Facility and Equipment Use Policy

28 February 2013

7300 Jack Newell Boulevard, South
Fort Worth, TX  76118-7115
817-272-5900
FACILITY AND EQUIPMENT USE POLICY

This policy prescribes the use of available facilities and equipment at The University of Texas at Arlington Research Institute (UTARI), an institution of higher education established under the laws of the State of Texas as an institution of The University of Texas System.

UTARI encourages the use of its facility and equipment on a pay-for-use basis by interested organizations and individuals. The intent is to attract users who need space, equipment, technology, or expertise which would otherwise be unaffordable or impractical for their own projects or research and to establish UTARI as an institution servicing the research needs of the region.

UTARI houses a full range of equipment from basic machining tools to sophisticated and state-of-the-art research equipment, as well as a multi-use facility available for hosting meetings, conferences, and events. Users of UTARI equipment and facility must read and understand this policy prior to use.

User Categories

There are three user categories: 1) University of Texas at Arlington (UTA) employees, 2) other non-UTA academic employees (such as Texas Christian University, University of North Texas, or University of Dallas, for example), and 3) all others. User rates and fees vary depending on the user category.

Hours of Operation

Normal working hours are Monday through Friday from 8:00 AM to 5:00 PM. Equipment and facilities can be used after these hours upon approval by the UTARI Associate Director. After hour users must adhere to a buddy system where at least one other user is in the building and both are aware of each other’s location. Should either user leave the building for any reason or duration, work must cease until they return.

Availability

Interested users can contact the Associate Director’s office to indicate an interest in using UTARI’s facilities or equipment and to describe some basic information for the work and equipment needed, the timeframe for conducting the work, and a general concept of what the project entails. Once a decision is made to authorize use, the user will coordinate to schedule time on the equipment, lab space, and access to the facility. UTARI requirements take precedence on scheduling equipment and lab space, if there is a conflict.
Termination

Either party may terminate the UTARI Access and Use Agreement with thirty day notice. UTARI may immediately terminate any agreement and suspend use of UTARI facilities and equipment in the event the user:

- Is more than thirty days past due in payments after being invoiced
- Fails to comply with any of the conditions or rules contained in this policy, the Laboratory Safety Manual, or the terms of the UTARI Access and Use Agreement
- Fails to comply with relevant UTA policies, rules, or procedures.

Patents, Copyrights, Technology Rights, Confidentiality, and Export Control

A “subject invention” is any invention or discovery conceived or first actually reduced to practice directly in the course of, or under, the UTARI Access and Use Agreement AND arising directly from the performance of the project under said agreement.

Subject inventions shall have inventorship determined by the application of US patent law. Namely, title to all inventions and discoveries made solely by an inventor reside in the sole inventor. Title to all inventions and discoveries made jointly by two or more inventors reside jointly in the joint inventors. The user is ultimately responsible for the inventorship claims of participants under these terms.

To clarify prospective invention and discovery status, the fact that UTA-owned or UTARI equipment or facilities may be used by the user in research and development to create a subject invention does not mean the user research and development is collaborative research and development with UTA, nor that UTA is a joint owner or inventor of any such invention or discovery. **THIS AGREEMENT IS NOT INTENDED TO AND DOES NOT INCLUDE RESEARCH AND DEVELOPMENT, INVENTIVE ACTIVITIES OR COLLABORATION, BETWEEN AND AMONG UTA, UTARI AND THE USER. IF COLLABORATION IS DESIRED, THEN AN ADDITIONAL AND DIFFERENT AGREEMENT MUST BE NEGOTIATED AND SIGNED.**

No confidential or proprietary information is expected under this agreement. **THIS AGREEMENT DOES NOT INCLUDE CONFIDENTIAL TREATMENT OF INFORMATION EXCHANGED BETWEEN AND AMONG UTA, UTARI, AND THE USER. INFORMATION IS PRESUMED TO BE PUBLIC INFORMATION. IF CONFIDENTIALITY IS DESIRED, THEN AN ADDITIONAL AND DIFFERENT AGREEMENT MUST BE NEGOTIATED AND SIGNED.**

No export controlled information is expected under this agreement. The user acknowledges that the export of goods, materials, or data may require some form of export control license from the US Government and that failure to obtain such a license may result in criminal liability under the laws of the United States. **THIS AGREEMENT IS NOT INTENDED TO AND DOES NOT INCLUDE THE EXCHANGE OR USE OF EXPORT CONTROLLED OR ITAR INFORMATION BETWEEN AND AMONG UTA, UTARI AND THE USER. IF THE USER**
HAS OR CREATES EXPORT CONTROLLED INFORMATION AS PART OF THE RESEARCH, THE USER MUST, BEFORE DISCLOSURE TO UTA OR UTARI, PROVIDE EXPORT CONTROL DESIGNATION INFORMATION ASSOCIATED WITH SUCH DATA, INFORMATION, EQUIPMENT OR MATERIAL, SUCH AS ECCNS OR ITAR MUNITIONS CONTROL LIST INFORMATION, IN ORDER FOR UTA AND UTARI TO OBTAIN NECESSARY REVIEWS, LICENSES, OR AGREEMENTS AS REQUIRED BY EXPORT CONTROL LAWS AND REGULATIONS AND AN ADDITIONAL AND DIFFERENT AGREEMENT MUST BE NEGOTIATED AND SIGNED.

**Damages, Personal Property, and Warranties**

Users agree that in the event damages are incurred on UTARI facilities or equipment through negligence, misuse, or accident, to bear full financial responsibility and to make payment for damages and/or repairs within fourteen days of receiving cost estimates for repairs.

The user is responsible for loss, theft, or damage to any personal property located within UTARI facilities. UTARI has no responsibility for any user's personal property other than that authorized by the constitution and laws of the State of Texas.

**UTARI EXPRESSLY DISCLAIMS AND EXCLUDES ALL EXPRESS OR IMPLIED WARRANTIES CONCERNING UTARI EQUIPMENT OR FACILITIES, WHICH ARE PROVIDED ON AN ‘AS IS’ BASIS. UTARI DOES NOT GUARANTEE THE ACCURACY OF ANY TEST RESULTS THE USER MAY OBTAIN FROM USING UTARI EQUIPMENT OR FACILITIES, NOR GUARANTEES THE PROCESSES, MATERIALS, OR OTHER COMPONENTS THE USER MAY UTILIZE. UTARI DOES NOT GUARANTEE EQUIPMENT WILL BE FUNCTIONAL AT ALL TIMES AND DOES NOT GUARANTEE THAT UTA OR UTARI STAFF WILL BE AVAILABLE AT ALL TIMES TO ASSIST.**

**Limitation of Liability.**

*IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, UTARI SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO THE USER OR ANY OTHER PARTY FOR 1) PERSONAL INJURY OR PROPERTY DAMAGE, 2) LOST PROFITS, WORK STOPPAGE, LOST DATA, COMPUTER HARDWARE OR SOFTWARE DAMAGE, FAILURE OR MALFUNCTION, OR ANY OTHER SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES OF ANY KIND, 3) DAMAGES, REGARDLESS OF THE NATURE, CAUSED BY THE USER’S FAILURE TO FULFILL RESPONSIBILITIES AS SET FORTH IN THIS POLICY, OR 4) DAMAGES OCCASIONED BY OR CAUSED BY OTHERS BEYOND THE CONTROL OF UTARI. USER’S REMEDIES PROVIDED IN THIS AGREEMENT ARE EXCLUSIVE.*
UTARI Access and User Agreement (TAB A)

Once approved to use UTARI facilities and equipment, users must sign an access and user agreement. This agreement briefly describes the work to be conducted, provides the rules and requirements for using the facilities and equipment, and payment methods. This agreement serves as the contract between UTARI and the user.

Users must read and understand this policy, as well as the UTARI Laboratory Safety Manual, and agree to:

- Pay applicable fees in advance or within 30 days of receiving an invoice
- Comply with this policy
- Train, as required, on equipment
- Follow access and use protocols
- Follow equipment use protocols and housekeeping rules
- Leave equipment and facilities in the same, or better, conditions
- Report any problems
- Use equipment and facilities only for research and development activities.

Unless agreed to, items permitted to be brought on UTARI premises and furnished by the user must be removed by the user within ten days after completing work. No modifications of UTARI equipment or facilities are allowed.

In the event that the user does not comply with this policy and agreement, UTARI may, without prejudice to any other legal or contractual rights, terminate this agreement.

UTARI facilities and equipment may only be used for research and development activities. In no case will users offer for sale any device or product manufactured utilizing UTARI facilities or equipment.

Users also agree not to use the names of The University of Texas at Arlington, The University of Texas System, or The University of Texas at Arlington Research Institute, or any acronym thereof, such as UTA, UT System or UTARI, in any publicity releases (e.g., news releases or advertising) or in any written or oral public statements about these terms or the work done at UTARI, or a project, without the prior written consent of UTA.

Release and Indemnification Agreement (TAB B)

Users agree, shall indemnify, defend, and hold harmless UTARI, UTA, UT System, their Regents, officers, agents, employees, students, and others holding academic appointments within those institutions (sometimes “Institutions”) on demand for, from, and against any and all losses, liabilities, suits, judgments, obligations, fines, penalties, claims, costs and
expenses (including reasonable attorney’s fees) that arise from the user’s activities under the UTARI Access and User Agreement, including but not limited to the use and commercialization by the user of the results of any project or research; user’s infringement of any patent, copyright, trademark, trade name, trade secret, or other proprietary or contractual right of any third party, or personal injury or death to any person or property damage in connection with the UTARI Access and User Agreement or arising from the user’s use of UTARI facilities or equipment; provided that any injury that results from Institutions’ negligence or intentional misconduct is excluded from the user’s requirement to indemnify and hold harmless.

User shall employ attorneys of its own selection in defense of any claim (subject to the statutory duty of The Texas Attorney General) and is responsible for all expenses that result from employing a vigorous, diligent defense of Institutions, regardless of whether any claims are rightfully or wrongfully brought or filed. Subject to the statutory duty of The Texas Attorney General, Institutions shall fully cooperate with the user in defending the claims and will make no compromise or settlement without the prior written approval of the user.

UTARI, UTA, nor the UT SYSTEM is responsible for any personal injury or death to users while operating equipment. Users assume financial risk for any equipment damaged during use and agree to provide personal injury insurance coverage during the period of use to mitigate bodily injury risk.

Facility Access and Equipment Fee Schedule (TAB C)

The UTARI Lab Manager is responsible for maintaining the facility and equipment, as well as providing access to the facility. Only authorized users can use the provided access card for entry into the facility and users agree to be photographed and monitored remotely by video or other electronic means. At the conclusion of the term of agreement, users will return any access cards which were provided.

User agrees to provide UTARI a list of participants required to use the facilities and equipment. All participants must be approved to use the facility and equipment. **UTA and UTARI reserves the right to disallow or restrict access.**

The fee schedule delineates costs for using certain machines and equipment. Only equipment listed in this schedule is charged for on a pay-for-use basis and users agree to fill out a daily log stating the equipment used and duration of usage. Fees are based on the user category, type of equipment being used, and/or the level of consulting and
User agrees to provide payment by check or credit card in advance or within thirty days upon receipt of invoice to the UTARI Financial Analyst. **There is no cash payment method.** A $400 quarterly access fee is applied to all users, regardless of category, in order to defray overhead and consumable expenses. There are certain limitations for charges, depending on the user category.

All payments are received by the UTARI Financial Analyst who establishes the amount due and invoicing.

Most of the equipment in the facility is delicate and expensive and requires extensive training prior to use. The manager of each laboratory is responsible for the training and safe operations of the equipment in their lab. **Prior to any work, users must be trained and certified on any equipment to be used.**

**Comprehensive Equipment List (TAB D)**

This tab provides a more comprehensive list of equipment available to users. Not all equipment is charged for use. The $400 quarterly access fee covers the expense of using equipment that is not charged for on a pay-for-use basis.

**Laboratory Safety Manual (TAB E)**

Users must read and comply with this safety manual. Any questions or issues must be directed to the Facility Manager for resolution.
<table>
<thead>
<tr>
<th>ATTACHMENTS</th>
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<tbody>
<tr>
<td>TAB A</td>
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<tr>
<td>UTARI Access and User Agreement</td>
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<td>TAB B</td>
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<tr>
<td>Release and Indemnification Agreement</td>
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<tr>
<td>TAB C</td>
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<tr>
<td>Facility Access and Equipment Fee Schedule</td>
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<tr>
<td>TAB D</td>
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<tr>
<td>Comprehensive Equipment List</td>
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<tr>
<td>TAB E</td>
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<tr>
<td>Laboratory Safety Manual</td>
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</tbody>
</table>
TAB A
UTARI Access and User Agreement

The University of Texas at Arlington Research Institute (UTARI) provides, on a pay-for-use basis, its facilities and equipment for UTA students, staff and faculty, and non-UTA affiliated users. This document prescribes the agreement between UTARI and the user for access and use of facilities and equipment.

The undersigned: ___________________________________________________________
address: __________________________________________________________________

intends to use UTARI facilities and equipment for the following purpose:
__________________________________________________________________________
__________________________________________________________________________

and agrees to:

• Pay applicable fees (see UTARI Facilities and Equipment Fee Schedule) in advance or within 30 days upon receipt of invoice for use of facilities and equipment.
• Comply with the UTARI User Policy and to follow the applicable Material Safety Data Sheet (MSDS) and Standard Operating Procedures (SOPs) for materials and/or chemicals used for each piece of equipment.
• Train in all applicable safety procedures BEFORE beginning any work.
• Follow all access and use protocols and not share user access cards.
• Follow UTARI equipment utilization protocols and housekeeping rules.
• Leave facilities and equipment in the same, or better, condition as found.
• Report any problems with facilities or equipment, including potential safety hazards, to the Associate Director.
• Use facilities and equipment only for research and development activities (e.g., not to offer for sale any device or product produced utilizing UTARI facilities or equipment).

General Provisions

Force Majeure. UTA is not responsible for any delays or failure to provide access to facilities and equipment due to acts of God, strikes, or other disturbances, war, insurrection, embargoes, governmental restrictions, acts of governments or governmental authorities, or any other causes beyond the control of UTA.

Governing Law. This agreement is governed by the laws of the State of Texas without regard to its principles of conflict of laws.

Entire Agreement. This agreement represents the entire understanding of the parties, supersedes all prior written and/or oral agreements, and may not be modified except by written agreement of the parties.
Severability. If any provision of these terms is declared void or unenforceable, such provision shall be deemed severed from these terms, which shall otherwise remain in full force and effect.

Notices. Each notice, request, approval, or demand given or required to be given or obtained pursuant to this agreement shall be in writing and deemed sufficiently given upon receipt by any reasonable means including hand delivery, delivery by recognized carriers such as FedEx, UPS, or US mail and addressed to the intended recipient or to any other designated address by notice given pursuant to this section.

I acknowledge and understand that failure to follow this agreement may result in loss of UTARI access and use and that I am responsible for any damages as described in the UTARI Indemnity Policy.

Signature: ______________________________________
Name (Printed): _________________________________ Date: _____________________
Email: _________________________________________ Phone #: __________________

UTARI ASSOCIATE DIRECTOR APPROVAL:
Signature: _____________________________________ Date: ______________________

UNIVERSITY OF TEXAS AT ARLINGTON APPROVAL:
Vice President for Business Affairs and Controller
or
Vice President for Administration and Campus Operations
Signature: _________________________________ Date: ______________________
Approval Authority: __________________________________________________________
TAB B
RELEASE AND INDEMNIFICATION AGREEMENT

INSTITUTION:
The University of Texas at Arlington Research Institute, UT System
7300 Jack Newell Blvd. S.
Fort Worth, Texas 76118

PARTICIPANT:
Name: _________________________
Address: ___________________________

DESCRIPTION OF ACTIVITY:
Access to and use of The University of Texas at Arlington Research Institute facilities and equipment for the period ________________ through _________________.

I, the above named participant, am eighteen years of age or older and have voluntarily requested to participate/engage in the above activity. I acknowledge that the nature of the activity may expose me to hazards or risks that may result in my illness, personal injury, or death and I understand and appreciate the nature of such hazards and risks.

IN CONSIDERATION OF MY PARTICIPATION IN THE ACTIVITY, I HEREBY ACCEPT ALL RISK TO MY HEALTH AND OF ANY INJURY OR DEATH WHICH MAY RESULT FROM SUCH PARTICIPATION AND I HEREBY RELEASE THE ABOVE NAMED INSTITUTION, ITS GOVERNING BOARD, OFFICERS, EMPLOYEES AND REPRESENTATIVES FROM ANY LIABILITY TO ME, MY PERSONAL REPRESENTATIVES, ESTATE, HEIRS, NEXT OF KIN, AND ASSIGNS FOR ANY AND ALL CLAIMS AND CAUSES OF ACTION FOR LOSS OF OR DAMAGE TO MY PROPERTY AND FOR ANY AND ALL ILLNESS OR INJURY TO MY PERSON, INCLUDING MY DEATH, THAT MAY RESULT FROM OR OCCUR DURING MY PARTICIPATION IN THE ACTIVITY, WHETHER CAUSED BY NEGLIGENCE OF THE INSTITUTION, ITS GOVERNING BOARD, OFFICERS, EMPLOYEES, OR REPRESENTATIVES OR OTHERWISE.

ADDITIONALLY, I ASSUME THE FINANCIAL RISK FOR ANY EQUIPMENT DAMAGED DURING USE AND AGREE TO PROVIDE PERSONAL INJURY INSURANCE COVERAGE DURING THE PERIOD OF USE TO MITIGATE BODILY INJURY RISK.

I further agree to indemnify and hold harmless the institution and its governing board, officers, employees, and representatives from liability for the injury or death of any person (s) and damage to property that may result from my negligent of intentional act or omission while participating in the described Activity.

I HAVE CAREFULLY READ THIS AGREEMENT AND UNDERSTAND IT TO BE A RELEASE OF ALL CLAIMS AND CAUSES OF ACTION FOR MY INJURY OR DEATH OR DAMAGE TO MY PROPERTY THAT OCCURS WHILE PARTICIPATING IN THE DESCRIBED ACTIVITY AND IT OBLIGATES ME TO INDEMNIFY THE PARTIES NAMED FOR ANY LIABILITY FOR INJURY OR DEATH OF ANY PERSON AND DAMAGE TO PROPERTY CAUSED BY MY NEGLIGENT OR INTENTIONAL ACT OR OMISSION.
PARTICIPANT
Signature: ________________________________
Printed name: ____________________________
Date: _________________________________

WITNESS
Signature: ________________________________
Printed name: ____________________________
UTARI Position: ____________________________
Date: _________________________________
Facility Access and Equipment Fee Schedule

This schedule reflects the charge rates for use of the facility and equipment where UTARI must recoup costs. Users are only charged for use of the equipment listed below. Other equipment is available (see Tab D for a more complete list of available equipment) for users, such as machine shop equipment, where fees are not charged.

Users incur fees based on whether they are UTA employees, non-UTA academic users, and non-academic users. **A quarterly access fee of $400 per user** is charged to cover costs for supplies, training, and consumables to support equipment operations.

There is no dollar limit for use of equipment for users. **All hourly fees are per person and the minimum time unit to be charged is 1 hour, which includes training time, usage, and any assistance for usage.**

Technical staff assistance is available for consulting and processing at $60 per hour for UTA and non-UTA academic users, and $80 per hour for non-academic users. Professional staff (lab manager level) assistance is available for consulting and processing at $100 per hour for UTA and non-UTA academic users, and $150 per hour for non-academic users.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>UTA Users</th>
<th>Non-UTA Academic Users</th>
<th>Non-Academic Users</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atometric CNC Milling Machine Model G4</td>
<td>$20</td>
<td>$30</td>
<td>$60</td>
</tr>
<tr>
<td>Minitech CNC Mini-Mill 3 DMS-PRO</td>
<td>$20</td>
<td>$30</td>
<td>$60</td>
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<tr>
<td>Epilog Legend EXT Engraving Laser and Cutting Sys</td>
<td>$20</td>
<td>$30</td>
<td>$60</td>
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<td>Mask Aligner EVG-620</td>
<td>$20</td>
<td>$30</td>
<td>$60</td>
</tr>
<tr>
<td>SmalTec Micro-EDM EM203</td>
<td>$20</td>
<td>$30</td>
<td>$60</td>
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<tr>
<td>Laurier M9 Flipchip Bonder</td>
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<td>$30</td>
<td>$60</td>
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<tr>
<td>FEI Quanta 400 Scanning Electron Microscope</td>
<td>$20</td>
<td>$30</td>
<td>$60</td>
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<tr>
<td>Morgan Injection Molder</td>
<td>$20</td>
<td>$30</td>
<td>$60</td>
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<tr>
<td>Wafer Bonding System EVG-520</td>
<td>$30</td>
<td>$45</td>
<td>$90</td>
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<tr>
<td>ADT Provectus 7100 Dicing Saw</td>
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<td>$45</td>
<td>$90</td>
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<tr>
<td>Hess &amp; Knipps Bondjet 815 Auto wedge bonder</td>
<td>$30</td>
<td>$45</td>
<td>$90</td>
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<tr>
<td>ONXY 500 Automated die attach</td>
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<td>$90</td>
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<td>Laser Sealing &amp; welding LC100,Trumpf Trupulse21</td>
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<td>Objet 3D Printer</td>
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<tr>
<td>3D ABS Printing System DIMENSION</td>
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<tr>
<td>3D Resin Printing Systems, SLA 3D Printer Viper Si2</td>
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<td>Resonetics Rapidx 250 Laser Machining System</td>
<td>$40</td>
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<td>RF Magnetron Sputtering System</td>
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<tr>
<td>CHA Industries Metal Deposition Evaporator</td>
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<tr>
<td>Dage XD7600NT X-RAY Inspection System</td>
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<tr>
<td>FEI Nova NanoSEM 230</td>
<td>$100</td>
<td>$150</td>
<td>$300</td>
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TAB D
## COMPREHENSIVE EQUIPMENT LIST

The charts below list most of the equipment available to users. Users are only charged for equipment listed at Tab C and training is required before operating any tool, machine, or equipment.

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Tool</th>
<th>Room Location</th>
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<tbody>
<tr>
<td><strong>Conventional Machining</strong></td>
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<tr>
<td></td>
<td>Lathe Engine JET 1440</td>
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<td></td>
<td>Mini-Lathe Grizzly M# G8688</td>
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<td></td>
<td>CNC Mini-Mill Minitech 3 DMS-PRO</td>
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<td></td>
<td>Manual Mill Bridge Port</td>
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<td>Horizontal Band Saw MSC</td>
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</tr>
<tr>
<td></td>
<td>18” Bandsaw Craftsman</td>
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<td></td>
<td>Tumbler Ultra-Vibe 45 Thumlers</td>
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<td></td>
<td>8” Bench Grinder Delta</td>
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<tr>
<td></td>
<td>Industrial Belt Sander Kalamazoo</td>
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<tr>
<td><strong>Characterization &amp; Testing</strong></td>
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<td></td>
<td>Surface Profiler Ambios XP-200</td>
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<td></td>
<td>Digital Microscope Hirox KH-7700</td>
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<tr>
<td></td>
<td>Air Forcing System FTS Thermojet</td>
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<td></td>
<td>Microscope VistaVision</td>
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<td></td>
<td>X-Ray Inspection System Dage XD7600NT</td>
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<td>Scanning Electron Microscope FEI Nova NanoSEM 230</td>
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<td></td>
<td>Microscope Wild Heerbrugg 391354</td>
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<td></td>
<td>Digital Microscope &amp; Probe Station for Reconfigurable Stages</td>
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<tr>
<td>Equipment</td>
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<tr>
<td>Profilometer</td>
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<tr>
<td>Veeco Wyko NT1100</td>
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<tr>
<td>Probe Station</td>
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<td>Karl-Suss PM5</td>
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<td>Controlled Infrared Heaters</td>
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<td>Gas Mixing System</td>
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<td>Measuring Microscope</td>
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<td>Nikon MM-40</td>
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<td>Pull &amp; Shear Tester</td>
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<td>ThermoScientific Nicolet 6700</td>
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<td>4-Point Probe</td>
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<td>PH, ISE, Cond, and DO Meter</td>
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**Micro Assembly**

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**Micro Fabrication**

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TAB E
UTARI Safety Manual

Introduction

The purpose of this site-specific manual for UTARI is to outline safety procedures and protocols that, if followed, provide a safe environment for users of the lab. Safety is the primary concern. Having a safe and organized laboratory also helps users work more efficiently.

Users of the labs are encouraged to review the safety information and procedures in this manual on a regular basis and when any questions arise. This manual is a guide and not comprehensive; therefore, in cases where the manual does not answer a user’s question, the user should contact the Lab Manager. Every question and concern is important and users that make efforts to abide by the safety guidelines and report violations deserve RESPECT.

General Safety

In order to provide and maintain a safe environment for all users, it is essential to adhere the following rules:

- **Use the Buddy System.** Using the Buddy System means **NO ONE** is to use any equipment or facilities in the labs without at least one other authorized user present in the building and aware of your being there.
- **Ensure all chemicals are labeled properly.**
- **Wear appropriate safety apparel** when handling chemicals. Users are required to wear safety glasses at all times when working in a cleanroom. The latex gloves donned by users of a cleanroom are to protect the cleanroom from the user, and are therefore not to be treated or used as safety apparel. When handling acids, bases or other chemicals, users must use protective gear (e.g., acid gloves, splash shield, apron) to protect the user.
- **Use safety carriers** when transporting chemicals between bays and when moving chemicals larger distances (e.g., transporting chemical waste to the chemical waste storage cabinets).
- **Report all emergency situations** (e.g., spills, fires, electrical problems, gas leaks or other) to the Lab Manager or senior staff researchers immediately.

Equipment Safety and Usage Guidelines

Equipment located in the laboratories is used for various research projects by multiple users. Some equipment is complex and expensive to repair/replace and specific training
is required to use it. Training is performed by the lab manager or other authorized personnel and each user must be “passed off” by the trainer before using the equipment that requires training. If in doubt about how to operate equipment, please contact the Lab Manager.

It is essential that the following guidelines be followed to ensure safety and to minimize potential negative impacts to important research:

- Know where the emergency shut-off switch is located and make sure access to it is unobstructed at all times.
- Be properly trained on equipment before using it. If an unauthorized user is found using a piece of equipment that requires training, the user will have their access to the laboratories removed until the training is completed and the user is “passed off”.
- If equipment is not working in accordance to the way it should based on what was covered in training, does not have power or appears damaged (e.g., an electrical cord has exposed wiring), do not attempt to make adjustments to the system; manipulate or modify system components; disable interlocks; or make repairs. Stop using the equipment, place a conspicuous sign on or near it to mark it “Down” and report the problem(s) to the Lab Manager.

Chemical Safety

There are many chemicals used and stored in the labs and it is important for each user to understand and follow certain guidelines, regardless of whether the user plans on using chemicals or not. Violations of these guidelines should be reported to the Lab Manager.

- Use appropriate safety apparel when handling, mixing or disposing of chemicals.
- Know the location of safety showers, eyewash stations, emergency exits, spill kit, fire extinguishers, and first aid kit.
- Report any spill to the Lab Manager or a senior researcher immediately and notify all other users. Evacuate if necessary.
- Ensure that chemicals are properly labeled. This applies to all chemicals, including mixtures made by the user.
- Store chemicals in appropriate containers. For instance, hydrofluoric acid must not be stored in a glass container.
- Store chemicals in designated areas. Chemicals that are not compatible when mixed should never be stored together (e.g., sulfuric acid and acetone).
- Dispose of chemicals properly. It is imperative that chemicals do not get poured down the drains. There are storage containers for waste chemicals that will be picked up by Environmental Health & Safety upon request.
• Dispose of empty containers properly. Empty solvent bottles should be left in the hood for 24 hours to evaporate any remaining solvent before rinsing the container. All empty containers should be rinsed at least 3 (three) times before being disposed of.

• Understand the hazards of each chemical you handle. Users are required to read and provide the Lab Manager with an MSDS for each chemical brought into the laboratories. There is a binder in each lab that has hazardous chemicals. Additionally, there is a master MSDS binder located on the wall just outside of labs 128, 129, and 130 which contains each MSDS for the building. If the user finds that one is missing, it should be reported to the Lab Manager immediately.

• Use a proper chemical carrier when transporting chemicals between areas. Carriers are located in the Gowning Room of the Modular Cleanroom and should be returned immediately following their use.

• Report any chemicals (even if it looks like water) left unlabeled and unattended to the Lab Manager.

• If chemicals are not in their original container, the new container (or Texwipe secured next to container) must include:
  o User Name
  o Phone Number where user can be contacted
  o Chemical(s) and ratio where appropriate (e.g., HCl:H2SO4:H2O; 2:3:7)
  o Time User Left
  o Time User Will Return

**Electrical Safety**

Work involving electrical prototyping may be conducted in the labs and each user must understand and follow certain guidelines, regardless of whether the user plans on conducting electrical prototyping work or not. Violations of these guidelines should be reported to the Lab Manager.

• Examine all electrical cords periodically for signs of wear and damage. If damaged electrical cords are discovered, unplug the equipment and report it to the Lab Manager.

• All equipment must be properly grounded.

• If sparks are noticed while plugging or unplugging equipment or if the cord feels hot, do not use the equipment until it can be serviced by an electrician.

• Do not run electrical cords along the floor where they will be a tripping hazard and be subject to wear. If a cord must be run along the floor, protect it with a cord cover.

• Do not run electrical cords above the ceiling. The cord must be visible at all times to ensure it is in good condition.
• Do not plug too many items into a single outlet. Cords that enable you to plug more than one item in at a time should not be used. Multi-plug strips can be used if they are protected with a circuit breaker and if they are not over used.
• Do not use extension cords for permanent wiring. If you must use extension cords throughout the lab, then it is time to have additional outlets installed.

**Etiquette**

Users must respect others and show common courtesy. For instance:

• Refill squirt bottles (Acetone, IPA, Water, etc) you find empty
• Replace carboys when full
• Leave equipment and work area clean and ready for next user
• Do not touch or disturb other users’ samples or processes
• Do not borrow other users’ tools/equipment/supplies
• Do not cough toward other users or their samples
• Do not push other users aside

Users are encouraged to point out any safety violations or violations of any guidelines to other users and make sure that all potential safety issues are reported to the Lab Manager.
Emergency Contact Information

In case of a life-threatening emergency, dial: 911 then, call UTA Police

UTA Police Department: (817) 272-3003

All other emergencies call:

Lab Equipment Technician:
Frank Lu
UTARI Room 314
(817) 272-5911
frankl@uta.edu

UTARI Safety Liaison:
Norman Spayd
UTARI Room 209
(817) 272-5910
nspayd@uta.edu

Lab Managers:

Room 126: Swarm Robotics Laboratory
Kris Doelling
UTARI Room 312
(817) 272-5887
mmayyas@uta.edu

Room 128: Prototyping Laboratory
Jeongsik Sin
UTARI Room 310
(817) 272-5983
jsin@uta.edu

Room 129: Micro-Fabrication and High Precision Manufacturing Laboratory
Mohammad Mayyas
UTARI Room 312
(817) 272-5887
mmayyas@uta.edu

Room 130: System Integration Laboratory
Aditya Das
UTARI Room 216
(817) 272-5970
aditya@arri.uta.edu
Room 141A: Packaging & Inspection Laboratory
Manoj Mittal
UTARI Room 209
(817) 272-5923
mmittal@arri.uta.edu

Room 222: Assistive Robotics Laboratory
Woo Ho Lee
UTARI Room 311
(817) 272-5979
whlee@arri.uta.edu

Room 321 & 322: Biomedical Devices Laboratory
Muthu Wijesundara
UTARI Room 307
(817) 272-5994
muthuw@uta.edu

Room 323: Energy / Water / Environment Laboratory
Caleb Nothnagle
UTARI Room 303
(817) 272-5958
calebn@uta.edu

Environmental Health & Safety:
Ramon Ruiz or Harvey Richey
500 Summit Ave.
Arlington
(817) 272-2185
ehgsafety@uta.edu
ruiz@uta.edu

Resources
UTA’s Laboratory Safety Manual:
Room 126 Swarm Robotics Laboratory

This lab provides a testing and staging area for Swarm Robotics. It houses a variety of ground and aerial vehicles as well as industrial manipulators and other various robotics. Such robotics will be divided into bays in the future and more equipment will be added as projects progress.
Room 128 Prototyping Laboratory

This lab (Figure 2) is equipped with various stationary machine tools and hand power tools used to fabricate components. Some of the major equipment available for use and located in this lab include:

- 3 Axis mills (Full sized, Mini, Micro)
- Lathe and mini lathe
- Welder
- Bandsaws (Vertical and Horizontal)
- Engraving laser
- Drill press
- Vibratory polisher
- Grinders (Belt and Wheel)

The single most important issue in the prototyping laboratory is safety, which is the primary objective of all users. Nothing that you can design or build using the prototyping laboratory is worth an injury. Familiarize yourself with the basic safety parameters of any space when you enter it: determine where the exits are, how they work, and whether or not they are obstructed; know where the emergency assembly point is in case the building needs to be evacuated; and locate the phone, fire extinguisher, and first aid kit before you need them.

This lab is a hazardous environment. Consult the safety rules below to adjust yourself to working in this potentially dangerous environment and learn how to safely operate each tool and machine you use. Once a user knows how to use a tool safely, scrupulously follow safe procedures. Beware that familiarity can breed contempt and carefully think through each operation before you execute it. Use your common sense and do not perform any unsafe act nor improperly use tools or machines.
The Prototyping Laboratory Manager is available to help you safely use the lab. Users are responsible for the safe use of the facility. If unsure of the proper method to do something, ask the Prototyping Laboratory Manager to assist. Report any and all unsafe acts to the lab manager.

**Safety Rules**

The rules listed below apply to all users of the Prototyping Laboratory. They are not all encompassing and provide only the basic information for safely working in this lab. Most machines have specific safety rules related to their use and users must be properly trained before operating them.

The Prototyping Laboratory Manager must confirm training and proper use of the equipment the first time users use each machine or process in the lab. Each and every tool in the lab has safe operating procedures associated with it. Users are required to be personally trained on each machine and must not operate any tool or machine in the lab until the lab manager provides the proper training.

Never work alone in this lab and always use the buddy system. Users are required to notify at least one other authorized person who will be present in the lab or building during the period of the time. This is required during both regular and irregular working hours including weekends. A second person must be available in order to render aid and contact outside help, if needed.

Never work when you are impaired, tired, stressed, or otherwise inhibited from exercising appropriate caution in the lab. Do not use the lab when you are under the influence of any intoxicants or medications which may cause drowsiness or alter your ability remain alert. Do not use the lab you cannot think clearly and avoid last minute lab work which can lead to serious injuries.

Wear all necessary protective gear and clothing. This always includes safety glasses and shoes that completely enclose your feet. No sandals, shorts or open toe shoes are allowed and some activities may require additional safety gear. Eye protection is required while near a piece of running equipment, even if you are just observing.

Long hair must be tied up securely. Most of the power tools in the lab are based around a rapidly rotating shaft which long, loose hair may get caught in and pulled into the machine. Long hair must be kept out of the way by tucking it into a cap, tying it up, or knotting it in a way that prevents it from dangling. Notice and be aware of others near your work area and assume responsibility for keeping others safe in the work area in this lab.
Remove all personal accessories and loose clothing, which might get caught in moving machinery. This includes rings, watches, jewelry, corded headphones / earpieces, rags, ties, and open jackets. Like long hair, anything that dangles can get caught in rotating machinery as is not worth the risk. Avoid wearing loose garments and clothing and keep jackets or coats closed. Do not keep lab rags in your pockets and do not use cell phones, wireless or corded headphones / earpieces while machinery is in motion.

Never leave a machine running unattended. Many of the tools in this lab can be set to cut automatically and requires focused attention on the machine’s operation. This lab is used primarily for building prototypes and, as a result, most set-ups are not tried and tested in a production sense. It is inevitable that some set-ups will not work and by paying attention to the operation, you may be able to avert damage to yourself and others.

Never leave a chuck key in a chuck. If the key is in use, your hand must be on it. Chuck keys can be accidentally launched across the lab if they are left in place and the startup power of the lathe or drill press can throw the key with enough force to cause injury. Do not leave chuck keys in place when they are not in use.

Keep hands well away from the point of contact between the work piece and the cutter. If hands must hold the work to keep it in place, the set-up is unsafe; improve it. While working on the lathe and mill never hand hold your work. If the tool or work piece is vibrating, chances are high for a sudden shift in the set-up. When using the drill press, especially with large drill bits and tough-to-cut materials, clamp the work to the drill press table. On band saws, chop saw, and any other tool designed to be used with a hand-fed work piece, be certain to keep hands, fingers, and other body parts out of the path of cutters and away from the point of contact between the work piece and the cutter. Use a push bar (piece of wood) on the band saw to push a work piece through the blade. Keep all parts of the body at least 6 inches from the point of contact between any work piece and the cutter. Use brushes, pliers, or compressed air to remove waste from a working area.

Support and secure work pieces and cutting tools properly. A vibrating set-up is usually an indication that the work piece and/or tool are not held strongly enough to resist the applied cutting forces. Take the time to secure the set-up to resist the force of cutting or use a different operation to do the job. Do not try to make do with a flimsy set-up and expect to spend a lot (80% or more) of your time in the lab making set-ups. It is difficult to visualize when thinking about work in the lab. A well-metered approach to work in the lab is a more efficient and effective approach. If things are taking longer to execute than expected, scale down or redesign the work.

Cleanup procedures are part of the safe operation of the lab. It is important, especially in times of heavy use, to keep the lab clean and to return everything to its correct place at
the end of its use. Carefully cleaning a machine or area can increase knowledge of where things are and how things work in the lab. The cleanup procedure to be followed by each user is:

- **Shut off power to the machine.** Turn off the main power switch for the machine. If the machine has an emergency stop switch, depress it. Disengage all power feeds and lead screws.

- **Properly store all tools, material scraps, and drawings.** Put away objects that do not belong permanently with the machine. If you do not know where something goes, ask the Prototyping Laboratory Manager.

- **Clean chips and excess oil from machines and chip pans.** To protect hands always use shop rags, most machines can be wiped down completely with a lab rag. If compressed air is used, be careful and do not point compressed air guns at people. Blown chips can become lodged in eyes and the compressed air itself can do severe damage. Use compressed air early in the cleanup process, otherwise blown chips and dirt will dirty areas already cleaned.

- **Do not use brooms or brushes on the machine tools.** Brushes and brooms pick up abrasive dirt from the floor which may damage machines and tools. Clean equipment and machines well enough that the next user will not be able to tell what material you were using.

- **Sweep the floor in the vicinity of the used machines.**

- **Report damaged, broken, or inoperable equipment to the lab manager.**
Room 129 High Precision Manufacturing Laboratory

The High Precision Manufacturing Laboratory (HPML) is equipped with tools used to fabricate small components that require high precision. In the HPML, there is a clean area—known as the Micro Fabrication Laboratory (in red in the diagram).

Micro Fabrication Laboratory

This lab has three work areas, classified as Class 10,000, Class 1,000, and Class 100 clean rooms. Gowning supplies are provided to users in order to keep the amount of particles in the cleanroom to a minimum. Major equipment located inside the Modular Cleanroom includes:

- Wafer bonder
- Mask aligner
- DC/RF sputter system
- Metal deposition evaporator
- Spinner stations
- Wet benches
- Single wafer plasma photo resist stripper
- Surface profiler

Micro Fabrication Cleaning Procedures

To ensure the safety of users and to maintain the cleanliness of the Modular Cleanroom, the following guidelines must be adhered to:
• Know and understand the chemical safety guidelines.
• Wear safety glasses at all times while working in Micro Fabrication Laboratory except when in the gowning area or using the eyewash station/safety shower.
• If bringing in a chemical, make sure there is a copy of the MSDS in the binder. If not, contact the Lab Manager before using or storing the chemical in the lab.
• Maintain a safe and organized work area (e.g., do not leave chemical bottles on the floor, do not leave used Texwipes in fume hood, clean photoresist off all surfaces of spinners and spinner table).
• Place broken glassware and sharp objects in “sharp” containers and vacuum area where breakage occurred (IF THERE IS NO LIQUID) with the HEPA-filtered vacuum located in the gowning room.
• When entering the cleanroom, make sure to step on the sticky mat with both feet. If mat is very dirty, peel off to expose a new one.

**Gowning Procedures**

• Follow the proper gowning procedure in order to keep the Micro Fabrication Lab clean. Only authorized users may enter the Micro Fabrication Laboratory.
• Do not let attire touch the floor. Put on blue shoe covers; if you have long hair, put on a bouffant; put on face mask and hood.
• Inspect and put on a jumpsuit, ensuring the ‘hood skirt’ is tucked inside the jumpsuit neck. Zip up the jumpsuit.
• Put on gloves, taking care not to touch the finger areas of the glove.
• Put on safety glasses.
• Wipe down sample holders or containers and make sure they are labeled properly before taking them past the second sticky mat.
• Step on second sticky mat with both feet. If mat is dirty, peel off to expose a new one.
• Do not unzip jumpsuit while outside of the gowning area.
• Replace torn or soiled cleanroom attire.
• Properly store any samples in designated cabinets, not in fume hoods, next to equipment, or on general use tables.
• When exiting the cleanroom, hang up cleanroom attire and place shoe covers—if in good condition—in the bin for reuse.

Other major equipment located in the area outside the Micro Fabrication Lab includes:

• Multi-purpose reflow system
• X-ray inspection system
• Dicing saw
• Laser machining system
• Micro-electron discharge machining
• Digital microscope
Room 130 System Integration Laboratory

This lab houses several systems custom built at UTARI to support system integration. These systems are delicate and require more training and supervision than the norm from the Lab Manager in order to ensure proper operation and use. This lab contains the following equipment:

- Scanning electron microscope
- Meso, micro, and nano assembly systems
- Electro-hydro dynamics printing system
- Non-colluminated Class 4 Diode Laser at 810nm
Room 141A Packaging and Inspection Lab

The Packaging and Inspection Lab is a Class 10000 cleanroom located at Room 141A and is equipped with various tools used to accomplish microsystem assembly, packaging and characterization. The following equipment is available for use:

- Optical profiler
- Probe station
- Flipchip bonder
- Plasma cleaner
- Microscopes
- Bond tester
- Chemical hood
- Wedge bonder
- Vacuum oven
- Scanning electron microscope
- Spectrometer
- Laser sealer
- Die attach

Non-Chemical Hazards and Safety

Following are some of the common hazards that users need to be aware of while working inside this lab:

- Exposure to UV light.
o Wear safety glasses/shield certified to block the wavelength of light used and ensure other users are also protected. Everyone must wear protective glasses as well as gloves while operating UV equipment.

o Users may be exposed to less than 1mW/cm² at all times. This intensity can be measured using a radiometer.

o Do not shine UV light at people walking outside in the atrium.

• Exposure to laser.
  o Users must be certified to use laser equipment.
  o Laser diode can be used only inside the safety curtain area.
  o Safety glasses certified to block the wavelength of light must be used. **Do not switch laser ON until everyone inside is wearing protective glasses.**
  o All safety instructions pertinent to the class of laser to be used must be observed.
  o While gowning, observe if the laser ON sign is on. If it is, wear appropriate safety glasses in the gowning area.

• Electrical Hazard.
  o Examine all electrical cords periodically for signs of wear and damage. If damaged electrical cords are discovered, unplug the equipment and do not use unless all precautions are taken.
  o All equipment must be properly grounded. If sparks are noticed while plugging or unplugging equipment or if the cord feels hot, do not use the equipment until it can be serviced by an electrician.
  o Do not run electrical cords along the floor where they will be a tripping hazard and be subject to wear.
  o Do not exceed the capacity of electrical outlets. Multi-plug strips can be used if they are protected with a circuit breaker and if are not overused.

• Broken wafers.
  o Broken wafer chips can result in serious injury to the eyes. Wear safety glasses while handling wafers (especially after they are diced).
  o It is recommended users wear gloves while handling substrates.

Chemical Hazards and Safety

The following chemicals are currently permitted for use by all users inside this lab:

• Isopropyl Alcohol
• Acetone
• Methyl Alcohol
• N2 (Compressed Gas)

IPA, acetone and methyl alcohol **are highly flammable and must be handled carefully.**
Other chemicals available for use include:

- Epoxy (UV and thermally curable). Causes irritation with skin contact/when inhaled. Some classes of epoxy are toxic when consumed.
- Carbon Nanotubes. Causes irritation when contacted with skin/eyes or when inhaled. Prolonged inhalation may be carcinogenic.
- Pump oil for the SEM (flammable).
- Users must be properly trained on the use of the chemicals before using them in the lab.

**Chemical handling protocol**

- Store chemicals only in designated areas. The fume hood has storage area for acids and solvents.
- Dispose of chemicals properly.
- Dispose of empty containers properly. Empty solvent bottles must be left in the hood for 24 hours to evaporate any remaining solvent before rinsing the container. All empty containers must be rinsed at least three times before being disposed.
- Understand the hazards of each chemical you handle. Users are required to read and to provide the lab manager with an MSDS for each chemical used in the lab. There is a binder at the entrance that contains a copy of each MSDS. If the user finds that one is missing, it should be reported to the lab manager immediately.
- Report any chemicals (even if it looks like water) left unlabeled and unattended to the lab manager.

**Lab Protocol**

- Use the **Buddy System**. Users cannot use any equipment or facilities in the lab without another authorized user present in the building and aware of your presence.
- Read MSDS and wear **appropriate safety apparel** when handling chemicals.
- **Contact the primary user for tool specific training**. Users must be properly trained on the equipment before using it.
- When entering the cleanroom, make sure to step on the sticky mat with both feet. If mat is very dirty, peel off to expose a new one. Follow the proper gowning procedure, being careful not to let attire touch the floor.
- Put on new shoe covers
- Put on a bouffant cap.
- Inspect jumpsuit (discard and get new one if needed).
- Put on jumpsuit.
• Look for other users operating the UV or laser related equipment.
• Put on gloves (if necessary).
• Put on safety glasses (if necessary).
• **DO NOT** keep both doors (entrance to gowning area and entrance to cleanroom) open at the same time.
• Wipe down any item before carrying it into the lab.
• Do not unzip jumpsuit while in the lab cleanroom.
• Replace torn or soiled cleanroom attire.
• Store samples in designated cabinets, not in fume hoods, next to equipment or on general use tables.
• When exiting the cleanroom, hang up cleanroom attire and discard shoe covers—if in very good condition they may be reused.
• Only authorized users may enter lab cleanroom
• Users are encouraged to point out any safety violations, violations of any guidelines, and any other potential safety issues to the lab manager.
Lab 222  Assistive Robotics Laboratory

The Assistive Robotics Laboratory is where autonomous vehicle technologies are designed and implemented. The activities in the lab include theoretical development of various algorithms, computer-aided design, and building of electronic and mechanical prototypes. The equipment located in the Assistive Robotics Laboratory includes:

- Robotic manipulators and grippers
- Radio controlled helicopter platforms
- Quad-rotor platforms
- Mobile ground robots
- 4x4 ground vehicle robots (wheelchair base)
- Lab power supplies
- Analog function generator
- SMD hot air soldering station
Lab 321 & 322 Biomedical Technologies Laboratory

The Biomedical Technologies Laboratory is where devices are tested and characterized at various stages throughout the manufacturing process. Equipment in this laboratory is varied to accommodate these devices based on different principles such as electrical, chemical, thermal, mechanical, magnetoresistive, magnetostrictive, photovoltaic or piezoelectric. Testing of novel materials such as electroactive polymers is also performed in this laboratory. Some of the equipment located in this lab includes:

- Parylene Deposition System, SCS Labcoter 2010
- 3D ABS Printing System, Dimension SST 768
- 3D Resin Printing System, 3D Systems Viper SLA®
- Microscopes: Stereo and Compound, upright and Inverted
- 3D ABS Printing System
- 3D Resin Printing Systems, SLA
- 3D Resin Printing Systems, (new)
- Goniometer/ tensiometer
- Viscometer
- UV flood lamp
- Wax printer
- Wet benches
- Environmental oven
- Vacuum oven
- DI water generator
Lab 323  Energy / Water / Environment Laboratory

This lab is reserved space for future work on projects advancing the field of energy and environmental impact. It contains a suite of equipment for electrical analysis such as:

- Programmable pulse generator
- Multi-frequency LCR meter
- Impedence/Gain phase analyzer and measurement unit
- Synthesizer/Function generator
- 3D vibrator platform for dethethering
- Power amplifiers and matching networks
- Oscilloscopes