Program Now Available Online!
www.amc.mrl.illinois.edu

Register now!

- full access to lectures
- vendor show + instrument demos
- downloadable literature
- lab tours
- meals and evening reception
- networking events

https://amc.mrl.illinois.edu/registration

Applications-oriented tutorials given by our MRL staff:

- **Microscopy**: SEM, TEM, STEM, FIB...
- **Surface**: XPS, AES, SIMS, AFM...
- **Microstructure**: RBS, XRD, XRR...
- **Optics**: Raman, ellipsometry, PL, FTIR...

+ Nanoindentation, bio/soft materials
+ Industrial tutorials

June 4 - 5, 2019
AMC
Advanced Materials Characterization Workshop

PLATINUM SPONSORS

- Anton Paar
- Bruker
- Cameca
- National Electrostatics Corp.
- Oxford Instruments
- Physical Electronics

SPONSORS

- DMS
- EDAX
- Heidelberg Instruments
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- JEOL
- KLA
- Kurt J. Lesker Company
- Leybold
- Micro Materials
- Park Systems
- Princeton Instruments
- RAITH
- Rigaku
- Shimadzu
- STS
- Thermo Fisher Scientific
- Zeiss
Where are the MRL Central Research Facilities?

Most Central Research Facilities labs are in the basement or 3rd floor of MRL or Supercon.

“ESB” 4-digit room #s

“Supercon” 4-digit room #s

“MRL” 3-digit room #s

Loomis (physics)

Green Street
MRL – Central Research Facilities instrumentation cores:

- Electron Microscopy (including bio analysis services)
- Micro/Nanofabrication facility (including mask fabrication services)
- Scanning Probe Microscopy
- Laser and spectroscopy facility
- Surface Analysis
- Thermal Properties and Soft Materials Analysis
- X-ray analysis

- Characterize materials from the nanoscale to the centimeter scale.
- Fabricate micro/nanomaterials and devices.
Storeroom

Physics/MRL Shipping-Storeroom

- 1st floor, between MRL and Loomis
- Net ID, AD password and CFOP
  Self check-out (record ALL items using computers at the counter)
- Pick up or mail packages or borrow carts
Safety

at the
Materials Research Laboratory
Central Research Facilities

Orientation for New Researchers
Safety Contact

Maisie Kingren
MRL Safety specialist
295 B Engineering Sciences Building
mlswans2@illinois.edu

• Chemical waste questions and issues
• Lab safety questions

safety@mrl.illinois.edu

safety@mrl.illinois.edu
Building Emergency Action Plan
the “BEAP”

BEAP is the campus-wide initiative to provide annual training on what to do and where to go in case of an emergency.

- Training is on Compass: Training > BEAP > MRL
- You must be up to date on your BEAP training to log in to the schedule system to request instrument training or to receive key access to the MRL.
In case of a serious injury or other emergency, get help *immediately*.

- Call 911 from a cell phone.
- Get medical attention!
  Even if you are otherwise okay (err on the side of caution)

**In case of fire or hazardous chemical release:**

- Pull the fire alarm.
- Call 911 from a cell phone.
- If a fire alarm is sounded, you must leave the building immediately. Meet at Grainger Library.
If your injury is not serious (no bleeding, not unconscious, nothing’s broken), go to your nearest health care provider.

- McKinley for undergrads
- Wherever you have health insurance (Carle, Christie, etc.)

Notify Susan Logan (sklogan@illinois.edu) within 24hrs. Fill out Injury/Incident Report forms so:

- MRL administration can address safety issues
- Insurance will be able to cover your medical costs
Health Insurance

If you are working at MRL during the summer, make sure your health insurance continues.

Student health insurance doesn’t automatically continue when you are not registered.

Opt in through the Office of Student Health Insurance: http://si.illinois.edu/
Working Late or on the Weekend?

Buddy system

- Bring your outside door key, as the building will be locked.
- Have someone within shouting distance who can help you in case of an emergency.
- If you’re doing anything hazardous, **don’t work alone. (a buddy must be present for hazardous tasks)**

Don’t let strangers into the building.

SafeWalks and SafeRides phone numbers are on the back of your i-card.
1. They protect YOU from
   - the process that you’re performing
   - the materials that you’re handling
1. They protect YOU from
   - the process that you’re performing
   - the materials that you’re handling

2. They protect YOUR SAMPLES or equipment from you (skin particles, oils, etc.)
The Right Glove for the Right Job

Gloves may or may not be needed.
- Different types for different instruments or samples
- Ask during training

nitrile gloves for precision work

cryogenic gloves for extreme temperatures
PPE is for LAB WORK only...

Do not touch personal items or “common fixtures” with gloves.

Throw out gloves after you’ve used them once.
Protect yourself!

In MRL labs you are expected to wear:

• Long pants
• Close-toed shoes
• Clothing that will not get caught on things
• Eye protection when needed
• And if you have hair that can get in the way, please tie it back out of the way.
No Food or Drinks Allowed in Any of the Labs

Your food may contaminate your work or damage equipment!

Your chemistry may contaminate your food!
You are welcome to eat or drink in the lounges on the 2nd and 3rd floor of Supercon and in the break room in the center of the basement of MRL.
Transport of Material

Use **freight elevator** for:
- Compressed gas cylinders
- Cryogenic dewars
- Chemicals
- Carts and heavy objects
- Equipment

Do not travel with hazardous materials.
Secondary containment is required for liquids > 500 mL (use a bottle carrier).

Transport materials through public areas in a way that doesn’t require gloves.
Safety Data Sheets

Read SDS to understand hazards associated with each material you use.

Questions? Email Maisie Kingren: mlswans2@illinois.edu
Door Signs

in front of every lab

Authorized Personnel Only - Hazards Present

Room number

Staff contact information
• in case of instrument problem
• contact right after an emergency

Potential safety hazards in the room

For medical/safety emergencies, call 911

No biological or radioactive hazards present.

University of Illinois - Division of Research Safety 217-333-2755

In case of emergency call 911
Labeling Containers

Chemical containers **must** have labels!
No “mystery materials”! Please write clearly!

Secondary containers must have:
- Full chemical name
- Warning statement
- Solution or mix concentrations
- Preparation date
- Name, net ID and MRL user number

Avery labels (transparent sticky sheets) can be bought in the MRL-Loomis storeroom.

Waste containers must also be labeled “WASTE”.

http://www.drs.illinois.edu/SafetyLibrary/LabelingChemicalsInLaboratories
What Do I Do with Waste?

If you generate waste at MRL, bring it back to your own lab or dispose of it in specified containers.

Follow the DRS waste disposal guide:

MRL is a Biosafety Level 1 Facility

All biological materials must be approved by MRL’s biosafety officer, before they are brought to MRL.

• Biological: anything that is, or was, alive and derivatives of those things (proteins, plants, cells, etc.).

• Biological materials must be described on your proposal.

• BE SPECIFIC IN YOUR DESCRIPTION OF MATERIALS
  Don’t just say “cells”, “proteins”, “drugs” or “polymers”.

Fixative is available for free (contact lamiller@Illinois.edu).
Materials Safety at MRL

Prior approval and staff permission are required before bringing new or hazardous materials into MRL.

Submit a Change of Scope proposal to your project if your materials change.

Discuss materials with MRL staff for each instrument.
Have the SDS available for review.
Getting things done at the Materials Research Laboratory Central Research Facilities Orientation for New Researchers
Making changes and other details

**Your account** (University CFOP-A*) submitted with the proposal is how your MRL Central Research Facilities use is billed each month.

To change your account contact [mrl-facilities@illinois.edu](mailto:mrl-facilities@illinois.edu) or stop by the MRL office.

More than one project? A new PI or different fund source requires submitting a new proposal. Each MRL ID is tied to one CFOP-A.

Adding a technique to your existing project? Submit a “change-of-scope” (instead of a “new”) proposal.

To purchase from the storeroom, use the appropriate account/CFOP-A (this doesn’t have to be the same account as for facilities use billing).

* A stands for activity code. Not all accounts have one of these.
Procedure

• Submit (a) proposal(s) online. Once proposal is approved and you have been assigned a user number:
  • Request trainings
  • Be trained by MRL staff
  • Submit a change-of-scope proposal, if project changes, or need to add techniques or materials
• Request room access online
• ALWAYS carry your I-Card
You may need additional safety trainings after MRL orientation before you can work in MRL facilities:

- cleanroom, HF trainings - Microfab Facility
- Laser safety training - Laser and Spectroscopy Facility
- Analytical X-ray safety training - X-Ray Diffraction Facility
1. PRE-TRAINING
   - Discuss with staff about your experiment plans.
   - Some instruments require background reading or a seminar before the first training session. This makes the in-person training go faster.

2. IN-PERSON TRAINING
   - Group training, individual training
   - Supervised Sessions: some instruments require several sessions.
   - Testing: Demonstrate safe and effective operation of the instrument.

3. ADVANCED / REFRESH TRAINING
   - Advanced or special modes require additional training.
   - Refresher training may be required if you haven’t use the instrument for 6 months.
Request Training and Schedule Instrument Time

• The instrument scheduling system
  https://cmmserv.mrl.illinois.edu/

• Walkthrough video
  https://www.youtube.com/watch?v=kElGtjcGi-E&t=44s
Instrument Reservation and Logging System

MRL Facilities Number or NetID: 
MRL Password: 
(not your AD password)

Login

View Schedules
(inlinois.edu domain only)
Prepare for Your Training

The well-equipped trainee...

• Be ON TIME!
• Leaves texting and messaging for later.
• Make notes. Brings a pen or pencil, notebook and/or instrument instructions to the training session.
• Has an alert and inquisitive mind. Ask questions!

Your PI is supporting your work by paying for you to learn!
Always inform the staff

If you need to be late or absent

• Email the staff as far in advance as possible
• Other trainees may have to wait
• Other researchers may be able to use the time

After 15 minutes, no notification, no show

• You will be charged for ½ hour of training time.
• Your PI will be notified.
• You will be moved to the bottom of the training queue. Sometime it can be months away.
Logbook Recording

• Accurately report your instrument usage
  • Failure to report this accurately is considered theft of instrument time – your access to the instrument and lab could be suspended.
  • Record the amount of consumables used with the instrument (example: thickness of gold sputtered).
• Accurately record instrument status parameters, if being asked.

<table>
<thead>
<tr>
<th>Time In</th>
<th>Time Out</th>
<th>Date</th>
<th>Code</th>
<th>Hours Used</th>
<th>User Number</th>
<th>Name</th>
<th>Adv</th>
<th>Sample</th>
<th>Scanner</th>
<th>Transducer</th>
<th>Probe Used (S/N)</th>
<th>Probe Left On</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:35</td>
<td>4:14p</td>
<td>1/23</td>
<td>A1</td>
<td>8</td>
<td>1138</td>
<td>H. Solo</td>
<td>I. J.</td>
<td>cement</td>
<td>S</td>
<td>S</td>
<td>MS01121007</td>
<td>MS01121007</td>
<td>OK</td>
</tr>
</tbody>
</table>
Fill the logbook. Write neatly, please!

Make sure that you record your actual end time. Your check in and check out times should accurately reflect the time you use the instrument!

If you finish early
  • delete the remaining time and notify the next user.

Take your data with you
  • MRL instrument computers are not long-term data storage (data can get lost).
  • How you transfer data depends on the instrument.
    • USB vs. internet, shared folders
    • Virus-scan your USB drive before bringing it to MRL
Scheduling Etiquette for the Responsible MRL Researcher

• Most instruments are used by many researchers—be considerate!

• Be patient when trying to get time/training on heavily-used equipment.

• Until you’re good at the instrument, schedule time during workday hours when staff are around.

• If you can’t use your scheduled time, cancel as soon as possible. Check sign-up rules to see restrictions on late cancellations.

• Don’t reserve time you don’t expect to use.
Not Nice: Frequent Overscheduling

Signs up for extra-long sessions and cancels lots of time

The user booked an extra-long session...

Later, the user deleted part of his session hours.

This user could use the instrument earlier.
Be a Responsible Researcher

**Do:**

Keep equipment and the instrument area in a usable and clean condition for the next researcher.

- Your samples must be labeled indicating the specific material(s) and your name
- Take your samples with you. **Samples left in the lab are potential hazard. Samples left in the lab will be discarded, your access to the lab may be suspended and your PI will be contacted.**
- Put trash in appropriate waste containers
- Return all accessories to their proper storage location

**Contact the staff is something is wrong with the equipment**

- **Staff contact info posted near the instrument, lab door and/or instrument manual**
- That’s what we’re here for.
- It’s a much more efficient use of your research time
- The staff have experience fixing similar problems
Be a Responsible Researcher

**Do Not:**

Take tools/parts!
- MRL equipment and consumables are for use in the MRL Central Research Facilities *only*
- If you need to borrow something, talk to MRL staff *first*
  - Even if your professor tells you to do it
  - Even if it’s just a little bit of consumable
  - Even if you plan to bring it right back

Try to solve instrument problems yourself

Install any software on MRL computers.

Use the internet on MRL computers for anything except:
- Data transfer
- Scheduling instrument time
- Research activities like looking up papers
Getting Lab Room Access

After you have been trained on an instrument, you may request access to the lab room. All key and I-card access requests are made via the MRL web:

- Log in to https://my.mrl.illinois.edu/
- Hover over the menu: Facilities
- Click the sub-menu: Keys
- Input key information
- Submit

Note: some rooms have limited terms for access. For example, you may be limited to daytime hours when staff are present.
As part of the MRL research community, I will...

**Be Safe**
- Operate the equipment as instructed by MRL staff.
- Follow safe work practices and report any accidents.
- Properly dispose of my materials and clean up after myself.
- Notify MRL staff if I notice problems with the equipment or observe unsafe or improper behavior.

**Be Courteous**
- Respect other researchers’ rights to use facility resources.
- Respect their samples and processes.
- Read all communications from MRL facilities (safety posters, instrument status or procedure updates, etc.).
- Ask staff for clarification if you don’t understand the communications.
The MRL Suspension Policy ensures that research is done safely and courteously.

- Suspension: Case-dependent. You may lose access to an instrument or to all MRL facilities for a week or a month or forever!

- If you are a mentor to undergraduate students, be a responsible mentor. Suspension of an undergrad means the postdoc/grad supervisor will also be suspended.
When Your Work is Published

All publications that incorporate results obtained through the MRL Central Research Facilities must include the following acknowledgement:

“...was carried out in part in the Materials Research Laboratory Central Research Facilities, University of Illinois.”

Please also send a copy of your publication to:

mrl-facilities@illinois.edu
MRL After Graduation

Congratulations!
Turn in your keys to the MRL office and have your MRL User ID deactivated.

Are off-campus users permitted?
YES! You may apply to use MRL as an affiliate of any academic institution or business.

You need to have an active appointment on campus and proof of health insurance to do any work in the MRL after graduation unless you are an affiliate of an institution as described above.
Resources
For working at the
Materials Research Laboratory
Central Research Facilities

Orientation for New Researchers
MRL on the Web

mrl.illinois.edu
Staff directory, instruments, proposal submission, upcoming seminars and workshops

mrl.illinois.edu/facilities/become-user
Links to many useful documents for MRL users, including this presentation!

https://www.facebook.com/mrlfacilities/
https://www.facebook.com/MaterialsResearchLab/
https://twitter.com/MRLatIllinois
MRL Workshops

Advanced Materials Characterization (AMC)
2-day workshop held early June each year introducing techniques and instruments available at MRL.

Specialized Instrument Workshops/Seminars
Throughout the year with information and registration links posted on the MRL web.
Applied Vacuum Society Student Chapter

Free student membership for 1 year
No experience required

Outreach
• Vacuum demonstrations
• Engineering Open House
• Leadership opportunities
• Exploding PEEPS

Career development
• “How to give a presentation” faculty talk
• Learn about grad school
• Learn what research groups are doing

AVS and MRS trip to Argonne National Lab
Engineering IT

264 MRL Computer Lab

• Open ~ 9am to 5pm
• Printing services in MRL 264, including large frame poster and color printing
• Computer lab for use by MRL students
• Computer registration on the MRL Ethernet network
• Lending of projectors
• Technical assistance resolving computer problems from the office desktop to research systems running instruments
• Participation in technical research discussions to develop/acquire computer systems for labs or projects
• Poster Printing
  – Available to people in MRL or Physics research groups
  – [go.illinois.edu/mrlposter](http://go.illinois.edu/mrlposter)
  – Research posters only

For help using the computer lab email Engineering IT: [engrit-help@illinois.edu](mailto:engrit-help@illinois.edu)
Don’t have your MRL ID yet?

We welcome your participation in MRL Orientation before your project has been approved (and before your MRL User ID has been issued).

Be advised that updating your record about Orientation completion once your user ID is issued is **NOT AUTOMATIC**.

We update every week, however you may email us if you would like to bring it to our attention sooner.

mrl-orientation@illinois.edu
Thank you for coming!

Materials Research Laboratory
Central Research Facilities

Orientation Team