a container, a container of chemical substance, or a container used after taking a small amount	
	Experimental waste liquid and waste management status (waste liquid classification mark, use of appropriate container, waste container cover closed, etc.)	
	Whether to store in quarantine and use a locking device for hazardous chemicals such as carcinogens and toxic substances	
Daily checklist Confirmation	Checker signature	
	Laboratory manager signature	

Rules for using UNIST Design & Manufacturing Center(Maker Lab)

(Maker Lab, Apr. 2021)

Article 1. Access

- ① A person who wishes to be authorized to access the maker lab must fill out an application form and submit it to the manager of the maker lab after obtaining approval from the person in charge of the central research facilities.
- ② A person who wishes to access without access authority shall be accompanied by the operator in charge or shall obtain approval for access from the operator in charge.
- ③ Unauthorized or simultaneous access by using a pass in the name of another person is not permitted, you must enter/exit individually using a pass in your name.
- ④ A person who use the maker lab at night(18:00 ~ 09:00 the next day) or holiday must enter after establishing personal safety and protection rules(Accompanying 2 or more people, emergency contact measures, etc.) in case of a safety accident.
- ⑤ A person who violates above clause ①~④ regarding access to the maker lab shall be obligated to compensate for all safety and property damage caused by the violation.

Article 2. Use of space

- ① A person who enter the maker lab must understand and follow the common safety rules for the laboratory(Attachment 1).
- ② A person who enter the maker lab on weekends or holidays must fill out the laboratory daily checklist(Attachment 2) provided in each laboratory, and must submit it receiving the signature of the principal investigator(advisor) within 3 days from the date of use.

- ③ A user should clean up the surrounding area after the end of the experiment, and must promptly notify the operator in charge if there is a problem with the equipment or the environment. Violation of the notification obligation may result in restrictions on the use of the equipment.

Article 3. Use of Equipment

- ① A person who wishes to use the equipment of the maker lab must reserve and use the equipment after completing the training of the equipment operator, passing qualification evaluation, and acquiring unsupervised use rights. (Processing request is irrelevant to equipment training and qualification evaluation)
- ② A person who completes regular and occasional training(including practice) by the equipment operator can receive practical training from the senior person of the laboratory to improve your proficiency. the qualification of the senior person (who used it 5 times or more within the previous 6 months) must be at least 1 year of experience in using the equipment.
The laboratory is responsible for all safety and property problems arising from practical training conducted by the senior person of the laboratory.
- ③ If there is no record of equipment use in the last 6 months, the qualification for unsupervised use is canceled. A person who reacquire the unsupervised user qualification must pass equipment training and qualification evaluation conducted by the equipment operator. the application for unsupervised user rating adjustment can be made through the website of UCRF. (<http://ucrf.unist.ac.kr>)
- ④ Equipment reservations or requests can be made through the UNIST Portal System and the website of UCRF, and the reservation time should not be unnecessarily occupied for a long time so as

not to damage others.

- ⑤ A user should be familiar with the safety rules for each equipment before using equipments, and use equipments after wearing appropriate safety gear.
- ⑥ Bringing in chemicals and other items for personal use is possible after prior consultation with the operator in charge.
- ⑦ A user must check that there is no problem before using equipment, chemicals, etc, and contact the operator promptly if there is problem before, during, and after use.
- ⑧ A user must thoroughly fill out the performance records after using the equipment
- ⑨ A user must take safety measures by posting the contents of the experiment to deliver accurate information to others if you inevitably leave your seat during the experiment.
- ⑩ The laboratory(in case of outsiders, affiliated institution) of self-user shall be obligated to compensate for all safety and property damage such as accidents (equipment damage, breakdowns, losses, etc.) caused by the negligence of the self-user.

Article 4. Cancellation after equipment reservation

- ① A self-user can cancel equipment reservation by himself up to 2 hours before equipment reservation time. (※ Cancellation is not possible after the cancellation deadline has passed.)

Article 5. Laboratory safety and user management

- ① A person who harms the safety of the laboratory or violates the rules of using the maker lab and damages the equipment use of other person, can be awarded penalties according to [Attached Table 1] and be taken appropriate action.
- ② If the violation of the rules is deliberately determined, the sanctions

may be strengthened. and If you voluntarily declare after violating the rules, the sanctions may be eased.

- ③ If it is judged that the sanctions are difficult to be properly implemented due to reasons such as graduation or resignation of the violator, the person can be suspended to access the maker lab until sanctions are implemented
- ④ A person who damage to the property and facilities of the maker lab by violating the rules shall be held liable to compensate for the damage.
- ⑤ If a violator does not follow the sanctions, the advisor of the violator will be held jointly responsible. (In the case of an outsider, the supervisor in charge of the affiliated institution)

[Attached Table 1]

Criteria for Awarding Penalty Points and Actions Taken against Users of the Maker Lab

1. Criteria for awarding penalty points

① Penalty points shall be awarded in the event that any inappropriate behavior by a research worker falls under the following. Each penalty score item may be incurred multiple times. (The expiration of penalty points is 1 year from the date of imposition)

No.	Description	Penalty points
[Equipment use qualification]		
1	Equipment is used by a user without obtaining permission to directly use the equipment concerned	5
2	Equipment is used without booking it	3
3	Equipment is used by a person who did not make the booking	3
[Equipment use bookings]		
4	Equipment is booked or used outside permitted times	1
5	Equipment is used in excess of the booking time without making a booking for the excess time before the end of the initially booked time	1
6	Equipment is not used in the booked time, but the booking is not canceled	3
7	Based on the provisions of Article 7 of the Regulations on the Operation of UNIST Central Research Facilities, a booking is canceled after the cancellation deadline	1
8	Equipment is used without notifying the equipment operator after a booking	1
[Negligent behavior]		
9	A feature is operated without permission during equipment use	3
10	An equipment abnormality or malfunction discovered during equipment use is not immediately communicated to the operator in charge	3
11	Equipment is damaged or malfunctions due to user negligence	5
12	Equipment parts are lost or damaged due to user negligence	5
13	The equipment usage log is not completed	1
14	Equipment is damaged or malfunctions due to failure to provide the operator in charge with sample information essential for	3

	maintaining the normal operation and safety of the equipment or facility concerned	
15	A person leaves the room without switching off the lights, locking the doors, tidying the surrounding areas, etc. after using equipment at night or outside the regular work hours of the equipment operator	3
16	A person causes the leakage of a harmful substance or gas, or any risk of fire	5
17	A person uses or steals the personal items(consumables, equipment, and materials for analyses and processes) of another person without prior consent	5

2. Actions taken after awarding penalty points

- ① If the cumulative penalty points fall under any of the following, appropriate sanctions will be taken.
- ② When sanctions are enforced, the relevant contents are notified by e-mail to the violator and the principal investigator(advisor) of the laboratory, and an official letter is sent to the department or institution(in case of an external institution) which the violator belongs.

Type	Penalty points	Action taken
Total penalty points awarded to the individual	10 points or more	<ul style="list-style-type: none"> - the use of the equipment is prohibited for 1 month. - When resuming use of the equipment, training and evaluation must be completed again.
	20 points or more	<ul style="list-style-type: none"> - the use of the equipment is prohibited for 3 months. - When resuming use of the equipment, training and evaluation must be completed again.
	30 points or more	<ul style="list-style-type: none"> - the access of the maker lab is prohibited for 3 months.
Total penalty points awarded to students affiliated with the same laboratory	40 points or more	<ul style="list-style-type: none"> - all members of the laboratory is prohibited from using the equipment for 1 month - When resuming use of the equipment, training and evaluation must be completed again.
	50 points or more	<ul style="list-style-type: none"> - all members of the laboratory is prohibited from using the equipment for 3 months. - When resuming use of the equipment, training and evaluation must be completed again.

Common Lab Safety Rules

(Safety team, 20th June 2016)

- ▷ Wear the proper lab clothes in the lab. Do not wear slippers.
- ▷ It is prohibited to smoke, eat, drink and/or wear make-up in the lab.
- ▷ Leave your workstation clean and in good order before leaving the lab.
- ▷ It is forbidden to carry out any goods that are not necessary for the purpose of the experiments.
- ▷ Perform only the experiments, according to the standards and procedures, authorized by the person in charge. I.
- ▷ The laboratory manager shall conduct a pre-safe training on any hazards that may occur during experiments.
- ▷ The experimenter shall read thoroughly all the safety rules prior to doing the experiment, with the appropriate safety gear or apparatus.
- ▷ Experiments shall only be conducted at the designated locations and shall always remain in those designated location. If inevitable, the experimenter shall obtain approval from the person in charge and have a substitute person for their experiment, before leaving.
- ▷ Inspect all apparatuses, reagents, and hazardous substances before using, while using and after using.
- ▷ Heating equipment and gas appliances are not allowed in the lab.
- ▷ The final check of the lab before leaving should be carried out by the last person in the lab. This person should make sure all of electrical appliances are powered off, all chemicals are properly stored, and all glass containers are locked up. They should also do any cleaning that is left to do inside the lab.

[Attachment 2] Laboratory Daily Checklist

Laboratory Daily Checklist

Name of Lab		Room no.		Inspection date	
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Section	Inspection point	Check
General Safety	Clean and tidy laboratory	
	Smoking and food intake in the laboratory	
	Safety rules, safety signs, personal protective equipment, and laboratory equipment (fume hood, etc.) management status	
	Publish a preliminary hazard analysis report	
	Attach danger index sticker or Safety/warning sheet	
	Turn off the power after using the equipment(Excluding equipment that is kept on standby)	
	Equipment emergency alarm	
Electrical Safety	Check the power-on status of electrical appliances that are not in use and whether to use octopus outlets	
	Using a grounding type outlet, damage to the insulation coating of electrical wiring and wiring arrangement	
	Grounding the device's enclosure or grounding to prevent electrostatic failure	
	Whether loading of foreign substances around the electric distribution board is prohibited	
Fire Safety	Fire extinguisher sign, proper fire extinguisher installed, and regular fire extinguisher inspection status	
	Securing emergency exits and evacuation routes, and whether obstacles are loaded in the passage	
	Whether it is prohibited to load foreign substances around fire hydrants and fire extinguishers	
Gas Safety	Storage of gas containers in designated places outdoors, prevention of fall and ventilation	
	Corrosion, deformation of the gas container exterior, nozzle lock condition, and excess gas container filling limit	
	Installation of brackish water leakage detection and alarm device, backflow/backfire prevention device, neutralizing agent poisoning device, and operation status check	
	Attachment of piping labeling, warning/warning of gas facilities, operating status of regulators and valves	
	Whether to handle such as maintaining a separation distance from nearby firearms	
Chemical Safety	Hazardous factor handling and management ledger, MSDS	

	Classification of chemical substances by nature and storage in a safe place such as reagent storage	
	Whether a warning sign is attached to a container, a container of chemical substance, or a container used after taking a small amount	
	Experimental waste liquid and waste management status (waste liquid classification mark, use of appropriate container, waste container cover closed, etc.)	
	Whether to store in quarantine and use a locking device for hazardous chemicals such as carcinogens and toxic substances	
Daily checklist Confirmation	Checker signature	
	Laboratory manager signature	

Rules for Using the In Vivo Research Center (IVRC)

(June 4, 2021)

Article 1: Access

- ① Each user must enter (exit) individually using the pass card with their own identity. Entering the room using another person's pass card or without permission is prohibited. A person who wants to access the laboratories in the IVRC must obtain self-user qualification according to Article 4, paragraph ①.
- ② A person who wants to access the animal zone in the IVRC must complete the following training guidelines:
 - 1) User training is available on the UNIST Blackboard website. After completing the online training, qualification for the on-site training is granted if the sum of points is 180 points or more (video: 100 points, test: 100 points).
 - 2) On-site training is held in the laboratory. Users must go directly to the laboratory which they wish to access and receive training under the guidance of the laboratory manager.
 - 3) An existing user who has completed the on-site training can only access the lab for which they have completed training. Further on-site training is required to access an additional laboratory.
 - 4) Access permission for the animal research facility expires after 2 years. Training must be repeated to extend or renew access.
- ③ A person who violates the above clauses ①~③ regarding access to the laboratories and the animal research facility of the IVRC shall be liable for all safety and property damage caused by the violation.

Article 2: Requirements for IVRC Reservations

- ① IVRC reservations may be reserved through the reservation system guided by the IVRC. Concurrent reservations may not be possible for some spaces due to microbial contamination or experimental conditions.
- ② A person must wear proper clothing when entering the IVRC laboratory and animal research facility, and may wear additional clothing as needed.
 1. A person must wear laboratory clothing in compliance with management standards according to the safety level.
 2. A person must wear surgical clothing and dust-proof clothing in the animal research facility according to IVRC standards.
- ③ A user of the animal research facility may not enter with personal items (e.g., cell phone, watch, wallet, earphones, etc.). However, a user may bring in necessary items after consulting with the manager and observing the appropriate safety measures.
- ④ The animal room space is allocated by zones according to the purpose of the experiment, and the administrator allocates space in consideration of the number of cages available and the number of cages that will increase in the future.
- ⑤ A person must be quiet in the animal research facility, and actions that cause harm to other users are prohibited.
- ⑥ A user shall not arbitrarily use the equipment and property of others, and shall mark them to prevent theft of personal items and the use of others.
- ⑦ A user must clean up used items before leaving. If there is waste, the user must classify and dispose of it according to the characteristics.

Article 3: IVRC Laboratory Animal Management

- ① In order to conduct animal experiments, only experiments approved by the Institutional Animal Care and Use Committee (IACUC) can be carried out.
- ② A user must maintain the appropriate number of breeding animals in accordance with the standards of the IACUC.
- ③ The manager shall oversee laboratory animals in accordance with the IVRC SOP. A user must directly manage animals that require special treatment after consultation with the person in charge.
- ④ Basic animal management is performed under the direction of the manager, but if a user wishes to self-manage, , it can be done after completing the proper training procedures.
- ⑤ A user must not arbitrarily change the arrangement of animals and cannot touch or use other users' animals without permission.
- ⑥ A user must appropriately conduct infection experiments in a designated location.

Article 4: Use of The IVRC Equipment

- ① A person who wishes to use the equipment of IVRC must reserve and use the equipment after completing equipment operator training, passing the qualification evaluation, and acquiring the rights to unsupervised use.
- ② If the unsupervised use qualification is lost, a person must obtain it again through the training conducted by the equipment operator.
- ③ Equipment reservation can be made through the UNIST Portal System, the UCRF website, or the reservation system guided by the IVRC. To avoid harming others, the reservation time should not be taken without reason.
- ④ The use of the equipment may be restricted if the user does not show up after making a reservation.
- ⑤ A user must check how to use the equipment before handling. If

there are any problems before use, the issue must be noted in the logbook and reported to a the person in charge of the equipment.

- ⑥ When you inevitably leave your seat during an experiment, a user must follow proper safety measures by posting the contents of the experiment to provide accurate information to others.
- ⑦ The image analysis room should be managed at the same level of cleanliness as the return animal zone.
- ⑧ Only individuals who have completed radiation safety training may apply for gamma irradiation systems training.
- ⑨ A user must thoroughly complete the performance records after using the equipment. The use of equipment may be restricted if a record is falsified or unrecorded.

Article 5: Introduction and Release of Items

- ① All items brought into the animal research facility must be sterilized to prevent microbial contamination. Even if the item has been sterilized in the laboratory, a request for sterilization must be made.
- ② Sterilization work is carried out according to the schedule, and a researcher must bring in items directly through the pass box in consultation with the manager in charge.
- ③ Waste must be separated according to its properties and disposed of through an airlock.
- ④ A person must consult a manager before bringing in items that cannot be sterilized.

Article 6: Introduction, Release and Relocation of Animals

- ① When bringing in animals from other institutions, a person must submit a microbial monitoring report and an introduction application form and obtain permission from the person in charge of the

animal research facility.

- ② When purchasing animals through a supplier, a person must submit an application form to the person in charge and proceed in bulk.
- ③ Animals must be taken out only for the purpose of termination of the experiment, autopsy, or joint research. A user must submit a request to release laboratory animals or to take them out directly. The manager must confirm the request before taking them out according to the schedule.
- ④ Animals taken out of the animal research facility cannot be brought back into the animal research facility.
- ⑤ A person who wishes to move animals must fill out and submit an application for moving animals before proceeding.
 - 1) The movement of experimental animals between zones is based on the cleanliness level and it is not possible to proceed in reverse order.
 - 2) Movement between laboratories is fluid according to the monitoring results. Cages must be replaced when they are moved.
 - 3) When moving within the animal research facility, a person must use a general cart and be careful not to cause undue stress to the animals.
 - 4) When moving an animal to acquire a video image, a person must move the animal by using a sealed cart and return it to its original position by using a sealed cart after the experiment ends.
 - 5) A person must be careful not to let the animal under experiment come into contact with other animals and avoid microbial infection after the end of the experiment.

Article 7:Laboratory Safety

① Common Conduct

- 1) A person who harms the safety of the laboratory or violates the

rules governing the use of the IVRC and damages the equipment of others may be subject to penalties according to the [Attached Table 1].

2) A person entering the IVRC on weekends or holidays must complete the Laboratory Holiday Checklist (Attachment 2) provided in each laboratory submit it within two days of use with the signature of the principal investigator (advisor).

3) Only a person with at least three months of experience in the IVRC may use it at night, on weekends, or during holidays and must enter after following personal safety and protection protocols (being accompanied by two or more people, following emergency contact measures, etc.).

4) A user must understand and follow the general safety rules provided at each entrance to the IVRC laboratory and the basic rules of the UNIST Regulations on Bio safety Management.

5) A user should be familiar with laboratory safety accident response measures and first aid described in the UNIST Regulations on Bio safety Management, which are posted at each entrance to the IVRC laboratory, in order to respond quickly in the event of a safety accident.

6) A user must make sure that there are no problems before and after using the IVRC equipment and laboratory and contact the operator in charge promptly if there is a problem.

7) A user must wear appropriate safety protection equipment before the experiment and clean the surrounding area, laboratory equipment, and protective equipment, after finishing the experiment.

8) Bringing in chemicals and other items is only permitted after prior consultation with the operator in charge and a user submits a material safety data sheet (MSDS).

② Laboratory Safety

- 1) Sitting on the workbench in the laboratory, leaning on equipment, running, or sitting on the floor is prohibited.
- 2) The user should be familiar with the safety rules for each equipment.
- 3) The gamma irradiation systems facility (image analysis room 2) is managed separately in accordance with radiation protection management regulations.

③ Regarding animal research safety:

- 1) Sitting or running on the floor in the animal research facility is prohibited.
- 2) Infection experiments must follow the operational details made in accordance with the IVRC Bio Safety Levels.

④ Waste Control

- 1) A person must comply with the 「Wastes Control Act」 when disposing and managing waste, such as any microbial culture medium, perishable waste, animal tissue, and animals from the animal research facility.
- 2) A user of the animal research facility shall become familiar with waste treatment procedures and methods, comply with treatment procedures, and strive to ensure the safe disposal of waste.

Article 8: Others

- ① The rules for using the IVRC follow the operational details established by the 「Animal Protection Act」, 「Laboratory Animal Act」, 「Transboundary Movement, Etc. of Living Modified Organisms Act」, and the 「Integrated Notice on Transboundary Movement of Living Modified Organisms」
- ② Further details regarding the operation and use of equipment must follow the IVRC SOP.

[Attached Table 1]

Criteria for Issuing Demerits and Actions Taken Against Users of the IVRC

1. Criteria for issuing demerits

① Penalty points shall be issued in the event that any inappropriate behavior by a user falls under one or more of the following descriptions Penalties may be incurred multiple times. The expiration of demerits is one year from the date of imposition.

Penalty points	Description
10	A person commits a serious violation that may cause pollution accidents
	A person endangers public safety, such as fire, exposure to pathogens and toxic substances, or violates laboratory safety regulations
	A person damages or intentionally loses laboratory equipment and breeding equipment
	A person carries out animals or items(equipment) used for infection testing without sterilization procedures
	A person conducts animal experiments without the approval of Institutional Animal Care and Use Committee (IACUC)
	A person neglects to manage psychotropic drugs
	A person causes damage to the safety of others and contamination of the animal research facility or violates related laws
5	A person enters the animal research facility without permission
	A person uses equipment without unsupervised user qualification
	A person leaves animals unattended in other place(not breeding room) for 24 hours or more
	A person's neglect leads to an animal's escape
	A person acts against animal welfare
	A person violates the order of access by zone and period of access restriction

	A person moves animals randomly or without permission
	A person takes out items or animals of the animal research facility without permission
	A person uses other researchers' equipment and items without permission
	A person harms others, damages equipment and facilities, or violates the rules of use
3	A person uses equipment without a reservation or uses equipment reserved by another person
	A person does not use the reservation time without notice of cancellation of equipment reservation
	A person does not follow entry/exit procedures of the animal research facility
	A person interrupts animals care (by causing noise, causing differential pressure fluctuations, etc.)
	A person engages in poor breeding management (non-compliance with feeding, providing insufficient drinking water supply, limiting the number of breeding animals, writing name tags, etc.)
	A person experiments in an area outside of the designated location
	A person does not properly tidy up after use (failure to clean equipment, failure to clean the facilities, , failure to turn off lights at night, improper disposal of animal carcasses, etc.)
	A person is sanctioned for causing damage to others in the use of other animal research facilities and equipment
1	A person does not submit appropriate applications
	Equipment is used in excess of the booking time without making a proper reservation.

2. Actions taken after issuing penalty points

- ① If the cumulative total of penalty points fall under any of the following, appropriate sanctions will be taken.
- ② When sanctions are imposed, the violator and the principal investigator (advisor) of the laboratory will be informed by email,

and an official letter will be sent to the department or institution (in the case of an external institution) to which the violator belongs.

Type	Penalty points	Action taken
Total penalty points awarded to the individual	15	- The use of the IVRC is prohibited for 1 month. When resuming use of the IVRC, training must be completed again.
	30	- The use of the IVRC is prohibited for 3 months. When resuming use of the IVRC, training must be completed again.
Total penalty points awarded to students affiliated with the same laboratory	40	- Penalty for assigning breeding rooms for 3 months (subordinated assignment)
	50	- Penalty for assigning breeding rooms for 6 months (subordinated assignment) - Training must be completed again for all members of laboratory.

(Attachment 2) Laboratory Checklist (Holiday)

Zone	Bldg./NO.	105/	Date	
Division	Checkpoint			Check
General Safety	Lab is neat and tidy			
	No smoking or eating in the lab			
	Proper management of safety rules, safety signs, personnel safety equipment, fume hood, including experiment equipment			
	Posted pre-hazard risk analysis report			
Electric	Connect electric power without using electric devices and tentacle socket connection			
	Grounded outlets, insulating coating on electric wiring, and proper electrical wiring arrangement			
	Grounded status of experiment equipment cover for the prevention of static electricity			
	Loading at front of electric panelboard			
Fire	Proper fire extinguisher choice based on lab character, fire extinguisher notice, regular check status			
	Fire exit, secure evacuation way			
	Loading prohibit at fire extinguisher and hydrant surroundings			
Chemical	Put up hazard treat & manage register AND MSDS			
	Chemicals classification based on property and status, storage chemical reagents in safety cabinets			
	GHS mark attachment on reagents bottles and chemical containers			
	Experiment waste management status (classify sign, proper container with clamping cover)			
	Status of isolated storage and locking for cancer-causing agent and toxic substance			
Gas	Gas storage at restricted outdoor location, gas cylinder fall down prevention, ventilation status			
	Corrosion, modifications, locking nozzle, recharge time limit of gas cylinder			
	Gas leakage sensing alarm equipment, gas non-return valve, scrubber installation and operation status			
	Attach signs on gas pipe, warning sign on gas using equipment, regulator and valve status			
	Distance maintenance between gas cylinder and fire			
Biology	Management status on organism (including LMO), tissue, cell, blood (storage container, storage record and biohazard mark at storage place)			
	Management status on autoclave and cleaning facilities including hand sterilizer			
	Management and operational ledger at organism research lab			
	Separate disposal of medical waste and organism apparatus (syringe, tweezers, etc.), using statues of waste box cover			
Confirmation	Inspector Signature		(sign)	
	Lan Director Signature		(sign)	

* histopathology lab (106), cell culture room (107), teaching lab (108), imaging lab 1~3 (B44~B42), small animal zone (B24,B25), small-2 animal zone (B83), return animal zone (B53), isolation lab (B79)

Rules for using UNIST Optical Biomed Imaging Center(UOBC)

(UOBC, Apr. 2021)

Article 1. Access

- ① A person who wishes to be authorized to access the UOBC must fill out an application form and submit it to the manager of the UOBC after obtaining approval from the person in charge of the central research facilities.
- ② A person who wishes to access without access authority shall be accompanied by the operator in charge or shall obtain approval for access from the operator in charge.
- ③ Unauthorized or simultaneous access by using a pass in the name of another person is not permitted, you must enter/exit individually using a pass in your name.
- ④ A person who use the UOBC at night(18:00 ~ 09:00 the next day) or holiday must enter after establishing personal safety and protection rules(emergency contact measures, etc.) in case of a safety accident.
- ⑤ A person who violates above clause ①~④ regarding access to the UOBC shall be obligated to compensate for all safety and property damage caused by the violation.

Article 2. Use of space

- ① A person who enter the UOBC must understand and follow the common safety rules for the laboratory(Attachment 1).
- ② A person who enter the UOBC on weekends or holidays must fill out the laboratory daily checklist(Attachment 2) provided in each laboratory, and must submit it receiving the signature of the principal investigator(advisor) within 3 days from the date of use.

- ③ A user should clean up the surrounding area after the end of the experiment, and must promptly notify the operator in charge if there is a problem with the equipment or the environment. Violation of the notification obligation may result in restrictions on the use of the equipment.

Article 3. Use of Equipment

- ① A person who wishes to use the equipment of the UOBC must reserve and use the equipment after completing the training of the equipment operator, passing qualification evaluation, and acquiring unsupervised use rights. (Analysis request is irrelevant to equipment training and qualification evaluation)
- ② If there is no record of equipment use in the last 6 months, the qualification for unsupervised use is canceled. A person who reacquire the unsupervised user qualification must pass equipment training and qualification evaluation conducted by the equipment operator. the application for unsupervised user rating adjustment can be made through the website of UCRF. (<http://ucrf.unist.ac.kr>)
- ③ Equipment reservations or requests can be made through the UNIST Portal System and the website of UCRF, and the reservation time should not be unnecessarily occupied for a long time so as not to damage others.
- ④ A user should be familiar with the safety rules for each equipment before using equipments, and use equipments after wearing appropriate safety gear.
- ⑤ Bringing in chemicals and other items for personal use is possible after prior consultation with the operator in charge.
- ⑥ A user must check that there is no problem before using equipment, chemicals, etc, and contact the operator promptly if there is problem before and after use.

- ⑦ A user must thoroughly fill out the performance records after using the equipment
- ⑧ A user must take safety measures by posting the contents of the experiment to deliver accurate information to others if you inevitably leave your seat during the experiment.
- ⑨ The laboratory(in case of outsiders, affiliated institution) of self-user shall be obligated to compensate for all safety and property damage such as accidents (equipment damage, breakdowns, losses, etc.) caused by the negligence of the self-user.

Article 4. Cancellation after equipment reservation

- ① A self-user can cancel equipment reservation by himself up to 2 hours before equipment reservation time. (※ Cancellation is not possible after the cancellation deadline has passed.)
- ② If a user has reserved an analysis request but wants to cancel it, he must notify the equipment manager at least 24 hours in advance. A user who does not appear at the reservation time without prior notice will be charged a usage fee.

Article 5. Laboratory safety and user management

- ① A person who harms the safety of the laboratory or violates the rules of using the UOBC and damages the equipment use of other person, can be awarded penalties according to [Attached Table 1] and be taken appropriate action.
- ② If the violation of the rules is deliberately determined, the sanctions may be strengthened. and If you voluntarily declare after violating the rules, the sanctions may be eased.
- ③ If it is judged that the sanctions are difficult to be properly implemented due to reasons such as graduation or resignation of the violator, the person can be suspended to access the UOBC until

sanctions are implemented

- ④ A person who damage to the property and facilities of the UOBC by violating the rules shall be held liable to compensate for the damage.
- ⑤ If a violator does not follow the sanctions, the advisor of the violator will be held jointly responsible. (In the case of an outsider, the supervisor in charge of the affiliated institution)

[Attached Table 1]

Criteria for Awarding Penalty Points and Actions Taken against Users of the UOBC

1. Criteria for awarding penalty points

- ① Penalty points shall be awarded in the event that any inappropriate behavior by a research worker falls under the following. Each penalty score item may be incurred multiple times. (The expiration of penalty points is 1 year from the date of imposition)

No.	Description	Penalty points
[Equipment use qualification]		
1	Equipment is used by a user without obtaining permission to directly use the equipment concerned	5
2	Equipment is used without booking it	3
3	Equipment is used by a person who did not make the booking	3
[Equipment use bookings]		
4	Equipment is booked or used outside permitted times	1
5	Equipment is used in excess of the booking time without making a booking for the excess time before the end of the initially booked time	1
6	Equipment is not used in the booked time, but the booking is not canceled	3
7	Based on the provisions of Article 7 of the Regulations on the Operation of UNIST Central Research Facilities, a booking is canceled after the cancellation deadline	1
8	Equipment is used without notifying the equipment operator after a booking	1
[Negligent behavior]		
9	A feature is operated without permission during equipment use	3
10	An equipment abnormality or malfunction discovered during equipment use is not immediately communicated to the operator in charge	3
11	Equipment is damaged or malfunctions due to user negligence	5
12	Equipment parts are lost or damaged due to user negligence	5
13	The equipment usage log is not completed	1
14	Equipment is damaged or malfunctions due to failure to provide the operator in charge with sample information essential for	3

	maintaining the normal operation and safety of the equipment or facility concerned	
15	A person leaves the room without switching off the lights, locking the doors, tidying the surrounding areas, etc. after using equipment at night or outside the regular work hours of the equipment operator	3
16	A person causes the leakage of a harmful substance or gas, or any risk of fire	5
17	A person uses or steals the personal items(consumables, equipment, and materials for analyses and processes) of another person without prior consent	5

2. Actions taken after awarding penalty points

- ① If the cumulative penalty points fall under any of the following, appropriate sanctions will be taken.
- ② When sanctions are enforced, an official letter is sent to the department or institution(in case of an external institution) which the violator belongs.

Type	Penalty points	Action taken
Total penalty points awarded to the individual	10 points or more	<ul style="list-style-type: none"> - the use of the equipment is prohibited for 1 month. - When resuming use of the equipment, training and evaluation must be completed again.
	20 points or more	<ul style="list-style-type: none"> - the use of the equipment is prohibited for 3 months. - When resuming use of the equipment, training and evaluation must be completed again.
	30 points or more	<ul style="list-style-type: none"> - the access of the UOBC is prohibited for 3 months.
Total penalty points awarded to students affiliated with the same laboratory	40 points or more	<ul style="list-style-type: none"> - all members of the laboratory is prohibited from using the equipment for 1 month - When resuming use of the equipment, training and evaluation must be completed again.
	50 points or more	<ul style="list-style-type: none"> - all members of the laboratory is prohibited from using the equipment for 3 months. - When resuming use of the equipment, training and evaluation must be completed again.

Common Lab Safety Rules

(Safety team, 20th June 2016)

- ▷ Wear the proper lab clothes in the lab. Do not wear slippers.
- ▷ It is prohibited to smoke, eat, drink and/or wear make-up in the lab.
- ▷ Leave your workstation clean and in good order before leaving the lab.
- ▷ It is forbidden to carry out any goods that are not necessary for the purpose of the experiments.
- ▷ Perform only the experiments, according to the standards and procedures, authorized by the person in charge. I.
- ▷ The laboratory manager shall conduct a pre-safe training on any hazards that may occur during experiments.
- ▷ The experimenter shall read thoroughly all the safety rules prior to doing the experiment, with the appropriate safety gear or apparatus.
- ▷ Experiments shall only be conducted at the designated locations and shall always remain in those designated location. If inevitable, the experimenter shall obtain approval from the person in charge and have a substitute person for their experiment, before leaving.
- ▷ Inspect all apparatuses, reagents, and hazardous substances before using, while using and after using.
- ▷ Heating equipment and gas appliances are not allowed in the lab.
- ▷ The final check of the lab before leaving should be carried out by the last person in the lab. This person should make sure all of electrical appliances are powered off, all chemicals are properly stored, and all glass containers are locked up. They should also do any cleaning that is left to do inside the lab.

[Attachment 2] Laboratory Daily Checklist

Laboratory Daily Checklist

Name of Lab		Room no.		Inspection date	
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Section	Inspection point	Check
General Safety	Clean and tidy laboratory	
	Smoking and food intake in the laboratory	
	Safety rules, safety signs, personal protective equipment, and laboratory equipment (fume hood, etc.) management status	
	Publish a preliminary hazard analysis report	
	Attach danger index sticker or Safety/warning sheet	
	Turn off the power after using the equipment(Excluding equipment that is kept on standby)	
	Equipment emergency alarm	
Electrical Safety	Check the power-on status of electrical appliances that are not in use and whether to use octopus outlets	
	Using a grounding type outlet, damage to the insulation coating of electrical wiring and wiring arrangement	
	Grounding the device's enclosure or grounding to prevent electrostatic failure	
	Whether loading of foreign substances around the electric distribution board is prohibited	
Fire Safety	Fire extinguisher sign, proper fire extinguisher installed, and regular fire extinguisher inspection status	
	Securing emergency exits and evacuation routes, and whether obstacles are loaded in the passage	
	Whether it is prohibited to load foreign substances around fire hydrants and fire extinguishers	
Gas Safety	Storage of gas containers in designated places outdoors, prevention of fall and ventilation	
	Corrosion, deformation of the gas container exterior, nozzle lock condition, and excess gas container filling limit	
	Installation of brackish water leakage detection and alarm device, backflow/backfire prevention device, neutralizing agent poisoning device, and operation status check	
	Attachment of piping labeling, warning/warning of gas facilities, operating status of regulators and valves	
	Whether to handle such as maintaining a separation distance from nearby firearms	
Chemical Safety	Hazardous factor handling and management ledger, MSDS	

	Classification of chemical substances by nature and storage in a safe place such as reagent storage	
	Whether a warning sign is attached to a container, a container of chemical substance, or a container used after taking a small amount	
	Experimental waste liquid and waste management status (waste liquid classification mark, use of appropriate container, waste container cover closed, etc.)	
	Whether to store in quarantine and use a locking device for hazardous chemicals such as carcinogens and toxic substances	
Daily checklist Confirmation	Checker signature	
	Laboratory manager signature	