

Safety Manual

April 2018



Faculty and Graduate School of Science, The University of Tokyo

1. Introduction

1.1 Overview

This Safety Manual is based on the guidelines to Health and Safety Training created by the Division for Environment, Health and Safety, the University of Tokyo and the Safety Manual for the Faculty and Graduate School of Engineering, and it contains a summary of all items related to safety that represent the minimum that all members of the Faculty and Graduate School of Science are required to know. We hereby extend our deepest gratitude to the Division for Environment, Health and Safety, the University of Tokyo and the Health and Safety Management Office of the Faculty and Graduate School of Engineering for providing the documentation required to produce this manual.

1.2 Objectives

This Safety Manual stipulates the codes of conduct that all members are required to observe, regardless of whether they are teaching staff or students, in order to ensure that safety is fully guaranteed through all educational and research activities carried out by the Faculty and Graduate School of Science. These stipulations demand the strict observance of the Industrial Safety and Health Law, the Fire Services Act, the Poisonous and Deleterious Substance Control Law, all laws related to the emission of radiation, and all other laws and regulations in order to prevent or minimize damage and maintain health in the event of accidents or natural disasters, etc., occurring. It is particularly necessary for all people in management positions to carry out their duties regarding this without fail.

Details and up-to-date information on health and safety management are available on the website of the Environment and Safety Management Office, School of Science (hereinafter known as the Management Office Website) and the website of the Division for Environment, Health and Safety, the University of Tokyo, and you are duly recommended to refer to these sites.

Management Office Website: <http://jimubu.adm.s.u-tokyo.ac.jp/public/index.php/Esmo>

Website of the Division for Environment, Health and Safety:

<http://www.ut-portal.u-tokyo.ac.jp/gakunai/system/ehs/index.html>

Environment and Safety Management Office, School of Science, The University of Tokyo (hereinafter known as the Management Office.)

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2. Environmental Safety Management

Environmental safety management is important for ensuring the security of faculty members and students, as well as neighboring residents. Accidents, disasters and environmental pollution occurring during the course of research and education have the potential to invalidate or undermine the significance of the research and education being undertaken, and as such, preventing such incidents, minimizing the damage that they cause, and implementing follow-up measures and responses in a reasonable manner are the responsibilities of all those involved in research and educational activities. These duties are considered of the highest concern and preconditions for all research and educational activities. All faculty members must be mindful of these issues.

2.1 Environmental Safety Management

An outline of the management of environmental safety for the School of Science is shown below. Environmental safety management must be undertaken at all levels and in accordance with the structure of authority – from the Dean of the School of Science to the Head of the Department/Head of the Facility, and to the laboratory manager. All those responsible for management must be fully aware of their obligations to uphold safety standards.

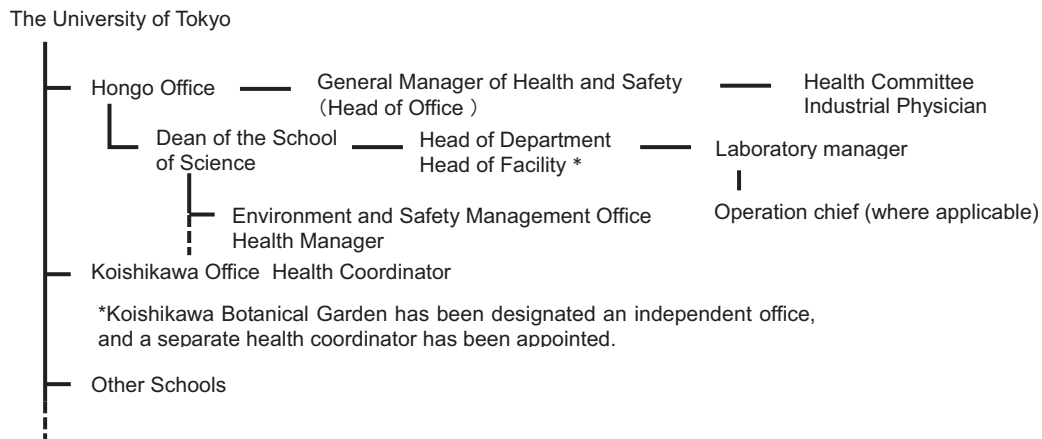


Fig.1. Environmental Safety Management

2.2 Patrols and Self-Inspections

Patrols and self-inspections must be carried out in order to prevent accidents, disasters and environmental pollution.

[Patrols]

- Patrol by the Dean of the School of Science (once per year)
- Patrols by the Industrial Physician (at least once per month)
- Patrols by the Health Manager
- Other patrols of important areas

[Inspections and reports]

There are certain areas that must be inspected and reported on in order to ensure the health and safety management of all educational and research activities, and in order to conform to laws. See the Management Office website for further details.

[Equipment that requires regular self-initiated inspections and examinations]

Localized ventilation equipment, X-ray irradiation equipment, pressure containers, manually-pressurized liquid nitrogen containers, gas detectors, centrifuge, autoclave, crane, etc.

2.3 Safety Training

Safety training helps faculty members and students to understand the risks in each area of research and operations. It helps them to take measures to prevent accidents, and to protect themselves from potential dangers.

All members must receive safety training when entering, moving up to and being employed by each office, and when job descriptions have been modified.

Report the list of all persons who received safety training to ESM OFFICE using the forms¹.

People involved in work that requires special training (crane operations, crane slinging operations, grinding stone replacement, arc-welding, chain saw operations, etc.) must attend lessons (special training) to acquire the knowledge and skills required for the job in question, and must acquire the legal qualifications.

Faculty members and students who handle radiation and radioactive isotopes (RI) must receive the prescribed training (seminars) complying with the Rules for the Prevention of Radioactive Damage, the School of Science².

3. Common Safety Practices

3.1 Important points

- Emergency Contact: See the back page of this Manual.
- Evacuation Route: Evacuation route, emergency exits, primary evacuation areas, secondary evacuation areas.
- Equipment: Fire extinguishers (Fig.5), fire alarms and fire hydrants (Fig.4), leak preventions kits, emergency showers (Fig.3), megaphones, etc.
- Emergency Broadcasts: Make sure you remain safe.



Fig.2. Lights indicating evacuation routes



Fig.3. Emergency showers (located in washrooms)

¹ <http://jimubu.adm.s.u-tokyo.ac.jp/public/index.php/Esmo>

² <http://jimubu.adm.s.u-tokyo.ac.jp/inside/index.php/Ri>



Fig.4. Fire alarm (top) and fire hydrant (below)



Fig.5. Fire extinguishers and fire extinguishing sand

3.2 Preparations for Disasters

It is important to take the following daily precautions in order to prevent and respond to any possible disasters.

- Fix cabinets to walls etc. to prevent them from falling. Ensure that the cabinets are mounted firmly enough to withstand strong force.
- Do not put obstacles in front of emergency exits, fire doors, or fire shutters.
- Do not put obstacles around fire extinguishers, fire alarms, or fire hydrants.
- Do not remove fire extinguishers from their designated locations, except when using them.
 - *Since their locations were reported to Fire Department, their movement is not allowed.
 - Please contact Facilities Department if a fire extinguisher is needed.
- Windows, aisles, doors, corridors and emergency stairways must be free from obstructions in order to keep evacuation routes clear.

3.3 General Safety Practices

- Always keep rooms and corridors tidy.
- In general, laboratory doors should be kept closed whenever possible.
- When leaving a room or a laboratory, lock its door after confirming all is safe inside.
- Do not lend your key (card key) to others. When entering a building etc., with your key, do not allow persons unknown to you to enter at the same time. They must use their own key card to enter.
- Take measures to prevent objects falling from flat laboratory tables and stone tables (e.g. use a rim or raised edge).
- Use wooden or steel cabinets with double sliding doors as chemical cabinets. Cabinets with double or single swing doors must not be used to store chemicals.
- Take measures to prevent objects falling from cabinet shelves (e.g. install railing).
- Do not allow obstacles to block the routes. The routes must have a width of 80 cm or greater. Secure at least two evacuation routes when using hazardous materials.
- Compare the power consumption to the capacity of the outlet in order to prevent overheating and current leakage. Table tapes must also be connected directly to the sockets.
- All electrical switches, fuses and wires must be suitable rated.
- Use safe rubber tubes and PVC tubes. (Tubes that crack when twisted must not be used.) Ensure that they cannot become dislodged or contact electrical cords.
- When leaving the workplace, turn off power to all appliances except those that are required to operate overnight.
- Use only safe heating appliances (e.g. shockproof quality), and do not place heaters near flammable substances or objects.

- Be aware that static electricity may ignite nearby combustibles.
- Equipment that uses naked flames must be placed on inflammable stands and flammable articles must not be located nearby.
- When working with visual display terminals (VDTs), do not work continuously for one hour or more.
- When using flammable solvents, use the minimum amount at all times. The amount used is often a definitive factor in the severity of accidents and/or the possibility of evacuation.
- Do not place any flammables or combustibles near a heat source.
- Waste materials, chemicals and effluents must be correctly sorted for disposal according to the relevant rules.
- Smoking is allowed only in designated smoking areas.

4. Emergency Responses

4.1 Basics of Emergency Responses

When disasters occur, the most important thing is to ensure your own safety and act in an appropriate manner in accordance with the scale of the emergency. Giving priority to your own safety does not only prevent injury, it also enables you to act swiftly to report or cope with the situation after disaster strikes. See the back of this Manual for details on whom to contact in emergencies.

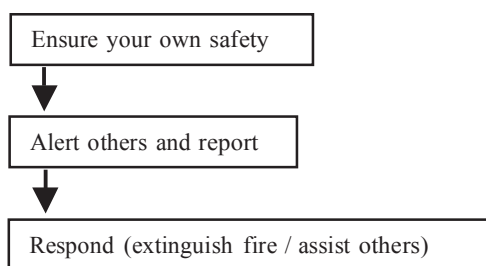


Fig.6. Emergency Responses

4.2 In the Event of a Fire

[Initial Response]

When fire breaks out, the first thing to do is shout “Fire!” as loud as possible to notify people in the vicinity, then trigger the nearest emergency alarm, report the fire on a 119 emergency call, and then contact the Disaster Center. The current system is set so that the Yasuda Auditorium Security Office and the School of Science’s Disaster Center is notified when the emergency alarm is activated, which will result in security officers hurrying to the relevant location.

[Evacuation]

The internal broadcasting system will be used to order all people into the building and adjoining buildings to evacuate to the designated evacuation areas.

See page 23 for details on the designated evacuation areas for the Faculty and Graduate School of Science (Hongo, Asano campuses) (As of April 01, 2018).

[Safety Confirmation]

- Follow the instructions issued by the people in charge of the building (annex).
- The safety of all people to be checked for each annex (and classroom) in all research offices as a basic principle.
- University staff must check the safety of all other staff and students in the same research office immediately.

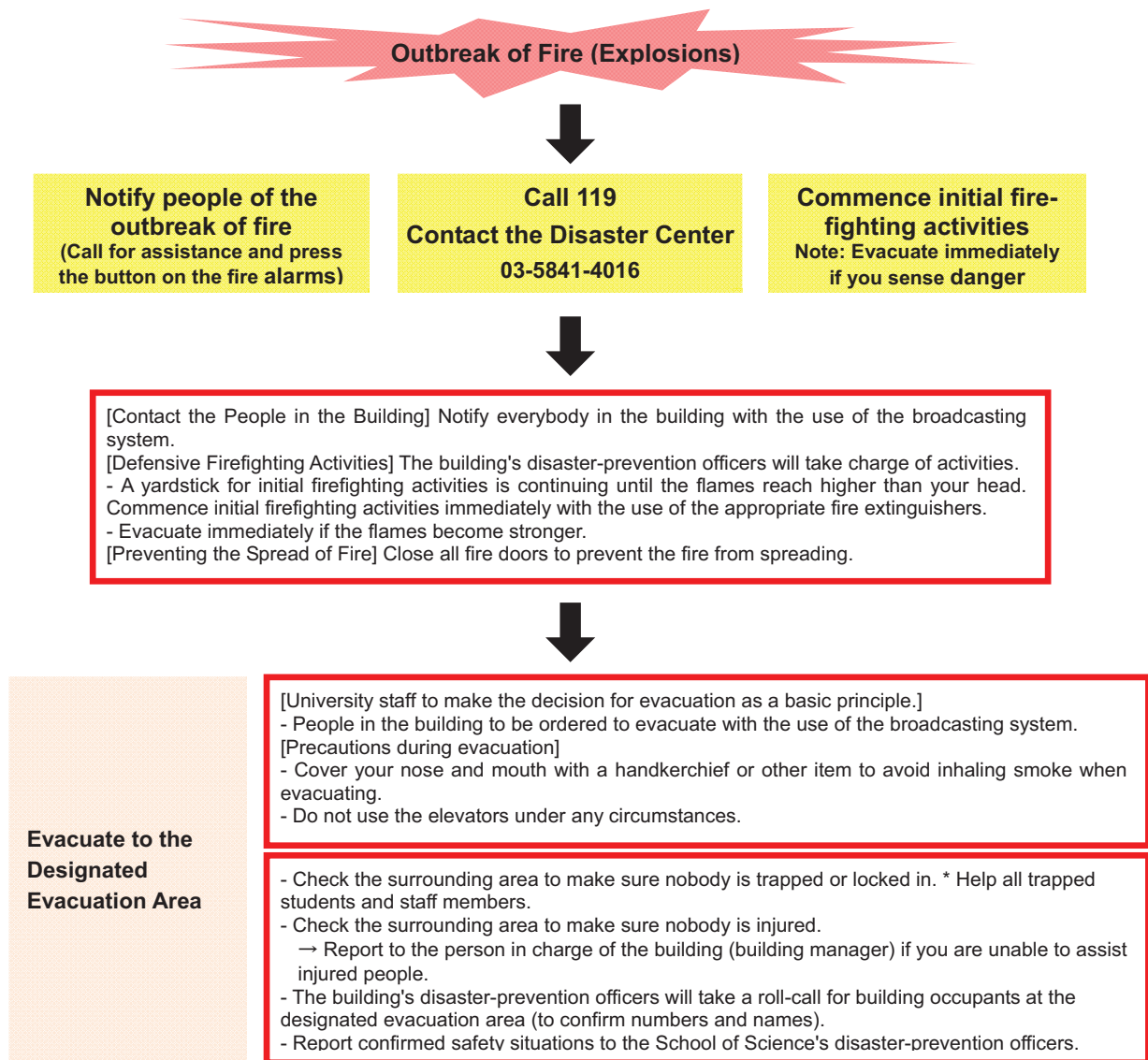


Fig.7. Initial response during the outbreak of fire

4.3 In the Event of an Explosion

- Check the immediate area and assist any injured persons.
- Notify the School of Science's Disaster Center and the fire department.
- The appliance that caused the explosion must be shut down or made safe. If that is difficult and the appliance may cause another explosion, evacuate the area immediately.
- Check the area near the appliance that caused the explosion in order to avoid secondary accidents due to the air blast of the explosion or shattered items.

4.4 In the Event of a Chemical Spill

- If the chemical is highly toxic, evacuate the area immediately. If possible, stop the spill and prevent it spreading.
- In the event of toxic gas spills, notify everybody in the surrounding area and, if necessary, evacuate the entire building.
- In the event of large quantities of acid entering the sewers, contact the Bureau of Sewerage Tokyo Metropolitan Government directly.
- In all events, contact the Management Office (Disaster Center at nights and on holidays) immediately.

4.5 In the Event of an Earthquake

4.5.1 Code of Conduct during Earthquakes

[Initial Response]

Stay calm and ensure your own safety in accordance with surrounding conditions. Observe the following to minimize the scale of the disaster when Emergency Earthquake Warnings have been issued.

(1) Extinguish all fires. (2) Protect yourself from falling objects and flying objects. (3) Close the tops on all chemicals. (4) Protect your head with a helmet or similar article in preparation for the earthquake. (5) Open the door and make sure the evacuation route is clear.

[Evacuation]

Ensure your own safety while waiting for the earthquake to subside. The level of shaking will differ depending on the building's structure and the floor you are on, so check with a university staff member to determine if it is necessary to evacuate the entire annex or building, and then evacuate to a safe location. If you feel that you are in danger, it is not necessary to await instructions for this. See page 23 for details on the designated evacuation areas for the Faculty and Graduate School of Science (Hongo, Asano campuses) (As of April 01, 2018).

[Safety Confirmation]

- Following the instructions of the people in charge of the annex.
- Check the safety of everybody in all classrooms and report to the annex head as a basic principle.
- University staff must check the safety of all other staff and students in the same research office immediately.
- Students must let staff in research offices, etc., know that they are safe in the event of large earthquakes.
- After confirming their safety, students are to standby for further instructions at the evacuation area. If students hear of information on changes to evacuation areas or on the safety of acquaintances, they are to report this information back to the staff in research offices, etc.
- Do not move around the campus unless otherwise instructed to.

[Evacuation Cancellation]

Evacuations can only be cancelled (return to the building) on the decision of people qualified to judge the level of danger within the university.

*People qualified to judge the level of danger will inspect the risk of damaged buildings collapsing and parts falling off and will decide whether the building in question and the buildings surrounding it may be used in the interim.

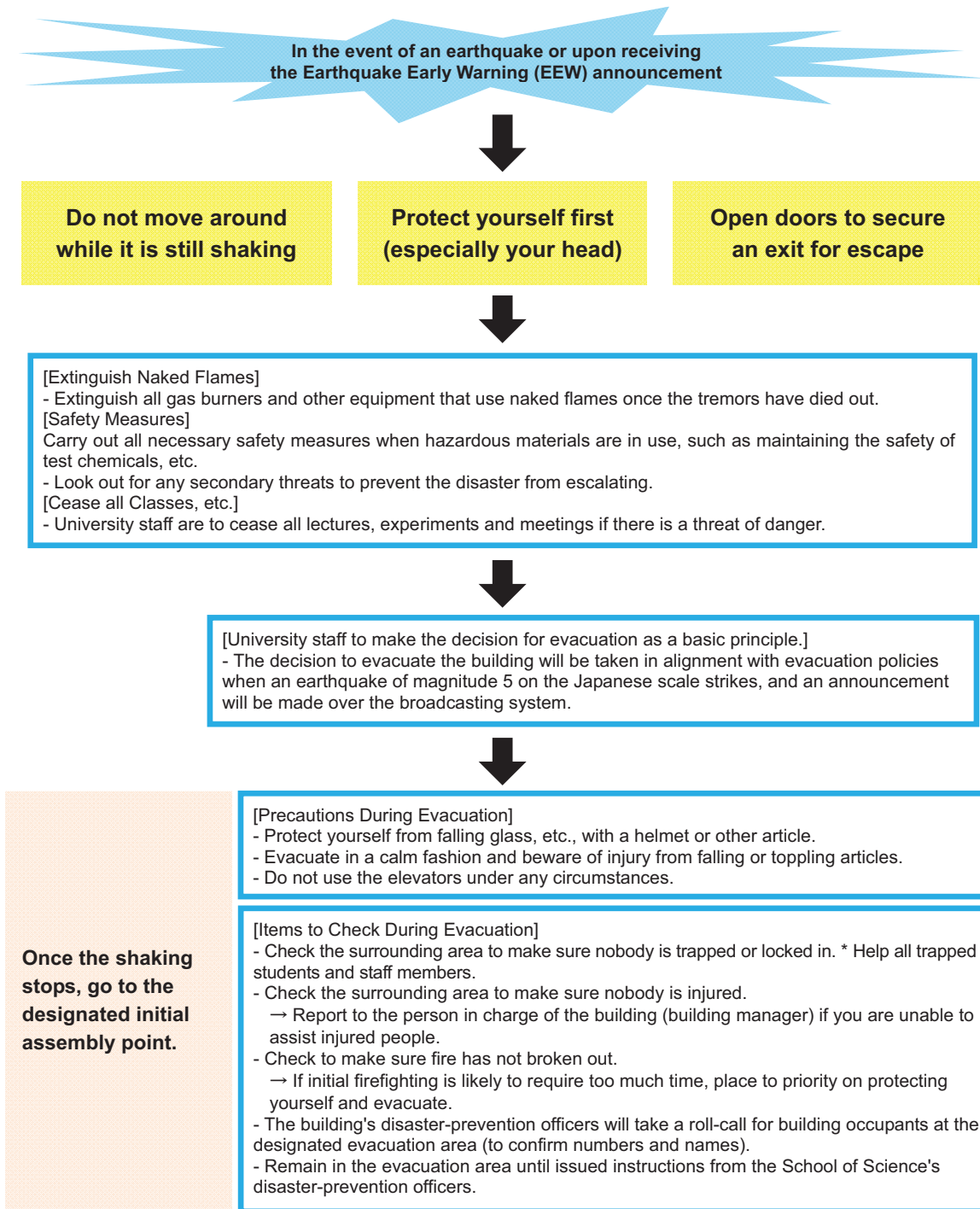


Fig.8. Initial response in the event of an earthquake

4.5.2 Earthquake Early Warnings

Earthquake early warnings detect the impending arrival and scale of earthquakes and warn people between a few seconds and ten seconds before the actual quake starts. A terminal for earthquake early warnings has been installed in the Disaster Prevention Center in Annex No.1 of the School of Science, and it will act as the center for warning the rest of the campus of impending earthquake via internal broadcasting.

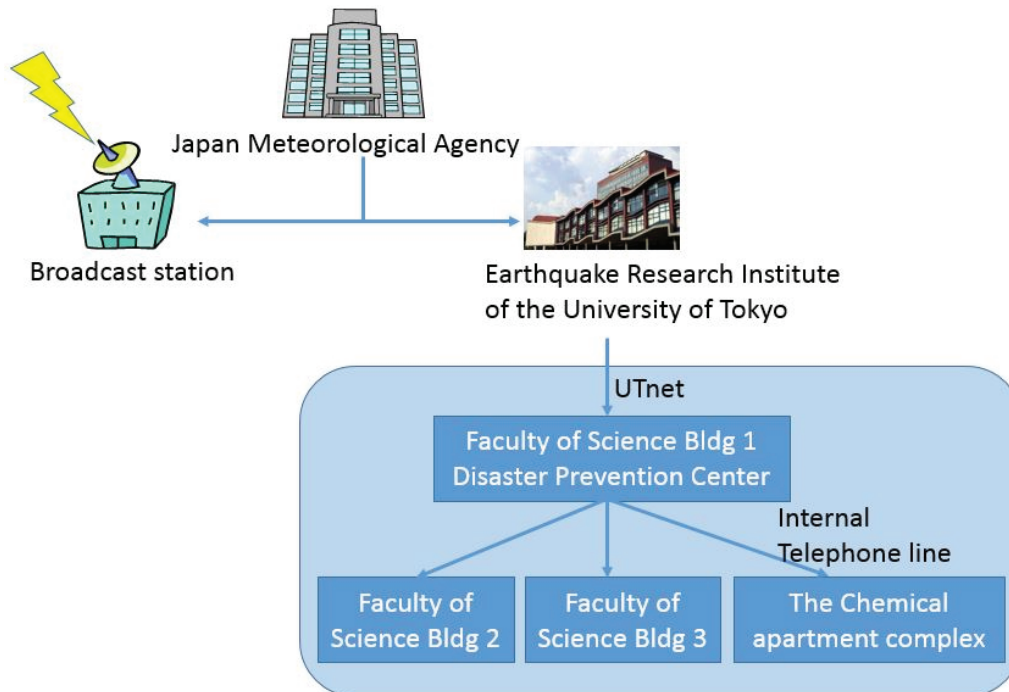


Fig.9. Transmission route for earthquake early warnings

The maximum magnitude of the next expected earthquake is predicted and the broadcast started.

- When the magnitude is expected to be 4 or more on the Japanese scale.
- When the magnitude is expected to be 7.9 or more on the Richter scale.

[Precautions during Earthquake Early Warnings]

- There are cases when the earthquake will arrive before an earthquake early warning can be received if the epicenter is directly below.
- The broadcasts are made with the use of data gathered with a very short period of time, and there are limits to the accuracy of the estimated magnitude, which sometimes could be wrong.
- Earthquakes estimated to be of magnitude 3 on the Japanese scale may cause people to lower their guard, so will not be broadcast.

4.6 Automated External Defibrillators (Using AEDs)

AEDs are cardiopulmonary resuscitator units that revive people whose hearts have stopped beating. They are medical equipment for restoring normal pulses, which involves applying an electric shock to the chests of patients whose hearts have stopped beating, and they have been authorized for use by people who are not qualified doctors since July 2004.

When prone people have been discovered:

- (1) Tap them on the shoulder and speak to them.
- (2) If there is no response, shout for help and ask passersby to call 119 and bring an AED unit.
- (3) Check the person's respiration.

- (4) If respiration is normal, commence chest compression (heart massage) 30 times immediately.
- (5) After the chest compression, perform artificial respiration twice.
- (6) When the AED unit arrives, first of all switch on the power. Then following the audio instructions provided. It is better if you know how to operate AED units beforehand³.
- See page 24 for details on the location where the AED units are installed on the Hongo and Asano campuses (as of April 01, 2018).

4.7 Reporting Accidents

- In the event of an accident, injury or illness, report it immediately to the Head of the Department, Head of the Facility and the Environment and Safety Management Office. Contact the Disaster Center (extension 24016) at night and on weekends.
- Submit a report on the accident with the online University of Tokyo's Safety Management & Information System (UTSMIS)⁴.

³ <http://www.ut-portal.u-tokyo.ac.jp/wiki/index.php/AED%E8%A8%AD%E7%BD%AE%E5%A0%B4%E6%89%80>

⁴ http://utsmis.adm.u-tokyo.ac.jp/UT_Anei_User/Report/Accident/

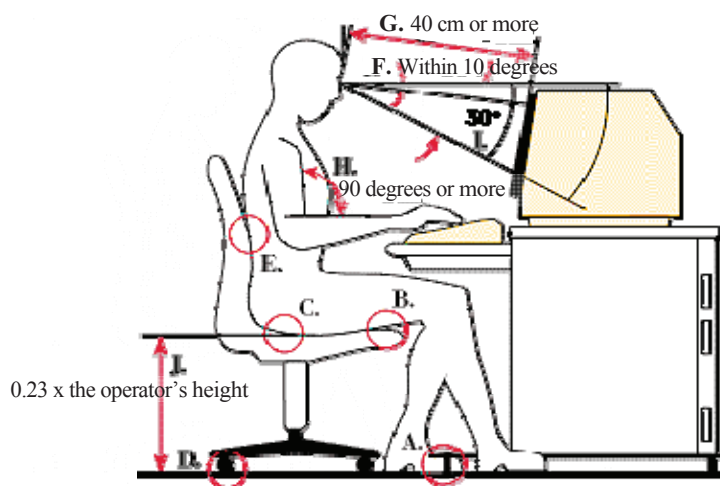
5. Office Safety Practices

5.1 VDT 1: Preventing Eyestrain

- If you usually require corrective lenses, wear lenses that best suit you (visual acuity at a distance of 50 cm is most important).
- To prevent dry eyes, ensure that the line of vision is downward. Also use eye drops as necessary. (Do not share eye drops with others.)
- Do not continue operation more than one hour in order to prevent eye fatigue.
- Arrange the office lighting environment so that lights are not reflected on the screen.
- Close curtains or blinds if sunlight is reflected on the screen.

5.2 VDT 2: Preventing Neck, Shoulder and Arm Strain

- Support the arms with wrist rests, arm rests, etc. in order to prevent static muscle contractions. Maintain good posture to avoid back strain.
- Take breaks and do VDT exercises or other physical exercises in order to avoid chronic fatigue.



- A. Keep the entire sole of both feet flat on the floor.
- B. Leave a space the width of one finger.
- C. Adjust the chair height and sit back in the seat.
- D. Choose a chair with high stability (with 5 legs).
- E. Adjust the height and angle of the backrest if possible. Stretch the back along the backrest.
- F. The line of vision to the upper edge of the screen should be maintained at an angle of around 10 degrees or less.
- G. Maintain at least 40 cm distance between the eyes and the screen. H. Maintain elbows at 90 degrees or more (as appropriate).
- I. Keep the angle of the line of vision to look down on the lower edge of the screen at around 30 degrees or less.
- J. Adjust the height of the chair so that $(\text{the height of the knee} - 2 \text{ cm}) / \text{operator's height} = 0.23$.
(*The height of the chair is around 2 cm lower than the knee when the operator sits down.)

Fig.10. Preventing fatigue in the neck, shoulders and arms

5.3 Preventing Backache

5.3.1 When Lifting a Heavy Object

- A man should not lift more than 40% of his weight.
- Bring your body close to the object and lower your center of gravity.
- When lifting the object, step one foot slightly ahead of the other, bend your knees, crouch down and hold the object firmly. Then, slowly straighten your knees and stand up.
- Use stands or similar devices of appropriate heights in order to reduce operations that require bending your back.
- When carrying a heavy object, keep your back straight and avoid twisting.

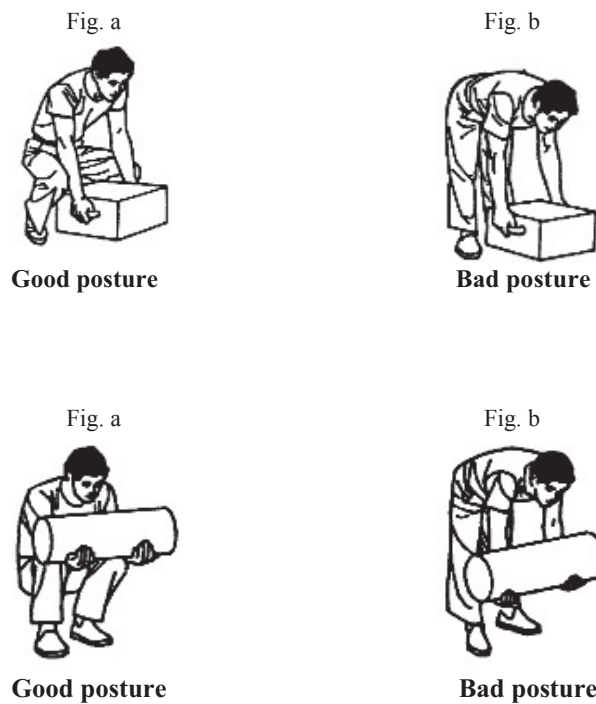


Fig.11. Picking up heavy objects

5.3.2 When Engaged in Deskwork

- Make the same adjustments to desks and chairs for regular deskwork as those for correct viewing of the VDT.
- Position the required work items so that you can use them while maintaining a natural posture.
- Stand up and stretch your back occasionally.

5.3.3 Daily Precautions

- Do physical exercises to prevent abdominal and back muscles losing condition.

6. Basic Knowledge of Occupational Health

***This is the matter for all persons who are employed by the University of Tokyo (School Staffs and Teaching Assistants et al.).**

Students and research students are not covered by the Industrial Safety and Health Law, but training will be enforced in the same way as for university staff⁵.

6.1 Definition of Occupational Accidents

Occupational accidents refer to injuries, illnesses, disabilities or deaths that occur at work.

Requirements for recognition:

Engaged in task: The employee was under the employer's supervision/instruction.

Origin of task: The employee incurred the injury etc. while fulfilling his/her job description.

Actual payment of medical fees, etc., as compensation, and compensation for absence from work.

Disability payment, payment to the bereaved in the event of death, etc.

6.2 Occupational Accidents under Special Circumstances

- Accidents during work-breaks
Accidents are recognized as occupational accidents if they resulted from deficiencies in the safety of the facility or failings in management.
- Accidents during business trips
Employees are considered to be on duty while on business trips, and as such, accidents that occur during business trips are regarded as occupational accidents, except when caused by a private activity.
- Applying for compensation
In order to qualify for compensation, the person who suffered injury, illness, etc., or his/her family must apply for compensation at the relevant Labor Standards Inspection Office. Obtain an employer certificate of occupational accident from the office of the relevant department before applying. In principle, the application should be submitted within 2 years of the accident (or 5 years for the payment of disability or bereaved family compensation).

6.3 Commuting Accidents

- Commuting accidents refer to injuries, illnesses, disabilities or deaths sustained while commuting to or from work. Although commuting accidents differ from occupational accidents, they are handled similarly.
- If there are any deviations from the normal commuting route or means of travel, the accidents are not considered commuting accidents. However, the following activities are not regarded as deviations:
 - a) Purchasing daily necessities, or a similar activity
 - b) Participating in professional training, education at school, etc., including taking evening educational classes
 - c) Voting in a government election, or a similar activity
 - d) Consulting or receiving treatment at a hospital, clinic, etc., or a similar activity

⁵ Division for Environment, Health and Safety for details on health and safety education (April 16, 2004).

7. Health Care and Others

7.1 Health Examinations

- Employees are obliged to maintain good health.
- Employees who are subject to health examinations must take examinations provided by the university. (Employees may choose to receive equivalent health checks at other medical institutions and submit their results.)
- University health checks comprise general checks for all employees and special examinations for employees engaged in certain hazardous jobs.
- Faculty members are obliged to comply with health instructions, etc. following health examinations.

7.2 Mental Health

- The most frequently occurring mental health problem in the workplace is depression. If you suffer any of the following symptoms, seek a consultation with a medical professional promptly:
 - a) Insomnia, waking up at night, or waking up early in the morning.
 - b) Feeling that you have not had enough sleep when you awake in the morning.
 - c) Not feeling like doing anything.
 - d) Feeling a sense of extreme disinclination toward work.
- If you have concerns about your mental health, you may seek assistance from the following services:
Industrial physician (+81-3-5841-8429, ext. 28429)
Division for Health Service Promotion (+81-3-5841-2578, ext. 22578)
Student supporting room of the School of Science (Faculty of Science Bldg.1. Room No. 132, ext. 28296)

7.3 Harassment

- Development of a platform of ethics and organization to prevent sexual harassment at the University of Tokyo
- Development of a declaration of prevention of academic harassment at the University of Tokyo

7.3.1 Consultation Services

If you have concerns about sexual harassment, you may seek assistance from the following. Your privacy is protected, and any information that you provide to these services is strictly confidential. Employees who seek these services need not fear reprisals or discrimination.

Harassment Consultation Center, The University of Tokyo (03-5841-2233, ext. 22233)

Harassment Counselors, School of Science (Enquire at the offices of individual departments.)

8. Laboratory Safety Practices

8.1 General Safety Practices

8.1.1 Principles of Safety Management

Learn about the potential hazards of substances and equipment. Check applicable laws and regulations.

- Safety Data Sheets (SDS) are useful for obtaining information on a substance.
- If you plan to use an extremely hazardous material, you must consider using a less hazardous alternative.



Establish safety measures to avoid creating potential hazards.



Carry out laboratory work with adequate safety measures in place.

8.1.2 Safety Data Sheet (SDS)

Items described in the SDS (Information with an asterisk should be notified to persons who deal with compounds.)

- | | |
|---|------------------------------------|
| 1)* Identification of the Substance and of the Manufacturer | 9)* Physical & Chemical Properties |
| 2)* Composition & Information on Ingredients | 10)* Stability & Reactivity |
| 3)* Identification of Hazards | 11)* Toxicological Information |
| 4)* First Aid Measures | 12)* Ecological Information |
| 5)* Fire Fighting Measures | 13)* Disposal Considerations |
| 6)* Accidental Release Measures | 14)* Transportation Information |
| 7)* Handling and Storage | 15)* Regulatory Information |
| 8)* Exposure Control & Personal Protection | 16)* Other Information |

©SDS can be obtained from the manufacturer and sales outlets of the relevant substance.

UTCRIS (University of Tokyo Chemical Registration Information System)⁶ also has a SDS search function.

8.1.3 Precautions during Experiments

- Keep the laboratory clean and uncluttered at all times.
- Do not leave unnecessary chemicals on the laboratory bench. In particular, do not leave chemical containers unattended on the floor.
- Use appropriate protective equipment such as protective goggles in accordance with the nature of the experiment.
- When carrying out experiments, always adopt a serious attitude.
- In general, do not carry out very dangerous or hazardous experiments during the weekend or after-hours. Such experiments must be attended by more than one person.
- Know the location of emergency exits, as well as the location, type and handling of fire extinguishers in case an accident occurs.
- Ensure that all the precautions that are required for unattended machine operations are in place, and

⁶ https://utcris.adm.u-tokyo.ac.jp/CRIS_v1_0/index.aspx

display emergency contact numbers near the entrance of the laboratory or where clearly visible.

- University laboratories do not have extraterritorial rights. They must comply with the same safety and health regulations that apply to other research institutions and companies. See the Management Office Website for further information on these regulations.

8.2 Management of Hazardous Substances

8.2.1 Management Systems for Chemical Substances

The quantity of each chemical substance and high-pressure gas that are used and stored in the School of Science must be managed in accordance with the Management System for Chemical Substances⁷. This system ensures that chemical substances are managed comprehensively and in accordance with the various regulatory requirements of Law Concerning Reporting, etc. of Pollutant Release and Transfer Register (PRTR) Law, Poisonous and Deleterious Substances Control Law, Fire Services Law, Industrial Safety and Health Law, and others.

Although chemical substances that are not regulated by the rules shown below (8.2.2 hazardous substances (1)-(11)) are not needed always to manage by UTCRIS, it is better to manage them by UTCRIS gradually.

8.2.2 Hazardous Substances

The following are designated hazardous substances by law. The handling and storage of most of these substances are also regulated by law. Sufficient safety measures are needed even when a substance that is not regulated by law is expected to be as hazardous as a regulated substance. Make sure these substances are handled safely.

- 1) Organic solvents (Ordinance on Prevention of Organic Solvent Poisoning, Industrial Safety and Health Law), which are Class 1, Class 2 and Class 3 substances
- 2) Specified chemical substances (Ordinance on Prevention of Hazards due to Specified Chemical Substances), which are Type 1, Type 2 and Type 3 substances
- 3) Poisonous substances (Poisonous and Deleterious Substances Control Law), which include poisonous substances and specified poisonous substances
- 4) Deleterious substances (Poisonous and Deleterious Substances Control Law)
- 5) Narcotics (Narcotics and Psychoactive Drugs Control Law)
- 6) Psychoactive drugs (Narcotics and Psychoactive Drugs Control Law) Psychoactive drugs
- 7) Stimulants (Stimulants Control Law) Stimulants
- 8) Chemical substances regulated by PRTR Law (PRTR Law) Class 1 and Class 2, Metropolitan bylaw⁸
- 9) Hazardous substances (Fire Services Law), which are Type 1, Type 2, Type 3, Type 4, Type 5 and Type 6
- 10) High-pressure gases (High-pressure Gas Safety Law)⁹, Gases with Special Components (High-pressure Gas Safety Law)
- 11) Radioisotopes (RI) (See section 8.5, "Radiation and Radioisotopes")
- 12) Biohazardous materials (See section 8.6, "Preventing Biohazards")

8.2.3 Required Knowledge prior to Handling Hazardous Substances

- Before handling a chemical substance, information on the toxicity (acute and chronic toxicity, and carcinogenicity), flammability and explosiveness of the substance must be obtained by consulting the SDS that is provided by the manufacturer or distributor of the substance.
- Before handling a chemical substance, determine whether it is regulated by law. If a specific procedure is

⁷ https://utcris.adm.u-tokyo.ac.jp/CRIS_v1_0/index.aspx

⁸ Environmental Science Center Website: <http://www.esc.u-tokyo.ac.jp/>

⁹ <http://jimubu.adm.s.u-tokyo.ac.jp/inside/index.php/Gas>

required by law, consult the ESM OFFICE for directions. Before preparing or importing poisonous and deleterious substances and before buying specified poisonous substances, narcotics, psychoactive drugs, and stimulants application etc. is needed. Be careful not to receive them easily.

- Minimize the use of substances that are considered highly hazardous due to their toxicity, flammability or explosiveness. Efforts to minimize the use of such substances must be taken when drawing up the study protocol. For example, consider whether the use of that substance is absolutely necessary, or whether another substance can be substituted.
- The chemical substance manager from each group, such as a laboratory, must take the central role in chemical substance management in regard to health and safety. When dealing with substances designated by the Ordinance on Prevention of Organic Solvent Poisoning, the Ordinance on Prevention of Hazards due to Specified Chemical Substances, and the Industrial Safety and Health Law, the law requires correct handling of such substances, evaluation of the work environment, and specialized medical checkups.

8.2.4 Precautions for Handling Hazardous Substances

- Any person(s) transporting or handling a hazardous substance must fully understand the nature of the substance. In principle, do not allow any person who has not been educated on hazardous substances, to handle hazardous substances.
- Before using any hazardous substance, measures for preventing disasters caused by the substance must be considered and prepared thoroughly. If the substance has the potential to cause a fire or explosion, place fire extinguishers nearby and work with respiratory protective equipment and heat resistant clothing. If a substance has the potential to cause poisoning, wear rubber gloves, a respiratory mask and protective clothing.
- Take measures to prevent spattering, spillage and loss of hazardous substances during handling. Use a solid container with a cap or stopper that will prevent the substance spilling, leaking or evaporating.
- Do not use an open flame heater in a laboratory where a volatile solvent is used.
- Know the locations of fire extinguishers. If there is a risk of fire, ensure, in advance, that a fire extinguisher is close to the work area.
- Turn off the main valve of the gas supply whenever no one will be staying in the room.
- Before conducting a potentially hazardous experiment, inform the people nearby, and take appropriate safety measures.
- Experiments must be designed so that the least possible amount of hazardous substances is used, and if the nature of a substance is unknown, a preliminary experiment must be conducted.
- When opening glass ampoules containing hazardous liquids, prepare a sealed container and open them inside it to prevent the hazardous substance from being spilled.
- Hazardous substance must not be disposed of with non-hazardous wastes. They must be disposed of in accordance with the methods stipulated in the relevant regulations.

8.2.5 Precautions for Storing Hazardous Substances

- When hazardous substances are stored, they must be categorized and stored in warehouses that meet the legal requirements. Poisonous or deleterious substances must be stored in a chemical cabinet under locked conditions.
- During storage, ensure that all containers of chemical substances and of waste liquids are closed.
- Inspect the storage conditions and quantities of hazardous substances when it is considered appropriate, and continuously implement measures to ensure health and safety.
- Generally, store hazardous substances in a cool place and away from direct sunlight and ignition sources such as sparks and heat. Do not store substances with different characteristics in the same location.
- Ensure that stored containers cannot be damaged as a result of falling over, falling from the shelf or colliding, even during an earthquake. Store hazardous substances separately to prevent a fire or explosion

caused by spilt substances interacting.

- If a hazardous substance is missing or stolen, the loss must be reported to the chemical substance manager so that measures may be taken to prevent the substance causing an accident.

8.2.6 Management Required by Regulations for Hazardous Substances

8.2.6.1 Health and Safety Management Required by OPOSP and OPHSCS

(OPOSP: Ordinance on Prevention of Organic Solvent Poisoning; OPHSCS: Ordinance on Prevention of Hazards due to Specified Chemical Substances)

[Managing the Work Environment]

- Preventing vapor and dust discharge (using a fume hood)
- Assessing the work environment (twice a year)

[Managing Work Procedures]

- Establishing safe work procedures
- Using personal protective equipment

[Health Management]

- Understanding measures to prevent sickness and injury, and knowing first aid
- Undertaking specialized medical checkups (twice a year)

[Others]

- Signs and displays referring to the substances being used, and precautions

8.2.6.2 Management that is Required by the Poisonous and Deleterious Substances Control Law, Narcotics and Psychoactive Drugs Control Law, and Stimulants Control Law

[Common matter]

- Store poisonous and deleterious substances separately from other chemicals in a chemical cabinet or other storage area under locked condition.
- By using UTCRIS manage the quantity of all substances purchased, used or disposed of, and record the date and name of person who did so.
- Use protective equipment as needed when handling such substances.

[Poisonous and Deleterious Substances]

- When preparing, importing, or buying (receiving) the specified poisonous substances, a treating license is necessary.
- Containers must be labeled as “Poisonous Substance Not for Medical Use” or “Deleterious Substance Not for Medical Use.”

[Narcotics]

- When buying (receiving) narcotics, a narcotic researcher license is necessary.
- The narcotic researcher bears the responsibility for management of the narcotics.
- When the narcotic researcher moves to the other place, the storage place are changed or the narcotic is disposed, a notification is necessary.

[Psychoactive Drugs]

- When buying (receiving) a psychoactive drug newly, a notification as “Psychoactive Drug Research Laboratory” is necessary. Although the School of Science has already done the notification, the researcher who intends to use psychoactive drugs must tell it to ESM OFFICE immediately, because management of research laboratory is necessary.
- A manager and a treating researcher of the laboratory concerned bear the responsibility for management of psychoactive drugs.
- Change of the storage place etc. is also required to notify it to ESM OFFICE.

[Stimulants and their ingredients]

- When buying (receiving) stimulants and their ingredients, a researcher must be designated as a stimulant researcher.
- The stimulant researcher bears the responsibility for management of the stimulants and their ingredients.
- When the stimulant researcher moves to the other place, the storage place is changed, or the stimulants and their ingredients are disposed, a notification is necessary.

8.2.6.3 Management that is Required by the Fire Services Law (Hazardous Materials)

Ensure that stored containers cannot be damaged as a result of falling over, falling from the shelf or colliding. Substances that are potentially hazardous when mixed (e.g., a combination of an oxidizing substance [belonging to Type 1 or 6] with a flammable substance [belonging to Type 2 or 4]) must not be stored in the same location.

When substances are stored at one fifth or more of the maximum quantity specified by the law, this situation must be reported in accordance with the law.

In the storage or handling area, possible ignition sources must be strictly controlled and fire-fighting equipment must be installed.

Use appropriate protective equipment such as goggles and shields in order to ensure personal safety.

8.3 Work Hazards and Safety

- When using equipment that involves extreme temperature, pressure, voltage, speed or weight, implement protective measures and handle the equipment with care.
- When handling specific equipment for the first time, take extra care by carrying out appropriate preparations and, if possible, examine every part of the equipment. Seek expert advice before use.
- Equipment that requires experience and practice must be handled only after the basic operational skills have been acquired. Carelessness may cause a serious accident.
- All equipment must be properly cleaned at the end of each experiment. If any defect is found, repair it or report it to the next user.
- Keep the work area organized to avoid unnecessary noise, vibration and odor. For example, improve work procedures by choosing low-noise and low-vibration equipment.
- Protective equipment must always be ready for use, and the person who is carrying out the experiment or using the equipment, either staff or student, must know the locations of such equipment.
- All personnel must receive training and acquire the knowledge required to use the protective equipment correctly.
- Take special care to disinfect and maintain the protective equipment after use.

8.4 Environmental Safety

Take measures to minimize the negative influence of our educational and research activities on the neighboring area, and implement safety measures to protect our living environment.

- With the Environmental Science Center as a core, we have been trying to minimize and neutralize waste at the university. The regulations specified by the Environmental Science Center must be strictly followed for the proper management of waste. See the website¹⁰ of the Environmental Science Center for further information.
- Potentially hazardous chemical wastes must be treated properly, even if they are not regulated by law.
- New types of hazardous wastes such as biological and medical wastes must be properly treated at their source.

¹⁰ <http://www.esc.u-tokyo.ac.jp/>

- The amount of daily waste, including trash, water and paper, is enormous. Strive continuously to reduce waste. Consider fundamental measures to achieve this aim.
- To conserve resources and energy, collect paper, metal, glass and plastic separately for recycling. Actively seek solutions such as developing a recycling system for water and reagent waste in order to protect the environment.
- Do not allow unknown reagents, chemicals and wastes to accumulate. They are a safety threat and require considerable expenditure and effort to dispose of properly. As such, all chemicals must be managed systematically so that unnecessary chemicals are disposed of promptly and unnecessary purchases are avoided. In addition, all chemicals, especially if transferred to different containers, must be properly labeled and immediately discarded when no longer needed.

8.5 Radiation and Radioisotopes (RI)

- Radiation and RI may be used only when its benefit is greater than the risk of working with such materials (Justification). Make exposure to radiation as short as possible (optimization) and do not expose to radiation over a radiological dosage at any time (limit of a radiological dosage)
- Radiation and RI must be handled properly in accordance with the Radiation Hazard Prevention Policy at the Faculty of Science.
- It is necessary to observe the Rules for Managing Scientific X-Ray Machines, etc. when handling e-ray machines and electron microscopes.
- Radiation Management Office is established as a central post to treat the work on the safety and management of radiation and RI at Faculty of Science. A manager handling radiation is superintending the work on the safety and management for radiation and RI
- Handling radiation includes using particle accelerator facilities and x-ray diffractometer or related equipment. Radioactive materials are classified to radioactive isotopes (RI) and nuclear fuel materials and so on. X-ray machines are divided into five categories of safety levels consisting of level A, B, C, D and E. Electron microscopes are also categorized into general microscopes and special microscopes.
- Radiation and RI must be handled only within a designated area (control area). Without permission, buying, disposing, and carrying in or out radioactive materials are forbidden.
- People who need to use radioactive isotopes (RI) or accelerators must be authorized to handle radioactivity. The procedure for acquiring this authorization requires the person concerned to apply for registration, then submit to a health check-up for radiation handlers, and finally receive lessons on the entire field or a localized field. The user of synchrotron radiation facilities also must follow the same procedure.
- People who need to use only A or B category x-ray machines with high safety levels must be authorized to handle radioactivity. The procedure for acquiring this authorization requires the person concerned to apply for registration, and then receive lessons on the entire field or a localized field.
- People who need to use C, D or E category x-ray machines or special electron microscopes that are perceived to have high levels of risk must be authorized to handle radioactivity. The procedure for acquiring this authorization requires the person concerned to apply for registration, then submit to a health check-up for radiation handlers, and finally receive lessons on the entire field or a localized field. Authorization to handle radioactivity is not required for people who need to use general electron microscopes.
- People who need to use x-ray machines or special electron microscopes must receive detailed explanations on the device to be used from the person in charge of the relevant device after acquiring the authorization to handle radioactivity, and may not commence use until permission is granted.
- About treatment of nuclear fuel materials, follow the instructions of Radiation Management Office, Faculty of Science

- In the event of an emergency, take emergency measures and immediately contact the laboratory supervisor, the person in charge of the laboratory, and Radiation Management Office (ext. 24606).
- People who need to use radioactive facilities from outside of the School of Science must submit evidence that they are authorized to handle radioactivity, and submit their request to the School of Science's Environmental Safety Management Office or Radiation Management Office.
- About unclear matters, contact Radiation Management Office.

Radiation Management Office, Faculty and Graduate School of Science
 Tel: ext. 24606, 03-5841-4606 Fax: 03-5841-1363
 E-mail: ri-kanri@chem.s.u-tokyo.ac.jp

8.6 Preventing Biohazards

- Biohazards are hazards that are posed by artificially modified living organisms or their metabolites, and that may present a risk to humans or the environment. It is important not only to secure the safety of researchers, but also to consider the environmental impact at all times.
- Biohazards are discussed by the Committee for Experimental Management of the Faculty of Science and are managed by the Biohazard Safety Officer of the Environment Management Office.
- Before carrying out recombinant DNA experiments, the person must apply to the Committee for Experimental Management, the School of Science. The previously issued Instructions for Recombinant DNA Experiments was abolished on February 18, 2004. Thereafter, the use of recombinant DNA has been regulated by the Law concerning the Conservation and Sustainable Use of Biological Diversity through Regulations on the Use of Living Modified Organisms. For further information on this law and related regulations, refer to "Instructions for Recombinant DNA Experiments"¹¹ at the website of the Ministry of Education, Science, Sports and Culture.

9. Education and Research Activities in the Field Work

- For responsibility and duty of field workers and for notification and treatment in the case of an accident, "Regulations of Health and Safety for Education and Research Activities in the Field Work" are established by the University of Tokyo. Field workers and their related persons must obey the regulations.
- Because there are several dangers in the field work in contrast to the indoor work, read and carry the booklet "Prevention Policy for an Accident in the field work", which is distributed to the related laboratory, in order to prevent an accident.
- Until one week before performing the field work the planning form for Education and Research Activities in the Field Work must be presented to EMS OFFICE.

10. Electrical Apparatuses and Facilities

Wrong treatment of electrical apparatuses and facilities (wiring, table tap etc.) causes an electric shock, a fire by overheat, or ignition of a flammable gas by a spark. Most of these accidents can be prevented by the regular check on the following matters.

- When feeling a shock on touching an apparatus, wiring and so on: contact a specialist since it is very dangerous situation due to a leakage of electricity.
- Damage of a film of a cord
 Replace if an opening exists when the cord is bent. Pay special attention to where the cord meets the plug and to old cords.

¹¹ <http://www.lifescience.mext.go.jp/bioethics/index.html>

- Loose screw
Use an insulated screwdriver, etc., to check that the screw is firmly tightened. Failure to observe this may result in overheating or short-circuits.
- Color change of a cord or a cord with heat
Touch by hand, and if it is warm there is a possibility of overcurrent. There is a possibility of defective insulation on discolored cords. Cease usage immediately.
- Preventing Electrical Leakage and Short-Circuits
Use a leak breaker or circuit breaker. Use appropriate thermal relays and motor protection relays with motors that are especially large.
- Foul odors or strange sounds
The insulation is defective owing to electrical current leakage, discharged electricity or overheating. There is a possibility that a tracking phenomenon has occurred in the socket, resulting in damaged or defective insulation.
- Disconnection of a ground wire.
Be careful to forget to set it again when moving the apparatus.
- Check on resistance of a ground wire more than once per year. Replace the wrong wire by good one.
- Submerged apparatus or a cord buried by a heavy apparatus.
- Use sufficiently thick cords for flowing electrical current.
Cord resistance could prevent the fuse or breaker from cutting off electricity supply, even with short-circuits, which may result in the outbreak of fire.
- Self-inspections of protector for insulation must be carried out once within 6 months.

Evacuation place for the Faculty and Graduate School of Science

(As of April 01, 2018)

[Faculty of Science Bldg.1 / Bldg.4 / Bldg.7 / Chemistry Bldg]

Location for evacuation: Yasuda Hall area , Sanshiro Pond Northern area



Fig.12 Sanshiro Pond Northern area



Fig. 13 Evacuation place for Buildings and Faculty

[Faculty of Science Bldg.2]

Location for evacuation: Front of the entrance of Faculty of Science Bldg.2 (Temporary gathering location), Kaitokukan (Safety evacuation place)



Fig.14 Temporary gathering location in Front of the entrance of Faculty of Science Bldg.2



Fig.15 Safety evacuation place for Faculty of Science Bldg.2

[Faculty of Science Bldg.3]

Location for evacuation: Front of the entrance of Faculty of Science Bldg.3 (Temporary gathering location) Yasuda Hall area (Safety evacuation place)

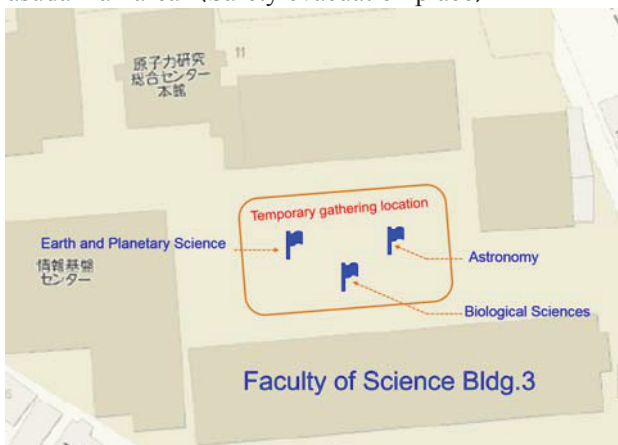
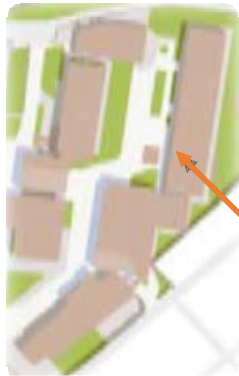


Fig.16 Temporary gathering location in Front of the entrance of Faculty of Science Bldg.3

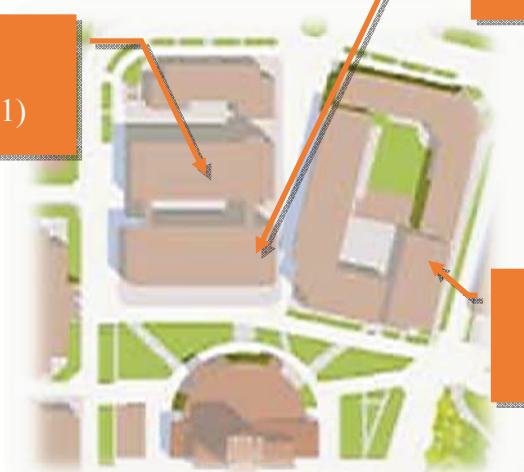
Map for the locations equipping AED for the Faculty and Graduate School of Science
(As of April 01, 2018)



Locations
equipping AED

Entrance Hall
(Faculty of Science Bldg.3)

Faculty of Science Bldg.3



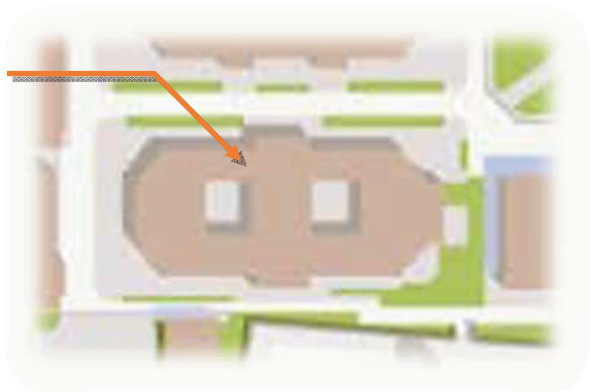
Koshiba Hall
(Faculty of Science Bldg.1)

Disaster prevention center
(Faculty of Science Bldg.1)

Entrance Hall
(Chemistry Main Bldg.)

Faculty of Science Bldg.1, Chemistry Bldg

Janitor's room



Faculty of Science Bldg.2

Table of Emergency Communications

	What to do	Contacts	TEL	What to report
Disease/Injury	1. Turn off the switch. 2. Call out to nearby people.	1. Hospital emergency room	ext. 34100 outside line/ mobile phone 03 (5800) 8683	_____of the Faculty of Science is injured, and will be taken to the hospital.
	3. Apply first aid treatment. Bleeding: Compress with a towel. Unconscious: Perform CPR. 4. Stay calm and take a deep breath. Call the numbers listed in the column to the right.	2. Fire Department (When calling an ambulance)	ext. 0119 outside line/ mobile phone 119	Send an ambulance. There is an injured/sick person in Room __ on the __th Floor of ___ Building of the Faculty of Science, XX Campus of the University of Tokyo. The address is XXX, and my name is XXXX.
	5. If the injury is not serious, take the injured person to the hospital emergency room.	3. Disaster prevention center, Faculty of Science	ext. 24016 outside line/ mobile phone 03 (5841) 4016	There is an injured /sick person in Room __ on the __th Floor of ___ Building of the Faculty of Science. An ambulance has been called. Please guide them here.
Fire	1. Call out to nearby people. 2. Turn off switches. Close gas valves. 3. Stay calm. Call the numbers listed in the column to the right.	1. Fire Department	ext. 0119 outside line/mobile phone 119	Send a fire engine. There is a fire in Room __ on the __th Floor of ___ Building of the Faculty of Science, XX Campus of the University of Tokyo. The address is XXX, and my name is XXXX.
	4. If the fire is small, try to extinguish it. If the fire is large, evacuate.	2. Disaster prevention center, Faculty of Science	ext. 24016 outside line/ mobile phone 03 (5841) 4016	There is a fire in Room __ on the __th Floor of ___ Building of the Faculty of Science. A fire engine has been called. Guidance please.
Problem/Crime	Communicate the problem / crime by calling the numbers listed in the column to the right.	1. Disaster prevention center, Faculty of Science	ext. 24016 outside line/ mobile phone 03 (5841) 4016	I witnessed _____ in _____ in the Faculty of Science.
		2. Police (If calling the police)	ext. 0110 outside line/ mobile phone 110	I witnessed _____ in _____ in the Faculty of Science, the University of Tokyo. The address is XXX, and my name is XXXX.

In the event of heavy-density acid, etc., flowing into the sewerage system, each research laboratory must immediately contact both the Waterworks Bureau and the School Science's Disaster Prevention Center. If the leak occurs on the Hongo Campus, contact the Western No.1 Waterworks Bureau 's Business Affairs Section at 03-5343-6209.

Report	In the event of an emergency, take appropriate measures in accordance with the situation, and then call one of the departments listed in the column to the right.	1. Disaster prevention center, Faculty of Science	ext. 24005	Report the details of the event, and the measures taken.
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