

# UGIM 2016

# VISITOR'S GUIDE



# LODGING

**2016 UGIM SYMPOSIUM**

**SALT LAKE CITY, UTAH - JUNE 12-15, 2016**

## **University Guest House**

110 South Fort Douglas Blvd  
Salt Lake City, Utah 84113

- The University Guest House is the recommended hotel for UGIM. **To make a hotel reservation call 1-888-416-4075**, mention group name **UGIM**.
- A block of rooms have been reserved for UGIM attendees.
- To receive the group rate, reservations must be made over the phone.
- FREE hot breakfast
- FREE WI-FI
- Light rail access to downtown and airport
- Walking distance to all UGIM venues
- For more information about lodging, please visit the UGIM website at <http://www.universityguesthouse.com/>





# Additional Hotels in the Salt Lake City Area

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Choose from various hotels including the Marriott, Little America Hotel, and The Grand America Hotel if you want something different than the University Guest House. Salt Lake City is a large place with many opportunities for new experiences, on and off campus.

## **Marriott**

480 Wakara Way

Salt Lake City, Utah 84108

1 (801) 581-1000

*[marriott.com/hotels/travel/slcup-salt-lake-city-marriott-university-park](http://marriott.com/hotels/travel/slcup-salt-lake-city-marriott-university-park)*

## **Little America Hotel**

500 South Main Street

Salt Lake City, Utah 84101

1 (800) 281-7899

*[saltlake.littleamerica.com](http://saltlake.littleamerica.com)*

## **The Grand America Hotel**

555 South Main Street

Salt Lake City, Utah 84111

1 (800) 304-8696

*[www.grandamerica.com/](http://www.grandamerica.com/)*

# Driving Directions from Salt Lake City International Airport to University Guest House



24 minutes (11.5 miles) via I-80 E

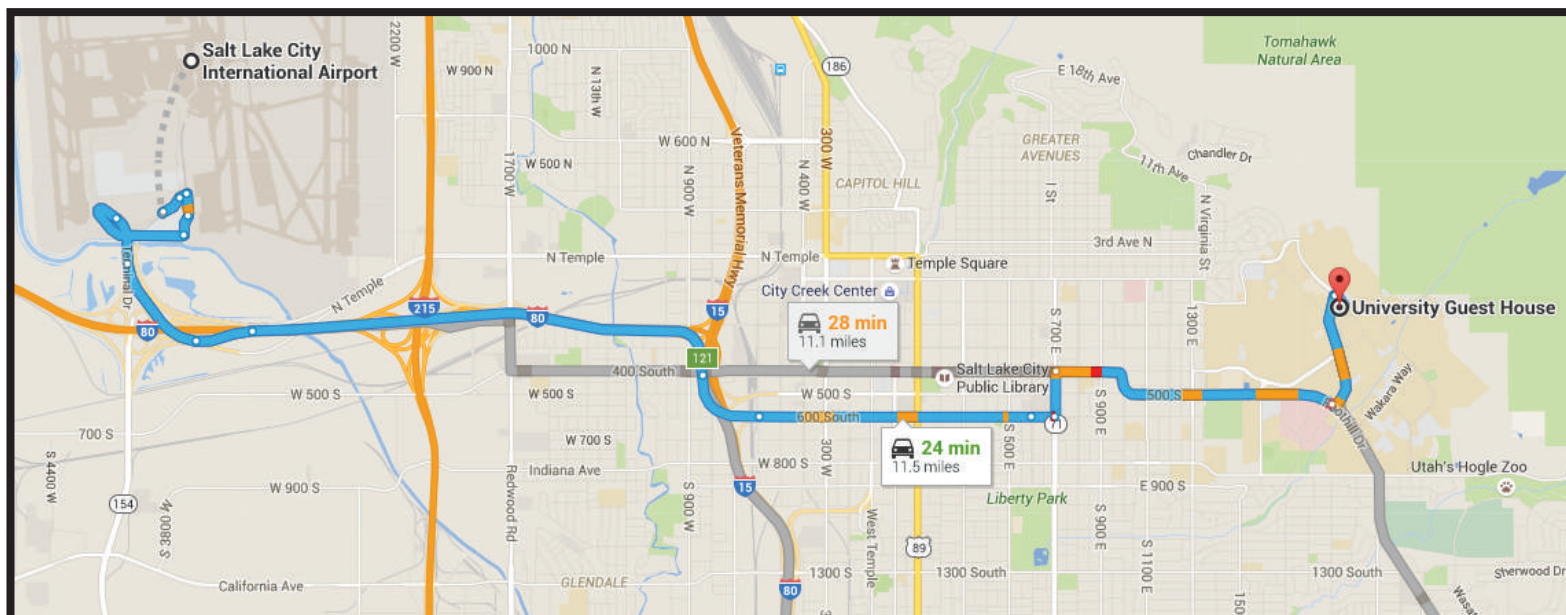
## Salt Lake City International Airport

776 North Terminal Drive, Salt Lake City, UT 84122

- Get on I-80 from Cross bar Rd and Terminal Dr  
5 min (2.7 miles)
  - Continue on I-80 E. Take 600 S and UT-186 E to S 1900 E  
17 min (8.7 miles)
  - ✓ Take Fort Douglas Blvd to your destination  
37 seconds (.1 miles)
- ➡ Turn right onto S 1900 E
- ➡ Turn right onto Fort Douglas Blvd
- Destination will be on the right

## University Guest House

110 Fort Douglas Blvd Salt Lake City, UT 84113



# UTA Trax Directions from Salt Lake City International Airport to University Guest House

UTA TRAX (door-to-door light rail train): Salt Lake Valley's light rail system now runs between the University of Utah and the Salt Lake International Airport, through downtown SLC.

WEBSITE: [www.rideuta.com](http://www.rideuta.com)

SCHEDULE: [www.rideuta.com/mc/?page=Bus-BusHome-Route704](http://www.rideuta.com/mc/?page=Bus-BusHome-Route704)

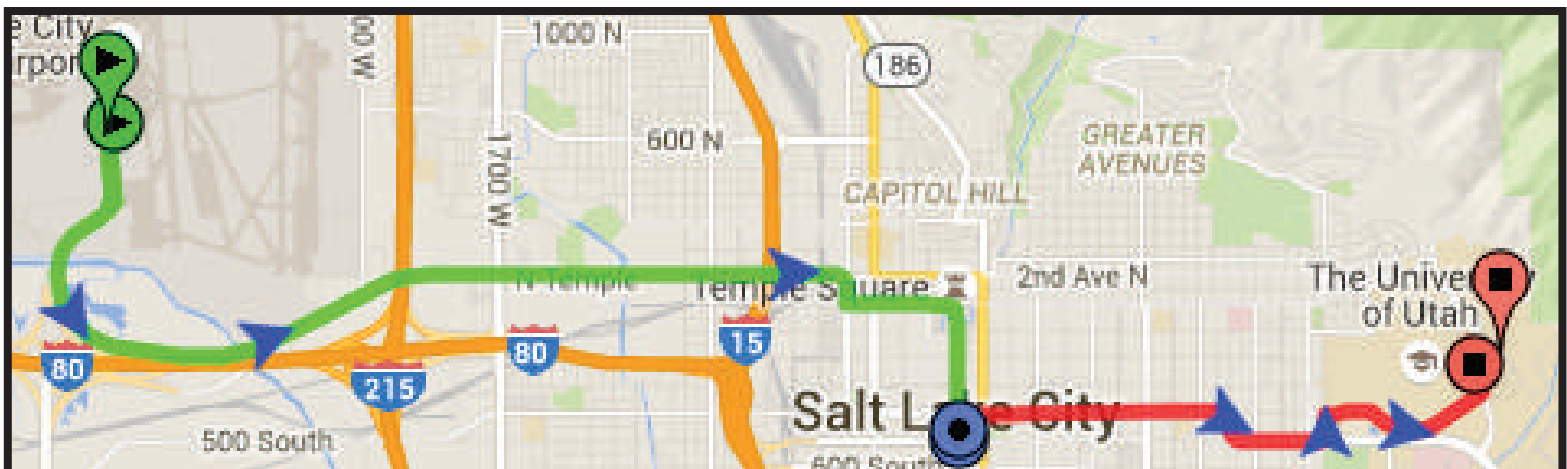
The **GREEN LINE** train stops at the airport and is located at the south end of Terminal One. Purchase tickets at the stop's kiosk, round trip for \$5 per person or \$2.50 per person one way.

Route to University of Utah: Only **GREEN LINE** extends from SLC airport. Take any airport train to the Courthouse Station at 500 South Main Street (~25 mins). This is an announced transfer point.

Exit **GREEN LINE** train at Courthouse Station.

Cross the platform. Your next train will be going the opposite direction. Electronic signage will indicate arrival of the **RED LINE**.

Take the **RED LINE** train (across the platform) designated to the University Medical Center. University Medical Center is the last stop. Take the stairs downhill 200 yards to the Sorenson Molecular Biotechnology Building (USTAR / SMBB), home of the Utah Nanofab.



# TRANSPORTATION



## XPRESS SHUTTLE

[www.expressshuttleutah.com](http://www.expressshuttleutah.com)

Reservations need to be made prior to you arriving at the Salt Lake City Airport. Your return trip to the airport reservation must also be made in advance.

Toll-free (in US) Phone Reservations:  
800-397-0773

Local Phone Reservations: 1 (801)  
596-1600

Fare: SLC Airport to the University Guest House is \$18 USD per person. Cash or credit card payment accepted.

## Shuttle Instructions

Xpress Shuttle check-in desks are located inside each terminal. Delta and SkyWest passengers should first retrieve their luggage in the baggage claim area of Terminal 2 then check in at the XPRESS Shuttle desk, located by baggage carousel #8. Please look for the sign that says "XPRESS Shuttle." All other airline passengers should retrieve their luggage in the baggage claim area of Terminal 1 and then check in at the XPRESS Shuttle desk located by baggage carousel #3. Please look for the sign that says "XPRESS Shuttle." These shuttles take passengers all around Salt Lake City. As a result, you may have to wait as others are dropped off before you are delivered to you destination.



## Taxi

[www.yellowcabutah.com/reservations.html](http://www.yellowcabutah.com/reservations.html)

Local Phone: 801-521-2100

Fare: SLC Airport to the University of Utah is \$30-40 USD. Cash or credit card payment accepted.

## Taxi Instructions

When you arrive at SLC International Airport AND have retrieved your luggage, please go to the Cab Starter on the Curb of your terminal. If no Starter is available, please call (801) 521-2100. Also, your cell phone should be turned on so they can contact you, if needed. After calling, please meet your cab at the terminal cab stand.

# Getting Around Campus



Rice-Eccles Stadium & Tower  
*Monday & Tuesday*



Walking



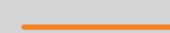
James LeVoy Sorenson Molecular  
Biotechnology Bldg (SMBB)  
*Wednesday*



Red Line  
TRAX



University Guest House



Driving

Visit <http://map.utah.edu/> for further instructions



# RESTAURANTS *in* Salt Lake

# Lake

## **The Copper Onion (American)**

**(801) 355-3282**

111 East Broadway

Salt Lake City, Utah 84111

## **Mazza (Middle Eastern Cuisine)**

**(801) 521-4572**

912 East 900 South

Salt Lake City, Utah 84105

## **The Pie Pizza (dine-in only)**

**(801) 582-5700**

1320 East 200 South

Salt Lake City, Utah 84102

## **Sapa Sushi**

**(801) 363-7272**

722 State Street

Salt Lake City, Utah 84111

## **Red Iguana (Mexican)**

**(801) 553-8900**

165 South West Temple

Salt Lake City, Utah 84101

## **Beer Bar (Brats & Drinks)**

**(801) 355-3618**

161 East 200 South

Salt Lake City, Utah 84111

## **Tavernacle Social Club (Piano Bar)**

**(801) 519-8900**

201 East 300 South

Salt Lake City, Utah 84111

## **Whiskey Street (Cocktails & Dining)**

**(801) 433-1371**

323 South Main Street

Salt Lake City, Utah 84111

## **Caffe Molise**

**(801) 364-8833**

55 West 100 South

Salt Lake City, Utah 84101

## **Porcupine (Pub & Grill)**

**(801) 582-5555**

258 South 1300 East

Salt Lake City, Utah 84102

## **Sawadee (Thai)**

**(801) 328-8424**

754 South Temple

Salt Lake City, Utah 84102

## **Bayou (Southern & Drinks)**

**(801) 961-8400**

645 South State Street

Salt Lake City, Utah 84111

## **Lucky 13 (Bar & Grill)**

**(801) 487-4418**

135 West 1300 South

Salt Lake City, Utah 84115

## **BeerHive Pub**

**(801) 364-4268**

128 Main Street

Salt Lake City, Utah 84101

## **The Green Pig Pub**

**(801) 532-7441**

31 East 400 South

Salt Lake City, Utah 84111



# While You Are Here

## ...Hiking

Visit [utah.com](http://utah.com) for more details  
[utah.com/hiking/salt-lake](http://utah.com/hiking/salt-lake)

## ...Utah Museum of Natural History

Take a free shuttle to the Museum.  
Only a 10 minute trip.  
[nhmu.utah.edu](http://nhmu.utah.edu)

## ...Family History Museum

Take a Trax train to downtown in 15 minutes.  
[familysearch.org/locations/saltlakecity-library](http://familysearch.org/locations/saltlakecity-library)

## ...Snowbird Ski Resort

Snowbird is a 30 minute drive, and is fun for the whole family.  
[www.snowbird.com](http://www.snowbird.com)

## ...Park City, Utah

Park City is so much more than just slopes. 45 minute drive.  
[www.visitparkcity.com](http://www.visitparkcity.com)

## ...Fossil Butte National Monument

2 1/2 hours away, Fossil Butte is America's Aquarium in Stone.  
[www.nps.gov/fobu/index.htm](http://www.nps.gov/fobu/index.htm)

## ...Dinosaur National Monument

Discover dinosaurs at this monument located 3 1/2 hours away.  
[www.nps.gov/dino/index.htm](http://www.nps.gov/dino/index.htm)

## ...Moab, Utah

It's two national parks, but just one destination located 4 hours away.  
[www.discovermoab.com](http://www.discovermoab.com)

## ...Bryce Canyon

Supporting the largest collection of hoodoos, located 4 hours away.  
[www.nps.gov/brca/index.htm](http://www.nps.gov/brca/index.htm)

## ...St. George, Utah

Located 4 hours away, this place is Utah's Florida, with fewer hurricanes.  
[www.nps.gov/zion/index.htm](http://www.nps.gov/zion/index.htm)

## ...Zions National Park

Just 5 hours away, Zions National Park is a wilderness to discover.  
[www.nps.gov/cany/index.htm](http://www.nps.gov/cany/index.htm)

## ...Canyon lands National Park

For sightseeing & adventure, go to this National park, just 6 hours away.  
[www.nps.gov/cany/index.htm](http://www.nps.gov/cany/index.htm)





# FLASH TECHNOLOGIES

*an intel, micron venture*

In January 2006, Micron Technology, Inc., one of the world's leading providers of advanced semiconductor solutions, and Intel Corporation, the world's largest chip maker, came together to form a new company: IM Flash Technologies, LLC.

IM Flash marries the technology, assets, and experience of two major corporations to manufacture NAND Flash memory—the fast-growing memory technology used in consumer electronics, removable storage, and hand held communication devices.

Manufacturing products exclusively for Micron and Intel, IM Flash combines Micron's expertise in developing NAND technology and operating highly efficient manufacturing facilities with Intel's multi-level cell technology and history of innovation in the Flash memory business.

Since we are the child prodigy of two powerful semiconductor companies, our product is distributed through them. However, you don't have to go far to find our product in your life: cell phones, cameras, flash drives, solid state drives, net books, and more.

**Our mission:** Be the pre-eminent manufacturer of NAND flash through innovative, low-cost solutions

## **IM Flash Tour**

Come tour IM Flash. Be prepared for a lot of walking, but get ready to see some amazing technology and get a chance to learn more about what we do here.

*IM Flash Technologies, LLC.  
4000 North Flash Drive; Lehi, UT  
84043*

*[www.imflash.com](http://www.imflash.com)  
(801) 767-4000*



One of the most popular attractions in Heber Valley is the historic Heber Valley Railroad. The 16 miles of track between the valley and Vivian Park in Provo Canyon offer access to some of the most spectacular scenery in the state.

The scenic excursions range from one and a half hours round-trip, to three hours round-trip. Seasonal activity rides are also available. Heber Valley Railroad's popular excursions include Day Out With Thomas, Haunted Canyon, the North Pole Express, Murder Mystery, the Tube 'n Train (snow tubing and train ride) and Rafts 'n Rails (river rafting and train ride).

The train departs from the Heber Depot, 450 South 600 West, and winds through agricultural lands, across the Provo River, and along the foothills of the Wasatch Mountains before tracing the west bank of Deer Creek Reservoir.

From the reservoir, the tracks descend into Provo Canyon, following the twists and turns of the Provo River. Here, wildlife is abundant, featuring bald eagles, rainbow trout, deer and elk.

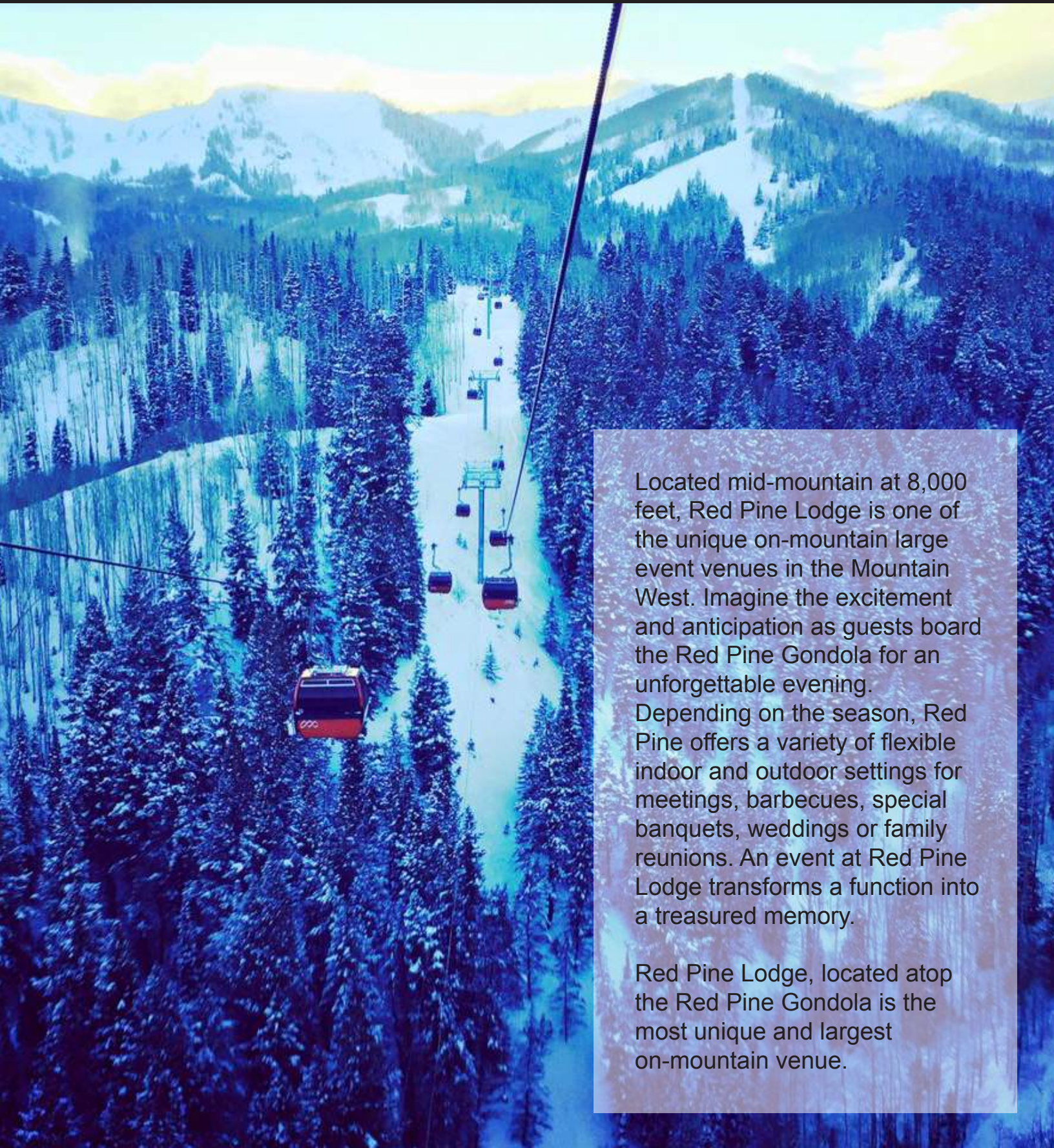
For specific event dates and departure times, visit [www.hebervalleyrr.org](http://www.hebervalleyrr.org).

# HEBER VALLEY RAILROAD

Historic Railroad, Heber Valley  
© Joe Fotman



# Red Pine Lodge



Located mid-mountain at 8,000 feet, Red Pine Lodge is one of the unique on-mountain large event venues in the Mountain West. Imagine the excitement and anticipation as guests board the Red Pine Gondola for an unforgettable evening.

Depending on the season, Red Pine offers a variety of flexible indoor and outdoor settings for meetings, barbecues, special banquets, weddings or family reunions. An event at Red Pine Lodge transforms a function into a treasured memory.

Red Pine Lodge, located atop the Red Pine Gondola is the most unique and largest on-mountain venue.



# KEYNOTE SPEAKER

## *Lawrence S. Goldberg*

Lawrence S. Goldberg was born in St. Louis, Missouri. He received his B.S. degree in Engineering Physics from Washington University in 1961, and his Ph.D. degree in Solid State Physics from Cornell University in 1966. From 1966-67, he spent a postdoctoral year at the Physikalisches Institute, Universität Frankfurt, Germany. From 1967-1985, he was with the Naval Research Laboratory as research physicist in the Optical Sciences Division where his research interests were in ultrashort pulse lasers and nonlinear optics. During 1976 - 1977, he was on sabbatical leave at Imperial College, London, England. Dr. Goldberg came to the National Science Foundation in 1985, where he currently is Senior Engineering Advisor in the Division of Electrical, Communications and Cyber Systems, Directorate for Engineering. He served previously as Division Director, and earlier as Program Director in areas of quantum electronics, optics, plasmas, and electromagnetic. In the summer of 1989, he served as Acting Head of the NSF Office in Tokyo, Japan. He was appointed by the President's Science Advisor in 1995 to the interagency management committee for the U.S.-Japan Joint Optoelectronics Project. He served in 2005 as U.S. Embassy Science Fellow in Chisinau, Moldova, where he worked in close cooperation in an advisory role with the President of the Academy of Sciences of Moldova. He has since participated in government-level science studies in Ukraine, Kazakhstan, and Romania. At NSF, Dr. Goldberg guided the competition and has provided oversight for the National Nanotechnology Infrastructure Network (NNIN). He is lead program officer in developing the future nanotechnology infrastructure support program, as successor to the NNIN. He has coordinated joint activities on nanoelectronics with the Semiconductor Research Corporation, conducted under NSF's emphasis area on Nanoscale Science and Engineering. He has led federal agency funding for the 2012 National Academies study on Optics and Photonics: Essential Technologies for Our Nation. He serves as NSF member of the interagency Wireless Spectrum Research and Development Senior Steering Group, and represents the Engineering Directorate on the NSF program Enhancing Access to the Radio Spectrum (EARS). He also coordinates the Major Research Instrumentation (MRI) program for the Engineering Directorate. Dr. Goldberg is Fellow of the Optical Society of America, and Fellow of the Institute of Electrical and Electronic Engineers.



# KEYNOTE SPEAKERS

*John  
Shott*

John Shott received three degrees from Stanford University in Electrical Engineering between 1972 and 1978. He then spent the remainder of his career at Stanford in clean room settings in the Integrated Circuits Laboratory, the Center for Integrated Systems, and the Stanford Nanofabrication Facility (SNL).

His focus during much of that time was on the technology, equipment, and facilities required to meet the research needs of a broad community of researchers.

He has recently retired, but is staying active in the university cleanroom community. John is currently the Emeritus Director of Technology at SNL.

*Russ  
Meyer*

Russ Meyer has spent 20 years working at Micron Technology supporting advanced development and manufacturing programs. His experience spans many technology nodes across DRAM, NAND, and most recently 3D XPoint. He is currently working as Director of Process Integration for the 3D-XPoint development with the responsibility to manage the Micron side of a joint development program with Intel. Prior to his current role he was the Director of the NAND technology development program, spanning several planar nodes and the startup of Micron's Vertical NAND technology. He has also served as integration manager for Micron's 300mm silicon transition as well as several DRAM technology nodes. He graduated with an M.S. in Engineering Physics from North Dakota State University in 1995.

# About the Host Institution



## UTAH NANOFAB

### INNOVATE

Our researchers are world leading innovators of nanophotonic devices, plasmonic materials, neural prosthetics, biomedical microfluidic systems, microsensors/actuators and biosensor chips.

### FABRICATE

The Utah Nanofab provides the equipment, processes, and expertise necessary to design, build and package revolutionary micro and nanoscale devices. Our facilities include device modeling, design layout, mask fabrication, thin film deposition and patterning.

### EVALUATE

We provide complete surface analysis and nanoscale imaging, including multi-scale, correlative analytical microscopy: creating contextually-intact analyses on a specific location of interest, spanning the dimensional range from 10's of cm to 10's of Å. Our scanning transmission electron microscope is the first of its kind in the country, with the ability to simultaneously image atomic lattices, while in the same scan collect meaningful, nm-resolution compositional maps of distributed elements.

### EDUCATE

Every year, we teach 8 to 12 formal lab-based courses inside our facility, beginning with freshman-level courses taught each semester. We also deliver hands-on demonstrations and curriculum support modules for use in STEM programs to help students gain intuition for the dominant physical phenomena that must be accounted for when designing in the micro- and nanometer scale. Our professional staff provide short courses to our interns and researchers in specific analysis techniques as well as in statistical experimental design techniques.

### CREATE

The discoveries made in the Nanofab help create life-saving medical devices, faster microchips and more efficient energy systems, resulting in scientific publications, new companies, and improved quality of life.

### TECHNICAL EXPERTISE & CAPABILITY

#### MULTI-SCALE, CORRELATIVE ANALYTICAL MICROSCOPY

- Fluorescence mapping of elements in mm resolution over 10's of cm ( $\mu$ Spot XRF)
- Stitch-montage imaging of samples in  $\mu$ m resolution over mm-cm scale (Keyence VHX5000, ESEM-FEG/EBSD/EDS, Zygo)
- Surface chemistry with mono-layer resolution in depth, 10  $\mu$ m lateral pixel resolution (XPS, Auger)
- Surface morphology and roughness at the atomic scale (atomic force microscopy)
- 3D tomographic reconstruction of 5 $\mu$ m x 5 $\mu$ m x 5  $\mu$ m volumes in nm resolution (dual-beam FIB)
- Lattice resolution imaging concurrent with fast, nm-resolution EDS elemental mapping. 3D EDS Tomography. (JEM 2800 S/TEM with dual EDS)

#### CLEANROOM FABRICATION

For biomedical and implantable micro systems, nanophotonics, environmental monitoring sensors; and micro machines:

- A full portfolio of thin film deposition and patterning tools
- Industry experienced staff (statistics, SPC, DOE, process development, product development, facilities and safe materials handling)
- 12 dedicated sputtering cathodes (cryo-pumped with load locks)
- 3 user-configurable sputtering cathodes (cryo-pumped)
- 3 e-beam evaporators
- Specialty materials (pyrlene, TEOS, LTO, PSG)



Picture taken by Bryony Richards -McClung



**UTAH** NANOFAB

## USTAR Cleanroom Billing Model

- Costs recovered by tool usage and tool reservations only
- Charges are per hour and vary by tool (set by the costs of operating that tool)
- Lithography charges are simplified per coating event, where the event charge includes all coat/develop/alignment and wet etch costs for that instance.
- No gowning or daily entry fees
- No billable cost for use of small tools and metrology instruments in the cleanroom
- Free (trained) safety buddies promote safe 24/7 lab utilization

Automation enables easy real-time access to all current spending reports for any lab, any student researcher, or any month the following for all lab members and PI's on a project.

The following aspects of the billing system apply to U of U campus projects:

- A monthly per-student, per-project spending threshold of \$800 triggers subsequent tool use fees for that month reducing by 50%
- An annual tool-use cap of \$15,500 per single member project applies, increasing to \$23,000 for a 2 person project, \$27,000 for a 3 person project, and only \$1,500 per additional student per year (cumulative) added to that project pro-rated for the duration of the project relative to the fiscal year

The design goals of this approach supporting (VPR and COE) subsidized on-campus users additionally include:

- Infrequent users benefit from lower hourly tool rates, per-tool
- Moderate users benefit from monthly threshold
- Big projects benefit from ease of budgeting and motivation to add multiple student researchers