ME Department Safety Committee

Jim Van de Ven, Research Safety Officer
Peter Bruggeman, Plasma Safety
Zhe Gao, Bio Safety
Seong Chan Kim, Radiation Safety
Richard Maharaj, Building Safety
Jennifer Dahal, Staff Safety

Anna Sitek, Research Safety Professional, DEHS

Contact: mesafety@umn.edu
Safety Training Agenda

- Minnesota Safety
- Personal safety
- Office safety
- ME student safety team
- Lab safety
- Discussion & survey
Minnesota Safety

Mechanical Engineering Department
Safety in Minnesota

Safety topic specific to Minnesota

- Water safety
- Winter Safety
- Tick borne disease
Water Safety

- **Cold temperatures, currents, and underwater hazards** can make a fall into these bodies of water dangerous. Even if you do not plan on swimming, be cautious.

- If you go boating, **wear a life jacket!** Most boating fatalities are caused by drowning.

- **Alcohol can make environmental hazards more dangerous.** Alcohol impairs judgment, balance, and coordination and reduces the body’s ability to stay warm.

Winter Safety

If your vehicle plunges through the ice, Climb out the side windows, ASAP.
It will stay afloat a few seconds to several minutes depending on the airtightness of the vehicle.
Winter Safety

Building entrances are high risk areas!
- Inside wet slushy tile
- Outside smooth ice

Black ice
> 20 reported injuries/day last winter

Traction aids can help

http://www.athensgaweather.com/tag/black-ice/
Tick borne disease

https://www.health.state.mn.us/diseases/tickborne/ticks.html

Most active May – July and end of September until freezing

LONE STAR tick - rare but can spread diseases
blacklegged tick (aka deer tick) – causes most disease in MN. 1 in 3 ticks infected with Lymes →

DOG or WOOD tick - common but diseases rare

All ticks will die in < 10 min from being dried out

Ticks NEED moisture/humidity to survive

Grab firmly, pull slowly.

https://youtu.be/dJvT8negKKU

Mechanical Engineering Student Safety Team
Personal Safety

Mechanical Engineering Department
Your responsibilities:

- **Turn off equipment** in case of power outage, if severe weather alert is made
- **Exit** promptly, if the fire alarm goes off
- **Maintain Security** – Do NOT: prop open windows, doors or provide access
- **Dispose** hazardous materials through DEHS (bulbs, batteries, paints, electronics etc)
- **Report problems** – injuries, facilities
- **911** always OKAY to call
  - Responders will arrive at Church street
  - Go talk to them: if you called, know of someone still in the building, left something running that could become dangerous

DEHS (612) 626-6002
FM (612) 624-2900
FYI

- Fire extinguishers available, NOT required to use
- AEDs available,
  - Easy to use, locations posted
  - “Good Samaritan Law”, won’t get in trouble for trying to help without training
- Recommend adding emergency contacts and medical information to your cell phone
- Anyone can access the EMERGENCY info without unlocking the phone
- More classes available on campus
  https://z.umn.edu/labfirstaid
Personal safety: crime

Reported Criminal Offenses 2015-2017 Minneapolis On Campus

<table>
<thead>
<tr>
<th>Crime</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>RAPE</td>
<td>4</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td>FONDLING</td>
<td>5</td>
<td>8</td>
<td>14</td>
</tr>
<tr>
<td>ROBBERY</td>
<td>6</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>AGGRAVATED ASSAULT</td>
<td>5</td>
<td>4</td>
<td>26</td>
</tr>
<tr>
<td>BURGLARY</td>
<td></td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>MOTOR VEHICLE THEFT</td>
<td>8</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>ARSON</td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

Note: Theft is not included.

On Thursday, August 22nd at approximately 8:45 p.m., University of Minnesota Police responded to a robbery on the NE corner of 19th Avenue S and 4th Street S.

The victim was approached by two males who were riding bicycles. The victim was punched in the head and knocked to the ground and kicked by the suspects, and their cell phone was taken. The suspects then rode away on bicycles.

A more detailed suspect description is not available at this time.

Anyone with information about the incident is asked to call the University of Minnesota Police Department at 612-624-COPS.

The Department of Public Safety is required to issue Timely Notifications for crimes that meet the criteria under the Federal Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act. This crime occurred on Campus and is being investigated by the University of Minnesota Police Department.
SAFE-U
Mass Emergency Notification System


**Understanding SAFE-U Notifications**

- What are SAFE-U notifications?
- When will the University send me emergency messages using SAFE-U?
- Does SAFE-U cost anything to use?
- Will all cell phone carriers deliver SAFE-U Notifications?
- Is the SAFE-U system reliable?
- How else does the University broadcast emergency information?
- Will you send me SAFE-U Notifications using multiple methods (cell phone, home phone, email)?
- Is there an app I can use to receive SAFE-U alerts?

**Making Changes to SAFE-U Notifications**

- How do I update my contact preferences?
- How do I remove myself from getting SAFE-U Notifications?
- How can I add numbers or email addresses to my SAFE-U Notifications account?
- Can I receive SAFE-U Notifications campus?
- How can I add my parents, spouse, or SAFE-U Notifications??
- If I make changes in SAFE-U will my information be altered on the MyU My Info tab?
- Will my emergency contacts listed on the MyU My Info tab be alerted of emergencies?

https://www.everbridge.com/products/mobile-apps/download/

Watch video at
publicsafety.umn.edu/active-shooter
Crime Prevention

Advice from police interview

- Walk in a group at night on and near campus
- Be aware: avoid talking on the phone, texting, wearing headphones
- Don’t drink too much: criminals target intoxicated students
- Don’t let a stranger use your phone
- Stay in well-lit areas
- Call 911 if you think you’re being followed
- If attacked hand over what ever is requested, so you can get away

Escorts

- 624-WALK: small service area, 24/7 service
- Gopher Chauffeur: large service area, weekend service (Thur-Sat, 10p-2:30a)

Source: Lieutenant Troy Buhta, UMNPD
UMN Sexual Assault and Harassment Policy

- You can report sexual misconduct to confidential resources such as counselors, psychologists, etc.
- University employees are **required** to report sexual assault and harassment claims to the Title IX office. **This includes faculty, graduate assistants, and student employees.**
- **Training** [https://it.umn.edu/training-guide-preventing-responding](https://it.umn.edu/training-guide-preventing-responding)
- Report using **EOAA Employee Sexual Misconduct Reporting Form** (or contact eoaa@umn.edu or (612) 624-9547)
- University has policies in place to prevent retaliation by accused parties

More information at [policy.umn.edu/hr/sexharassassault](http://policy.umn.edu/hr/sexharassassault) and [diversity.umn.edu/eoaa/home](http://diversity.umn.edu/eoaa/home)
Mental Health Resources

Surviving and Thriving in Higher Education Videos
- ccgs.chem.umn.edu/surviving-and-thriving-higher-education

PAWS: Pet Away Worry and Stress
- RecWell: Mondays, noon–2 p.m.
- St. Paul Student Center: Tuesdays, 1–3 p.m.
- Boynton Health: Wednesdays, 2:30–4:30 p.m.
- West Bank: Thursdays, 11:30 a.m.–1:30 p.m
- boynton.umn.edu/paws

Boynton Mental Health Clinic
- Where: 3rd floor of Boynton
- When: Weekdays 8:30am – 3:30pm
- Phone: 612-624-1444
- Cost: $10 copay with grad assistant plan
- mentalhealth.umn.edu

Student Counseling Services
- Where: 340 Appleby Hall
- When: Weekdays 9:00am – 3:30pm
- Phone: 612-624-3323
- Cost: FREE
- counseling.umn.edu

Graduate students are 6 times more likely to suffer from depression and anxiety than general population
General office safety and computational security
Electrical Hazards

- Secure electrical cords with a cover in walkways
- Keep connections off the ground in case of unexpected water
- Maintain a 3 ft clearance in front of electrical panels
- Do Not “daisy chain”, or plug one a power strip into another power strip.
- Do not use outlet adapters (3-prong to 2-prong)
- Use UL listed, 12-16 gauge, 3 prong cords. smaller gauge = bigger wire.
- Surge protectors have an indicator light. 330 V, offers the best protection, 500 V the least

Office Ergonomics

- Prolonged Static Posture
- Top of monitor at eye level
- Eye strain
  - 20 min @ screen, look 20 ft away, for 20 seconds
- Carpal Tunnel Syndrome

The ergonomic showroom is now open in the basement of Boynton Health Service in Room W-37 with staff available to offer individual ergonomic assistance.

Showroom hours: Thursdays from 10:00 am - noon

https://dehs.umn.edu/office-ergonomics
passWORD $\rightarrow$ passPHRASE

- **Q:** Is it a strong password?
  
  A.) Engineer1!2@3#  
  B.) 4fQjw$3lw190  
  C.) qwerty

- worst passwords: 123456 or “Password”

Passwords are like vacations - the longer, the better!

- 16 billion times longer to crack a 16-character password compared to an 8-character password

- Recognize and report email scams to phishing@umn.edu

https://it.umn.edu/news/spotlight-password
https://it.umn.edu/sites/it.umn.edu/files/uis_neo_handout_recognize_and_report_email_scams-2.pdf
Data Backup

• Choose the right medium
  - Hard Drive, Servers
  - Cloud: (Google Drive, Dropbox)
    UMN Github (version control)
• Cost, reliability, speed, availability
• For public, shareable data:
  DRUM - Data Repository for the U of M
  https://www.lib.umn.edu/datamanagement/drum
• Research Data Management Camp (UMN libraries)
  z.umn.edu/dmcamp2017
Student Safety Team

Mechanical Engineering Department
## Who we are:

<table>
<thead>
<tr>
<th>Graduate Student</th>
<th>Advisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dingyi Gu</td>
<td>Rajesh Rajamani</td>
</tr>
<tr>
<td>Nathan Hagstrom</td>
<td>Tom Chase</td>
</tr>
<tr>
<td>Saeed Hashemi</td>
<td>Will Durfee</td>
</tr>
<tr>
<td>Jay Jia Hu</td>
<td>Suhasa Kodandaramaiah</td>
</tr>
<tr>
<td>Jungyoon Kim</td>
<td>Tianhong Cui</td>
</tr>
<tr>
<td>Rui Li</td>
<td>Alison Hubel</td>
</tr>
<tr>
<td>Shihao Liu</td>
<td>Cari Dutcher</td>
</tr>
<tr>
<td>Advitiya Mahajan</td>
<td>Al Aksan</td>
</tr>
<tr>
<td>Kevin Mallery</td>
<td>Jiarong Hong</td>
</tr>
<tr>
<td>Athena Metaxas</td>
<td>Cari Dutcher</td>
</tr>
<tr>
<td>Sankarganesh Muthukrishnan</td>
<td>Vinod Srinivasan</td>
</tr>
<tr>
<td>Ranjeet Narayanan</td>
<td>Suo Yang</td>
</tr>
<tr>
<td>Kedar Nawathe</td>
<td>Terry Simon</td>
</tr>
<tr>
<td>Gaurav Nayak</td>
<td>Peter Bruggeman</td>
</tr>
<tr>
<td>John Proper</td>
<td>Frank Kulacki</td>
</tr>
<tr>
<td>Jeremy Simmons</td>
<td>Jim Van de Ven</td>
</tr>
<tr>
<td>Guanyu Song</td>
<td>Chris Hogan</td>
</tr>
<tr>
<td>Ruitao Su</td>
<td>Michael McAlpine</td>
</tr>
<tr>
<td>Abhinav Tripathi</td>
<td>Zongxuan Sun</td>
</tr>
<tr>
<td>Charles Weinberg</td>
<td>Julianna Abel</td>
</tr>
<tr>
<td>Yingying Zhang</td>
<td>Xiaojia Wang</td>
</tr>
</tbody>
</table>
Our purpose:

- Promote safety awareness across department
- Serve as a safety information resource
  - Provide information
  - Direct to appropriate resources
- Organize and administer the annual department safety training
- Safety awareness resume builder for team members
Safety Moment

We won't drop this... right?

Take it easy.
Use a cart.
Safety Experience Report

If you've experienced or observed an incident, an accident, or an 'almost!' situation, please report it here. This form is anonymous and secure. The contents will be communicated to our academic laboratory communities and used to prevent safety issues in the future.

* Required

Title of incident *
Please enter a brief yet descriptive title here.

Your answer

Please describe the incident without using identifying terms such as names, room numbers, etc. *
If relevant, include information about time of day, whether the researcher was alone when the incident happened, whether an injury resulted, what response was taken, etc.

Your answer

What could be done in the future to prevent this incident from happening again? *
If relevant, include suggested new controls (fume hood, PPE), changes to procedures, new group policies, etc.
Peer Inspections & Hazard Specific Training

• Peer Inspections
  - Starting this year, the ME Student Safety Team has been performing peer lab inspections of specific safety areas (Chemical, Biological, etc.)
  - Inspections are meant to see how lab groups carry out safety measures
  - Ultimately identify which measures are best for regulatory compliance (more than one method could be acceptable!)

• Hazard Specific Training Seminars
  - Mostly geared toward existing students in the department, although new students are encouraged to attend
  - Each safety sub-group will host a panel of faculty to discuss their own experiences with safety measures and report findings of peer inspections
  - The idea is to encourage a discussion between the students and faculty so that everyone can be on the same page regarding safety
Join the Safety Team:

• Meetings monthly
  - Free lunch!
• Address safety issues important to your research group
  - Help promote safety in your labs
  - If we didn’t cover a safety aspect important to your lab, encourage a member of your group to join us!
• Contact Professor Van de Ven or any safety team member
  - vandeven@umn.edu
Laboratory Safety

Mechanical Engineering Department
Resource: me.umn.edu/intranet/safety/

ME safety home page includes:

- Safety training videos from previous years
- Safety forms and documents
- Safety resources
- Safety updates
One time Online Training

- Introduction to Research Safety
- Chemical Safety
- Chemical Waste
Annual Lab-Specific Training

- A lab-specific training record is available to use as a guideline for topics to cover.
- Provided by adviser or lab group.
- Resources to deliver this training on me.umn.edu/intranet/safety/

Common ME lab specific training resources are:

1. Biosafety
2. Lasers - online module
4. Compressed gases - Compressed gas sop template (doc), Matheson video, "The Basic of Cylinder Handling"
5. Nanomaterials (pdf), Artcoa - "Nanoparticles can permeate gloves after 2 hours"
6. Noise
7. Ergonomics

Also annual Departmental safety training.
Resource:
www.DEHS.umn.edu
Safety Signage

Classrooms

Inside of labs with hazards

Warning outside of labs with hazards
Most effective protection = Ventilation and Enclosures

Enclosures
- Around hazards are the primary protection: tightly closed valves, caps, guards in place.
- Secondary enclosures ensure ventilation is effective: sash on fume hood, door on cabinet, **door to room**

Ventilation
- Air from public and office spaces is recirculated, but laboratory air comes in and directly exhausted.
- Fumehood 100 feet per minute (fpm) face velocity
- Room ventilation airs flows from hallway into lab for 6 - 12 air changes equivalent to volume of the room
- Local exhaust 5 fpm

https://z.umn.edu/cse-fume-hood-ppt
Lab Hygiene

- No food or drink in the lab
- Wash your hands before or immediately after leaving the lab
- Don’t wear your gloves/lab coat outside of the lab
- Keep a change of clothes handy, in case of a spill
- Try not to place laptops, phones, etc. on dirty lab workspaces
- Keep sink basin and area clear of items such as glassware
Compressed Gas Cylinders

- **Cylinder Delivery**
  - Flammables: Keller 3-145B Dock
  - Non-flammables: ME1127
  - UMarket Cylinders: Pick up within 1 week

- **Manual Transportation:**
  - Use a cylinder cart, return to ME 1127
  - Check valve cap and straps
  - Wear gloves, safety glasses & close-toed shoes
  - You may ride in an elevator with a gas cylinder, discourage any additional passengers

- **Storage**
  - “Upright & Secure”
  - Compatible - away from corrosive vapors, oxidizers and flammables separate

- **Training**
  - [Compressed gas sop template (doc)](#)
  - Matheson video, *"The Basic of Cylinder Handling"*
Machine Safety

- **Guards** - Physical barriers to prevent direct contact
  - Guard pulleys, belts and fan blades
  - Foot-operated switches to prevent accidental actuation by personnel or falling objects.
  - Machines that use coolant, using splash guards to prevent the coolant from reaching employees.
  - Compressed air used for cleaning, with a pressure controller to < 30 p.s.i.
  - All moving parts: chains, gears, belts, shafts, pulleys, sprockets, spindles, drums, flywheels, or other reciprocating, rotating, or other moving parts.

- **Safety Switches** - To prevent the operation of machine while the operator’s safety is compromised

- **Machine Location** - Keep hazardous machinery away from operator’s work area

- https://z.umn.edu/machine
Hydraulics

• Hydraulic / Pneumatic systems have energy storage that exists after system is turned off
• Use cardboard, never your hands to check for hydraulic leaks
• Use Floor Dry, kitty litter or Oil absorbent wipes for clean up, keep in metal can and dispose as hazardous waste,

Fluid Power Safety hydraulics fact sheet (pdf), Convergence training video, Fluid Power Safety Institute Safety Alerts
Laser Safety

Labels and warning signs should be displayed conspicuously in areas where they would best warn individuals of potential safety hazards.

<table>
<thead>
<tr>
<th>Eye Hazard</th>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I</td>
<td>No possibility of harm.</td>
<td>very low power or fully enclosed</td>
</tr>
<tr>
<td>Class II</td>
<td>Damage possible but unlikely because of blink reflex</td>
<td>Output power &lt; 1 mW. Staring into the beam for a long period could cause damage</td>
</tr>
<tr>
<td>Class IIIa/IIIr</td>
<td>Damage after 2 min of eye exposure</td>
<td>Output power &lt; 5 mW</td>
</tr>
<tr>
<td>Class IIIb</td>
<td>Permanent eye damage in &lt; 1/100th of a second</td>
<td>5mW &lt; Output power &lt; 500 mW or pulsed</td>
</tr>
<tr>
<td>Class IV</td>
<td>Severe permanent damage without optics in short exposures</td>
<td>“High-powered” Output power &gt; 500 mW or pulsed</td>
</tr>
</tbody>
</table>

More information on Laser Safety

- If using a laser, you must do the online safety training module [https://www.uhs.umn.edu/general-laser-safety](https://www.uhs.umn.edu/general-laser-safety)
- [https://z.umn.edu/cse-laser-fs](https://z.umn.edu/cse-laser-fs)
Laser Safety

- Laser safety glasses
  - Designed to block certain wavelengths of light
  - Must match glasses to laser
  - Coatings on the glasses are fragile
  - Optical Density (OD) indicates how much light is blocked; higher is better

\[ T = 10^{-OD} \]

OD = Optical Density
T = Transmittance (decimal)

These glasses would not protect you from lasers operating from 450 nm to 725 nm!!

Active adjustment of the laser’s position or Alignment is the most common cause of laser injuries. Use a lower class laser or the lowest power settings possible and viewing cards, IR viewers or burn paper.
Personal Protective Equipment (PPE)

Your choice of PPE will depend on your research. Common types include:

- **Personal attire:**
  - Closed-toed shoes protect from small broken glass shards on lab floor
  - Long pants covers areas not protected by lab coat
  - Secure loose clothing / long hair

- **Gloves:**
  - Nitrile (disposable) is most common, but has poor resistance to many common chemicals including acetone. Used because the other common disposable material latex causes serious allergy problems. Poor resistance is acceptable because lab work doesn’t usually involve immersion. If gross contamination is possible consult a glove selection guide.
  - Gloves can be layered “double-glove”, changed often, and come in different thicknesses and wrist lengths for additional coverage

- **Eye Protection:**
  - Safety glasses
  - Chemical splash goggles
  - Face shields
  - UV/Laser protection

Personal Protective Equipment (PPE)

• Lab Coats:
  - Resist spills
  - Protect against blood-borne pathogens
  - Provide flame resistance

• Respirators:
  - If you think you need a respirator, consult DEHS
  - Respirator use is covered under the Respirator Protection Program

• Radiation:
  - Dosimeters

• Hearing Protection
  - General rule - If you can’t hear yourself snap with your arm fully extended, you should be using hearing protection
Lab Emergency Response

• Know where your emergency equipment is located
• Use it as soon as possible
• Not required to clean up spills
  – Call DEHS or 911 (both work)

https://z.umn.edu/labmedicalresponses
Evaluating Experiments

Be aware of
• Chemical hazards
• Electrical hazards
• Fire hazards
• Mechanical hazards

Key questions
• What’s the worst thing, most likely thing that could happen?
• What would happen in a power outage?
• What would happen in the event of a spill or leakage?
• Is everything structurally sound and well secured?
Hazardous Waste Disposal

Never sewer, evaporate, or trash hazardous waste
Refer to the ‘Hazardous Waste Procedures’ and ‘Storage Requirements’ for instructions

• Is it hazardous waste?
  - Check the ‘Chemical Registry’. https://z.umn.edu/dehs-ddc
  - If it doesn’t have the xxNH designation or it’s not found in the registry, assume it’s hazardous.
  - Includes contaminated labware, solvent rags, etc.

• Handling and storing waste
  - Select compatible container small enough to dispose once a semester
  - Completely fill out the yellow ‘hazardous waste’ labels using full chemical names and HAZARD check boxes
  - Close containers when more than 3 ft away
  - Liquid hazardous waste MUST be stored in secondary containment
Hazardous Waste Disposal

Handling and storing waste (continued)

• Separate materials by hazard class (Flammable, oxidizer corrosives etc.)
• Waste should be stored in a safe location (i.e. chemical storage cabinets)

Preparing Waste for Collection

• Try to dispose of waste containers once a semester and review stock reagents once a year
• File for pickup online using chematix
  1. Create Waste Card
  2. Be sure to go to the second step “Pick up Worksheet”

[Image of chematix interface]

dehs.umn.edu
Sharps and Glass Disposal

- Purchase sharps from Chemistry Stockroom or Umarket
- Broken glass put in cardboard boxes lined with plastic bags. Must < 20" tall and say “Broken glass”

Set boxes in trays

Trays protect cardboard from getting wet and becoming weak

When glass waste container or sharps container is ¾ full,
- Seal shut
- Place next to regular trash for disposal
- Call FM (612) 624-2900 for a pickup

Solid, Non-hazardous, Free of sharp points
Biological Hazards and Disposal

- Check “Biosafety page” for additional training and IBC requirements
- Make sure to post both the
  - Decontamination plan and
  - Disposal template
  - See the ‘Biological Waste Disposal Table’ for detailed information
- Be familiar with Bio safety cabinets
Discussion & Survey

• Safety questions / concerns?

• Contact: mesafety@umn.edu

• Please remember to complete the signature form and comment form