

# POLICIES OF MIAMI UNIVERSITY'S ELECTRON MICROSCOPY FACILITY

Miami University's Electron Microscopy Facility (EMF) is utilized by over 90 users (undergraduate & graduate students, faculty, and staff) from 9 different departments (including the branch campuses) each year. Since we are utilized by such a large number of users from very diverse backgrounds for a wide range and variety of projects and techniques the rules for the EMF have to be different than those found in individual faculty research labs. The primary goals of these rules are (1) to ensure the safety of all of our users, (2) to ensure continued access to the best research tools for all our users, and (3) to provide an environment that allows for the best data collection possible.

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## A. GENERAL POLICY

- A.1 **CLEAN UP AFTER YOURSELVES!** Failure to clean up after yourself will result in your finding a new lab to work in.
- A.2 **NO EQUIPMENT OR SUPPLIES ARE TO BE "BORROWED" OR REMOVED FROM THE EMF.** Missing equipment may be assumed to be stolen and will be reported as such.
- A.3 **ALL FIRST TIME USERS OF THE EMF MUST SEE DR. EDELMANN OR MR. DULEY BEFORE BEGINNING ANY WORK.** **ALL** new users must contact the EMF Staff, and we will provide **ALL** initial introduction, training, and explanation of policies for **ALL** equipment (*including computers*) - this places the liability for misuse / damage, etc. on the EMF staff. If there are specialized techniques which have been developed by specific laboratories, then **AFTER** the initial EMF staff training, these specialized protocols or techniques can be taught by someone most familiar (possibly outside of EMF staff) with them.
- A.4. **UNAUTHORIZED USE OF ITEMS & SUPPLIES STORED IN SPECIFICALLY DESIGNATED USER CABINETS AND/OR DRAWERS WILL NOT BE TOLERATED.** Space is generally available for users to store limited amounts of research supplies within the EMF. These are NOT general EMF supplies and users must respect the rights of others.

- A.5. ALL equipment located in the EMF is available for **Everyone's** use. (See the Equipment section below for details).
- A.6. Breakage and equipment failures. Accidents do happen and equipment does need occasional maintenance. In order to help the EMF staff to meet the needs of our users on a timely basis, if you break something, know or suspect something is not operating properly, notify the EMF staff so that we can fix or replace the item.
- A.7. Notify the EMF staff of low supply levels. A simple memo on the board in either the SEM or TEM Laboratory is acceptable.
- A.8. Users are to sign logbooks. The logbooks enable the EMF to keep track of users, and shifts in activities within the EMF. We do review the log books regularly and use them as a source of information for problems or potential problems.
- A.9 Equipment and darkroom reservation. See Section C.4 below
- A.10 EMF Access times. The EMF is available to qualified users 24 hours/ 7 days a week. The EMF staff is available for assistance Monday - Friday, 8am-5pm (not including University holidays).
- A.11 **EMERGENCY CONTACT PERSONNEL.** Emergency contact information is posted by the main doors to the laboratories and is as follows:

Dr. Richard E. Edelmann - Office: 352 Pearson Hall; 529-5712.

Home: 737-4237, [EdelmaRE@muohio.edu](mailto:EdelmaRE@muohio.edu)

Mr. Matt Duley - Office: 359 Pearson Hall; 529-4164,

Home: 867-8604 [DuleyML@muohio.edu](mailto:DuleyML@muohio.edu)

Dr. David G. Pennock - Office: 248 Pearson Hall; 529-3127.

Home: 523-4941 [PennocDG@muohio.edu](mailto:PennocDG@muohio.edu)

## **B. SAFETY**

- B.1 **NO VIABLE PATHOGENIC ORGANISMS ARE TO BE BROUGHT INTO THE EMF.** This includes organisms that are known to be pathogenic to humans, animals, fungi, plants, and bacteria. It also includes potentially transferable viral transgenics. The EMF is not equipped or certified to handle pathogenic organisms {Please see Miami University's guidelines for handling, disposing, and registering pathogenic organisms}. The EMF staff will work closely with researchers handling these organisms and provide fixatives for killing and preserving these organisms within researchers own laboratories (since they have the proper facilities for safe handling of the organisms) prior to their transport to the EMF laboratories.
- B.2 **NO USE OF RADIOISOTOPES WITHIN THE EMF.** The EMF is not equipped or certified to handle radioisotopes {Please see Miami University's guidelines for Radiation Safety}. The EMF staff will provide any assistance we can to those users wishing to utilize autoradiographic (and related) techniques.
- B.3 **NO USE OF MOLYBDENUM METAL (I.E. GRIDS) WITHIN THE EMF.** Pure molybdenum metal is toxic and absorbable on contact with the skin. Alternatives are available, see the EMF Staff.

B.4 Dispose of all broken glass, pipets, razor blades, hypodermic needles, etc. properly. There are glass disposal and sharps disposal containers located in all the EMF labs.

**CHEMICALS:**

B.5 Material Safety Data Sheets (MSDS) are located in the SEM and TEM Labs. There are copies of all the material safety data sheets for all the chemicals in the EMF, know what you are working with and how to handle it properly.

**B.6 ALL FIXATIVES MUST BE HANDLED UNDER THE HOOD ONLY!!!!**

B.7 Use appropriate disposal procedures for all chemicals. There are labeled containers under the fume hoods for general EM preparation chemicals.

B.8 Label **all** chemicals, solutions, and samples. All chemicals and solutions prepared or transferred to unlabeled containers (i.e. flasks, bottles, beakers) must be labeled with contents, your name, and date. This includes water! A flask of H<sub>2</sub>O and a flask of concentrated HCl look the same.

B.9 **NO SAWING, FILING, SANDING OR GRINDING OF RESINS IN EMF.** Most components of microscopy resins are either known or suspected carcinogens, teratogens or mutagens, or immunologic irritants. Even when 'polymerized' resins retain free binding sites within their structure. The production of fine airborne particulates from sawing, filing, sanding or grinding of resins can result in unknowing inhalation of these toxic substances with potential serious health conditions. In order to provide a safe working environment for all our users all activities which may result in the production of resin dust are prohibited.

B.10 **NO VOLUMETRIC MEASURING OR MIXING OF RESINS IN EMF GLASSWARE.** It is nearly impossible to remove resin (polymerized or unpolymerized) from glassware. There are disposable containers available in the EMF for this.

B.11 **Never dispose of unpolymerized resin down a sink drain!** ( - - this will only work for so long before the drain will have to be replaced - - ). Dispose of unpolymerized resin by polymerizing in at 65°C for several hours after which time it can be thrown away as non-hazardous waste.

B.12 **USE YOUR COMMON SENSE.**

**C. EQUIPMENT**

**C.1. THE EMF STAFF IS TO PROVIDE ALL INITIAL INTRODUCTION, TRAINING, AND EXPLANATION OF POLICIES FOR ALL EQUIPMENT (INCLUDING THE COMPUTERS AND DARKROOMS) FOR ALL USERS - STUDENTS, FACULTY AND STAFF!** - this places the liability for misuse / damage etc. on the EMF Staff. If there are specialized techniques which have been developed by specific laboratories, then *AFTER* the initial EMF staff training, these specialized protocols or techniques can be taught by someone familiar (possibly outside of EMF Staff) with them.

C.2 Any damage to equipment by anyone **NOT** trained by the EMF will be the responsibility of the

user or their major professor.

C.3 ANY user found taking a screw driver, allen wrench, pliers, hammer, etc. to a piece of EMF equipment will be shot. However, the EMF is a teaching facility, users wishing to learn equipment maintenance are encourage to contact the EMF Staff and we will gladly help you to take things apart.

C. 4 Equipment Reservation

- a. Sign-up schedules are provided for reserving usage time for the microscopes, darkrooms, microtomes, computers, high pressure freezer, CS Auto Freeze Substitution unit, and analog graphics room.
- b. Users may not reserve a continuous block of time over two hours long (See exceptions list).
- c. Users may not reserve more than a total of 4 hours per week between 8am-5pm, Monday - Friday (See exceptions).
- d. **DO NOT EXCEED YOUR SCHEDULED TIME!**
- e. Unsupervised users may reserve additional time blocks outside of 8am-5pm, Monday - Friday and university holidays in excess of b & c, and are encouraged to do so - this frees instrument times for training new users.
- f. If no one is using or has scheduled time users may use the equipment in excess of b & c.
- g. Reservations may be made up to a month in advance (In special cases greater advanced reservations may be made, see the EMF Supervisor)
- h. Reservations are equal for students, faculty and staff. **No One** (faculty, student or staff) may pre-empt, override or 'kick-off' another user.
- i. Any user who is 15 minutes late for reserved time forfeits all their remaining scheduled time if another user wants to use the equipment.
- j. continued failure to use your scheduled time will result in the loss of your reservation privileges.
- k. Reservation exceptions (applicable 8am-5pm, Monday - Friday) :
  - The EMF laboratory courses take scheduling priority. During the first week of the semester each student will be scheduled for two hours per week for the entire semester. Additionally, the lab classes will schedule the applicable microscope Mondays 1:00 -4:30pm for the entire semester.
  - Principal investigators whose efforts lead to the purchase of a particular item of equipment will be given priority for time scheduling on that specific equipment. They may reserve time before the sign-up sheets are made available to other users. A principal investigator may reserve 8 hours per week during the hours

8am-5pm, Monday - Friday. A principal investigator can not pre-empt users who have already reserved time.

- Due to maintenance and repairs issues the EMF staff may override the above rules - although every effort will be made to provide for the users.
- The confocal microscope maybe reserved for continuous blocks of time up to fours hours long for a total of 6 hours per week
- The CS auto freeze substitution unit may be reserved for up to 7 days.
- The Balzers high pressure freezer may be reserved for up to 1 day.
- Additional exceptions may be made under extraordinary circumstances -- please see the EMF Supervisor.

I. Everyone else's work is just as important as yours, please cooperate with each other, and see Dr. Edelman or Mr. Duley if there are any problems.

## MICROSCOPES

**C.5 ANY UNAUTHORIZED USE OF ANY EM OR CONFOCAL MICROSCOPE BY ANYONE IS STRICTLY FORBIDDEN!** All new users (*faculty*, staff and students) must see Mr. Duley or Dr. Edelman before using the microscopes.

C.6 There are no charges or user fees to use the EMF microscopes. The EMF is a critical teaching and research resource funded by the College of Arts & Science for the Miami University community. However, users are to provide their own photographic materials (i.e. film).

## Instruction

C.7 New microscopy researchers. The EMF teaches three formal courses through the departments of Botany & Zoology at both the undergraduate and graduate levels. Microscopy users are strongly encouraged to take these courses.

481/581 - EM Theory Course  
482/582 - SEM Laboratory Course  
483/583 - TEM Laboratory Course

C.8 Confocal & Light Microscopy: Specialized instruction in the theory and operation of confocal and light microscopy will be provided as needed by the EMF staff. It is preferable to work with small groups from either single or multiple labs in order to conserve staffing resources.

C.9 Specialized instruction:

- Training in advanced techniques are routinely provided by the EMF staff on an as needed basis.

- Users needing “refresher” instruction can contact the EMF staff and arrangements will be made.
- Individuals who can not attend the formal courses (i.e. due to faculty scheduling conflicts) should contact the EMF Supervisor and arrangements for customized instruction will be made.
- Instructors in non-EMF courses at Miami University wishing to collaborate with the EMF for demonstrations or laboratory exercises are encouraged to contact the EMF Supervisor.
- In all cases where a formal instructional method is not apparent or available researchers are strongly encouraged to contact the EMF Supervisor - teaching and education are primary goals of the EMF and every effort is made to best meet the needs of the Miami University community.

C.10 Experienced microscopy researchers new to the EMF are required to take the Unsupervised User Exam. Contact Dr. Edelman

C.11 Supervised users vs Unsupervised users:

- Supervised users are those individuals who are not ready to competently handle the equipment independently and are therefore restricted to normal EMF operating hours (8:00am-5:00pm Mon.-Fri.) when staff members are available to provide assistance. Unsupervised users are authorized to operate the instruments independently.
- Each microscope has its own Unsupervised User Exam and unsupervised status on one microscope is NOT valid for another scope.
- Unsupervised User Exams are freely available and should be used as study guides. The purpose of the exams are to ensure safe operation of the microscopes (not to hinder their usage).
- Users must score 100% to obtain ‘Unsupervised’ status.
- Users can be checked out any number of times until her/his score is 100%.
- The microscope must be used at least once a semester to maintain unsupervised status.
- **ONLY** Dr. Edelman and Mr. Duley can authorize Unsupervised user status.

C.12 Emergency after hours shutdown. In rare situations the electron microscopes may need to be shutdown due to power or utility failures, etc. In cases when this occurs when a member of the EMF Staff is not available (See Emergency Contact Information) any EMF user is authorized to shutdown the microscopes by following the shut down instructions.

## **D. DARKROOMS**

D.1. **Clean up after yourselves!** Photographic chemicals may look clear when liquid but will stain surfaces and dry to a powder and contaminate the entire room.

D.2 Users are to provide their own photographic paper and film.

- D.3 Developer is to be disposed of down the drain.
- D.4 Exhausted stop bath turns blue/purple and must be disposed of down the drain
- D.5 Fixer is to be tested with hypocheck solution. When bad it is dumped into the 5 gallon plastic carboys for disposal (NOT down the drain).
- D.6 Empty bottles. When a gallon bottle of chemicals is emptied it is to be placed outside of darkroom doorways (Elves will come and replace the chemicals).
- D.7 The TEM Negative chemicals are monitored by the EMF staff, and are disposed of based on either age or usage and replaced by the EMF staff.
- D.8 The EMF darkrooms are available to everyone within Miami University for all types of photographic work (i.e. not restricted to microscopy).
- D.9 Each darkroom is equipped to handle nearly all film formats from 16mm (110) to 5"x7". If you have an unusual film format please contact the EMF Staff for assistance.

## **E. COMPUTERS**

### Computer Usage

- E.1 **ALL NEW USERS (STUDENTS, FACULTY & STAFF) MUST CONTACT THE EMF STAFF, AND WE WILL PROVIDE ALL INITIAL INTRODUCTION, TRAINING, AND EXPLANATION OF POLICIES FOR ALL COMPUTER EQUIPMENT** - this places the liability for misuse / damage etc. on the EMF Staff. If there are specialized techniques which have been developed by specific laboratories, then *AFTER* the initial EMF staff training, these specialized protocols or techniques can be taught by someone familiar (possibly outside of EMF Staff) with them.

We will make every effort to provide this initial training within 1 to 2 days (Mon - Fri) of a request.

- E.2 Every user must work under their own account. No "Sharing" accounts. Creation of a new account takes 2-5 minutes, and we will provide accounts to any member of Miami. In cases where people need shared access to files & data this is also very easily done, from as many individual accounts as needed - just ask. (Verification from the original owner of the data will be required to arrange shared data access).
- E.3 No user installation of new software or hardware. EMF computers have a wide variety of interrelated software and hardware used by a wide number of researchers. Improper installation of software or hardware, or conflicts from new installations can seriously affect the functioning of these systems making them unusable. Users needing software or hardware not presently available must contact the EMF Supervisor (Dr. Edelman) and we will endeavor to correct the situation.
- E.4 EMF computers are *not* for general word processing. The primary function of the EMF computer is for digital imaging applications, which generally are beyond the capacity of most computer systems. However, we do provide support for inclusion of digital images into word processing documents. Contact the EMF Staff for assistance.

E.5 Failure to follow these policies will result in disabling of user(s) computer accounts. I.e , You will need to see either Matt Duley or Dr. Edelman in order to have your account unlocked before you will be able to use the graphics computer again.

#### Data Storage

E.6 No long term archiving of data on EMF computers or network disk space. The EMF maintains over 44 GB of local hard disk storage, and 60 GB of networked storage. However, high resolution images require large storage space, and it is expected that users actively working on projects may utilize over 1GB! In order to ensure users have access to space when they need it, it is requested that users move non-active files to alternative locations. The EMF offers CDR's, CDRW's, 100 & 250MB Zip drives, 650MBM & 1.3GB MO drives for archiving data.

E.7 Users leaving Miami University must remove their files from EMF computers.

E.8 The EMF will *not* delete user files without notification. You will be notified in advance of storage space problems. If notification is not possible files may be relocated or archived to CD, but they will not be indiscriminately deleted.

#### Printers

E.9 A Lexmark Optra (1200dpi) laser printer is available for use without charge. However, this printer is designed for printing images (not general text), and the toner cartridges are extremely expensive. This printer is *not to* be used for general non-image printing.

E.10 Epson ink jet printers are available for use without charge however users are to provide their own paper. Users printing large quantities of images are asked to contribute ink cartridges.

E.11 The Polaroid Pro-Palette 7000 film recorder (4000DPI) is available for use without charge but users are to provide their own film and developing. The EMF recommends Kodak Elite 100 film (E-6 processing) for color work. Any Kodak B&W film can be used for grey scale images (See EMF Staff for specific printing recommendations).

E.12 The Kodak 8650 dye-sublimation printer is available for use for the price of the printing materials.

### **F. LIQUID NITROGEN**

F.1 A Minimum of 7-days notification is required for cryo-preservation. Ultra-rapid cryo-preservation utilize large quantities of LN<sub>2</sub>. In order to ensure enough LN<sub>2</sub> is on hand for your needs as well as other users in the EMF we need advance 7-day notification for transport and filling extra LN<sub>2</sub> pressure dewars.

F.2 The EMF LN<sub>2</sub> dewars are for EM Facility use only. If you need LN<sub>2</sub> for work outside of the EMF you must use the Pearson Hall dewar located in the loading dock area in the basement level, or the LNB<sub>2</sub> facilities in the basement of Hughes Hall.

F.3 EMF & Pearson Hall LN<sub>2</sub> pressure dewars. As a courtesy, the EMF oversees the transport

and refilling of the Pearson Hall LN<sub>2</sub> Pressure dewar along with the EMF's own dewars. When the Pearson Hall dewar is empty, the EMF Specialist (Mr. Duley) will contact trucking to transport the tank to Hughes Hall and have an EMF Technician re-fill the tank and have it returned to Pearson Hall. This process may take up to 7-10 days (especially at the end and beginning of a semester as trucking is otherwise engaged). Notification of an empty tank will facilitate this process.

#### **G. GUESTS, VISITORS, DEMONSTRATIONS, AND TOURS OF EMF**

- G.1 The EMF staff routinely provides formal tours and demonstrations for Miami classes, high school classes, special groups, and visiting faculty and students. Please contact Dr. Edelmann if you would like to arrange such a visit.
- G.2 Users are welcome to show visiting friends and family the EM facility (it's a really cool place), however you must respect the rights of other users performing research within the facility.
- G.3 **NO CHILDREN.** The EM Facility can be a very dangerous place, and is inappropriate for children. All children within the EMF will be considered donated specimens and will be processed accordingly.