



# ENGINEERING DISCOVERY DAYS

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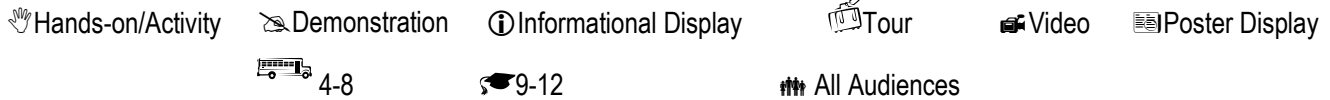
**Friday, April 25, 2014 9am- 2pm &  
Saturday, April 26, 2014 10am- 2pm**

# en·gi·neer·ing

*The UW College of Engineering is more than just a national leader in educating engineers for the 21st century. We're a diverse community of innovators, passionate about collaboration, teaching, and learning – a community dedicated to mentoring the next generation of researchers, entrepreneurs, and corporate and civic leaders.*



Following is a **Program of Exhibits** and attractions that form this year's Engineering Discovery Days. The enclosed map is a guide to the various exhibits. The number listed next to each exhibit corresponds with the number on the enclosed map. The icons next to each exhibit correspond to the table below identifying the 'type' of exhibit.



For event information, programs, lost children, lost items, and non-emergency medical needs, please go to the Loew Hall Welcome booth (1). If you need assistance navigating the event, look for volunteers in neon green t-shirts.

## Aeronautics and Astronautics

**Autonomous Control of Fish Robots** .....AERB Lawn (2)  
Demonstration of autonomous operation of underwater vehicles that move using fins rather than propellers.

**Catch a Wave**.....Guggenheim 105 (3)  
Use tools to figure out how mechanical waves form. (Saturday Only)

**Design Build Fly**.....Drumheller Fountain (5)  
Come see the RC plane that the UW Design Build Fly (DBF) team built for the annual DBF competition.

**HIT-SI Experiment**.....AERB 4<sup>th</sup> Floor (2)  
Come learn about alternative concepts for magnetic field confinement of plasma.

**JCATI: Advancing Public-Private Partnerships in Aerospace**.....Drumheller Fountain (5)  
JCATI supports the Washington State aerospace community by enriching research, business, and educational collaborations. Since 2012, JCATI has provided over \$2.64 million in research funds to 34 research projects led by researchers at UW, WSU, and WWU with collaborators distributed across 10 of Washington's 39 counties.

**Mars Rover**.....Rainier Vista (4)  
Come see the DUBotics Teams mars rover that they entered into the 2014 University Rover Challenge. Drive the rover and arm!

**Ram Accelerator Direct Space Launcher** .....AERB 012 (2)  
The fastest ramjet engines in the world are flown in the ram accelerator laboratory. Applications include: direct space launch, aeroballistics testing and impact drilling.

**Reduced Flight Water Rockets**.....Rainier Vista (4)  
Come launch water rockets with the UW AIAA team!

**Wing-Tip Vortices**.....Guggenheim 107 (3)  
Come see vortices in action!

**ZaP HD Experiment**.....AERB 036 (2)  
Come view our plasma experiment that investigates the stabilization of hot-dense materials and learn how plasmas are used in our everyday lives.

## Bioengineering

**All Exhibits will be on Rainier Vista (4) on Friday 4/25 and the Foege Building (7) on Saturday 4/26 unless otherwise noted.**

**Bioengineering Educational Programs**  
Come learn about degree programs and ask bioengineering counselors questions (Saturday Only)

**Body in a Bag**  
Come view implants and biomaterials. (Friday Only)

**Engineering and Simulating Life**  
Come learn about microorganisms through using computer simulation to predict how organisms respond to different external actions.

**Etch A Myogram**  
Wire up your muscles to create art through movement!

**Fun with Sugars and Photons**  
Come learn about carbohydrates (sugars), their role in biology and infection by playing with sugars and photons. (Saturday only)

**Inventing the Future of Medicine**.....Drumheller Fountain (11)  
Learn about how engineers at the University of Washington are using biological tools to revolutionize healthcare, and preform a hands on experiment to see what the molecules of life really look like! (Saturday Only)

**Nano Medicine, Small things have a Big Effect**  
Come learn about new medicines and how engineering make patients' lives easier by experimenting with materials that scientists use to build new medicines.

**Nanopatterned Surfaces for Cardiac Tissue Engineering**  
Learn how nanopatterned surfaces are used to guide the growth of cardiac tissue. (Friday Only)

**Point-of-Care Diagnostics for Global Health** .....Rainier Vista (4)  
Explore simple, inexpensive devices for use in point-of-care diagnostics, which can be used for global health applications.

**Sanders Lab Prosthetic Research**.....Rainier Vista (4)  
Come explore the devices and technology used to restore function to a lost limb. (Saturday Only)

### **Why You Can See**

Come learn about how your vision system works and eye protection methods by playing games and watching videos. (Friday only)

## Chemical Engineering

### **Cooler Than Ice**.....*Benson Hall (9)*

Come check out the science of cold! Ever hear a spoon sing? Wanna see a film canister blow its top? How about inflating a balloon with a solid? Come see it all and learn the science behind these wonders at the dry ice exhibit.

### **Biodiesel Cooperative** ..... *Benson Hall Lobby (9)*

The Biodiesel Cooperative is a student-run organization that seeks to increase campus sustainability by converting used cooking oil from Housing and Food Services into biodiesel for use by campus operations.

### **Making Molecules from Bugs**.....*Benson Patio (9)*

Learn how genetic engineering lets us manipulate DNA in harmless microorganisms to safely produce renewable chemicals and fuels, drugs and materials. Learn how to do your own DNA experiment at home!

### **Walk on Water**..... *Benson Patio (9)*

Come "walk on water" and explore the mysteries of non-newtonian fluid behavior.

## Civil and Environmental Engineering

### **Beyond Red Light Green Light: How New Technology is Making Transportation Smarter**.....*More Hall 101 (10)*

Come learn about both current standards and new innovations in transportation controls and planning. (Friday Only)

### **Concrete Canoe Club**.....*Rainier Vista (4)*

Come see and learn about the UW's Concrete Canoe.

### **Engineers Without Borders**.....*Rainier Vista (4)*

Come learn about the UW Student Organization Engineers Without Borders.

### **Engineering Plants to Fight Pollution**.....*Rainier Vista (4)*

Come learn about how plants fight pollution! (Saturday Only)

### **Estuaries in action**.....*Rainier Vista (4)*

Come see how fresh and salt water mix at a river mouth! (Friday Only)

### **Liquefaction Tank**.....*Drumheller Fountain (5)*

Come learn about liquefaction by viewing demonstrations with different soils. (Friday Only)

### **Measuring Snow in Mountains**.....*MEB/More Hall Lawn (6)*

Our drinking water comes from the melting snowpack every spring. Join us to see how and why we measure snow in the mountains! (Friday Only)

### **Shake Table**.....*MEB/More Hall Lawn (6)*

Come see a demonstration of earthquake impacts.

### **Water Treatment: Coagulation and Advanced Disinfection**.....*MEB/More Hall Lawn (6)*

Come learn how coagulation can pre-treat water! (Friday Only)

### **Watershed Dynamics**.....*MEB/More Hall Lawn (6)*

Come learn about water storage and climate change!

## Computer Science and Engineering

*All exhibits are held in the Paul G. Allen Center Atrium for Computer Science and Engineering*.....(8)

### **AccessComputing**

Learn about technology that can increase the participation of people with disabilities in computing careers and hear about activities for students.

### **AccessSTEM CAREERS**

This hands-on display showcases accessible science equipment and offers information about how students with disabilities can fully engage in science, technology, engineering, and mathematics.

### **The Allen Center from the Ground Up (and Down!)**

CSE student tour guides show you what makes this world-class facility for computing education unique. From the basement labs to the sweeping views of Lake Washington, it isn't all just clicks and mortar! Tours run every 1/2 hour from 10am -1:30pm. (Saturday Only)

### **Animation Program Demonstrations**

See the latest innovative animated short films from the CSE classrooms and workshops.

### **Center for Game Science**

Play game demos from the innovative Center for Game Science that focus on solving hard problems facing humanity in a game-based environment.

### **DawgBytes: A Taste of CSE**

Computer science comes alive through robot programming and puzzle solving.

### **The UbiComp Lab**

Come visit the UbiComp lab to discover how computer science and engineering can be applied outside of an ordinary computer. (Friday Only)

### **Wireless Power and Personal Robotics**

Come and explore electricity over thin air, energy harvesting sensors and the next generation of personal robots.

## Electrical Engineering

### **Art with E.coli**.....*EEB 2<sup>nd</sup> Floor Atrium (12)*

Come see how living organisms can make beautiful, colorful art and compete to have your own drawing made into E.coli art! (Friday Only)

### **Brushless DC Motor Controller** *EEB 2<sup>nd</sup> Floor Atrium (12)*



Come see an Arduino based controller run a DC motor by interfacing with a custom GUI that can be controlled with a Microsoft Kinect.



### **Embedded Fun**.....*EEB 2<sup>nd</sup> Floor Atrium (12)*



Come learn about embedded computer systems and hack a Furby and watch a phone get dunked on Twitter.



### **Fun With Yeast**.....*EEB 2<sup>nd</sup> Floor Atrium (12)*





Learn how to blow up a balloon using yeast and sugar! (Friday only)



  **The Glowing Pickle**.....EEB 303 (12)  
 What happens to a pickle when you plug it into a wall outlet? Don't try it at home ... but come watch what happens! **Tickets are required, and may be picked up at the Electrical Engineering Department's Welcome Table, located on the first floor of the Paul Allen Center for Computer Science and Engineering, room AE100.** (Friday Only)

  **High Voltage Electrical Apparatus**  
 ..... Paul G. Allen Center for CSE- Atrium (8)  
 Electrostatic and high frequency high voltage generators will be demonstrated, including a Jacob's ladder, Thompson coil, Van de Graaf, and Tesla coil.



  **Racing With Light**.....EEB 2<sup>nd</sup> Floor Atrium (12)  
 Explore interesting phenomena with light and race solar cell powered toy cars! (Friday only)



  **The UbiComp Lab**  
 ..... Paul G. Allen Center for CSE- Atrium (8)  
 Come visit the UbiComp lab to discover how computer science and engineering can be applied outside of an ordinary computer. (Friday Only)




    **UW's Google Glass Football Project**  
 ..... Paul G. Allen Center for CSE- Atrium (8)  
 Come learn about how the Electrical Engineering Department is working with the UW Football Team to improve training using Google Glass. (Saturday Only)




  **Wireless Power and Personal Robotics**  
 ..... Paul G. Allen Center for CSE- Atrium (8)  
 Come and explore electricity over thin air, energy harvesting sensors, and the next generation of personal robots.



## Human Centered Design and Engineering

  **Designing the Future**.....Drumheller Fountain (5)  
 How do we solve problems and build technologies that make the world better? Learn sketching and prototyping to bring ideas for future technology to life.

  **Fizlab** .....Drumheller Fountain (5)  
 Come engage in hands-on prototyping exercises for mobile apps, interactive electronics and 3D printing.



   **How Social Media Helps Us Respond to Emergencies**.....Sieg Hall 425 (13)  
 Human Centered Design helps us use social media like Facebook and Twitter effectively during emergencies like earthquakes and forest fires as well as political events. Come learn how we do this important work to help responders and citizens contribute to their communities. (Friday Only)



   **Patient-Centered Design for Multiple Sclerosis Case Management**.....Sieg Hall 420 (13)  
 HCDE puts patients at the center of design for better healthcare information systems. Come learn about new techniques to understand how technology should be applied to help clinicians and their patients to manage multiple sclerosis. (Friday Only)




  **Superhero-Centered Design**.....Drumheller Fountain (5)  
 Learn how to design for user needs! Help Harry the Husky by creating a "superhero bracelet" to defeat his archrival Butch the Cougar.





## Industrial and Systems Engineering

All exhibits for Industrial and Systems Engineering will only be held on Friday, April 25.



  **Accuracy Vs. Precision**.....Rainier Vista (4)  
 Come learn about basic engineering and statistics concepts of experimental measurement error through playing a game.




  **Getting Lean: Industrial Engineering Methodology**  
 ..... Rainier Vista (4)  
 Come learn about efficient manufacturing in our model airplane building workshop.



   **The Learning Curve Maze Challenge**  
 ..... Rainier Vista (4)  
 Explore the concepts of the learning curve by completing a human-sized maze at high speed that will demonstrate how your performance improves with experience.



    **How Sweet It Is** ..... Rainier Vista (4)  
 Learn about probability and statistics with M&Ms. How many red ones are in your sample?



## Materials Science and Engineering




  **Composite Materials** ..... Mueller Courtyard (11)  
 Come learn about composites and how you use them every day. Learn Concepts of stress and strain, compare the strengths of different materials, and see how much you weigh.



   **The Effects of Hot & Cold on Material**  
 ..... Mueller Courtyard (11)  
 See the effects of very hot and very cold on materials from space shuttle tiles to racquet balls to marshmallows.




  **Fuel Cells**.....Drumheller Fountain (5)  
 Come see out fuel cells project!

  **Functional Materials**.....Drumheller Fountain (5)  
 Come learn about Piezo-Electronics!


  **GEMSEC**..... Mueller Lobby (11)  
 Materials science inspired by nature.



   **The Material Science of Music** ..... Drumheller Fountain (5)  
 Musical instruments are made from a wide range of materials that include bio-materials, metal alloys, and polymers.



  **MSE Welcome Table** ..... Roberts Entrance (15)  
 Welcome to MSE! Stop by the welcome table for more information about our exhibits and receive a periodic table and a special gift from the students at MSE.

   **Nano Materials** ..... Mueller Lobby (11)  
 Come examine the behavior of nano materials under a microscope and get a picture.



  **Optical Properties of Materials** .....*Drumheller Fountain (5)*  
Come see what Jello-O and fiber optics have in common.


 **Organic Electronic and Photonic Materials**.....*Rainier Vista (4)*  
Come learn about organic photonic and electronic materials! Make multicolored "Silly Putty!"


  **Slip Casting** .....*Mueller Courtyard (11)*  
Slip casting, a common technique for making ceramics, will be demonstrated in this exhibit. Visitors are encouraged to participate.




  **Solar Cells** .....*Drumheller Fountain (5)*  
Come learn how solar cells work!




## Mechanical Engineering




  **Adventures in Wind and Water Energy** .....*MEB G021 (14)*  
Come learn about energy from waves to wind.




 **ASME** .....*Rainier Vista (4)*  
Come learn about buoyancy using tinfoil and pennies. Then get a an ASME coin stamped using recycled plastic. (Friday Only)




 **Biomedical Devices** .....*AERB 3<sup>rd</sup> Floor (2)*  
Come learn about DNA purification and disease diagnosis tools. (Friday Only)


   **Experimenting with Dust in Microgravity** .....*MEB/More Hall Lawn (6)*  
Come see the UW Microgravity Team's completed microgravity experiment. (Friday Only)




   **Fun with Foam** .....*MEB 129 (14)*  
Create billions of tiny bubbles in a piece of plastic and learn applications of this advanced micro-and nano- technology.



   **Human Powered Submarine** .....*Drumheller Fountain (5)*  
Come see our working human-powered submarine, as prepared for competition.




   **The Little Cell That Could Tug** .....*MEB/More Hall Lawn (6)*  
Cells are the basic building blocks of our body, but part of their job is to crawl, pull, and tug. Come learn about how strong cells can be and how we measure their nanoscale forces and build your own cell hand puppet! (Friday Only)




   **Manipulating Mechanical Waves in a Designed Structure** .....*MEB G4 (14)*  
Come learn about manipulating mechanical waves and what happens when you excite waves in the 'forbidden gap'.



 **Measuring Muscles** .....*MEB Lobby (14)*  
Using Electromyography (EMG) we can measure the signals generated by moving your muscles. We can then use these signals in engineering applications.

   **The Mechanical Body** .....*MEB/More Hall Lawn (6)*  
The human body is the ultimate machine that lets us move and explore the world. Come see how engineers are designing new hearts, feet, and other devices to help people after injury. (Friday Only)




  **Mechanical Testing Lab** .....*MEB 127 (14)*  
Learn how engineers test materials and structures using big machines, little sensors, light waves, and more.

   **Power Ankle Prosthesis Demo** .....*MEB Lobby (14)*  
Come see a demo of the power ankle prosthesis!

   **Thermoelectric Energy Harvesting** .....*MEB B012 (14)*  
Come convert your body heat into electricity with thermoelectric materials. (Friday Only)





  **UW EcoCAR 2: Advanced Vehicle Works** .....*Engineering Annex 101-1 (16)*  
Come check out the UW EcoCAR 2 lab, where UW students have spent the last three years participating in a challenge to create a cleaner, more efficient vehicle.

  **UW Formula Motorsports Racecar** .....*MEB/More Hall Lawn (6)*  
The UW Formula Motorsports team designs, builds, and races two open wheel racecars every year. Come check out the cars and learn more about this amazing student opportunity.



   **Vibrations: Big & Small** .....*MEB 114 (14)*  
From rockets, to your phones, to your ears, and beyond, vibrations help shape the world around us. Come learn how even the smallest shakers can have huge impacts!

   **WOOF 3D Printing** .....*MEB G045 (14)*  
WOOF is the student-run 3D printing club on campus. Come see prints in progress and learn about the technology.

## Molecular Engineering and Sciences Institute


    **Exploring Nanoscience and Molecular Engineering** .....*MEB/More Hall Lawn (6)*  
Come learn about Nanoscience and Molecular Engineering through interactive demos and hands-on activities!

## Engineering Library

  **Think Global: Engineers Improve Quality of Life Around the World** .....*Engineering Library 1<sup>st</sup> floor (17)*  
Come explore how engineers and engineering students collaborate to improve living conditions of people at home and abroad.


## Student Programs, Societies, & Community Organizations

### Engineering Ambassadors


 **Engineering Ambassadors Information Session** .....*Rainier Vista (4)*

We are student representatives for the College of Engineering who give a variety of outreach presentations to schools (K-12) throughout the state. Come take a look at fun, interactive activities.


### Phi Sigma Rho Engineering Sorority

 **Edible Engineering: How you can Learn the Science of Marking Ice Cream and Eat it too!**.....*Rainier Vista (4)*  
Come learn the science of making ice cream in a scientific way!


### Promoting Equity in Engineering Relationships (PEERs)

 **Diversity in Engineering?** .....*Rainier Vista (4)*  
An interactive display and activity showcasing diversity in engineering. (Sat. Only)

### Society of Women Engineers (SWE)

 **Fun With Air** .....*Drumheller Fountain (5)*  
Wind tubes are useful in studying how objects move in air. Build your own floatation device and test it in the wind tubes!

### Tau Beta Pi, Washington Alpha Chapter

 **Engineering for Tomorrow**.....*Drumheller Fountain (5)*  
Come learn about engineering by building aluminum boats, circuit designs, and create your own non-toxic polymer. (Friday Only)





# Scavenger Hunt 2014

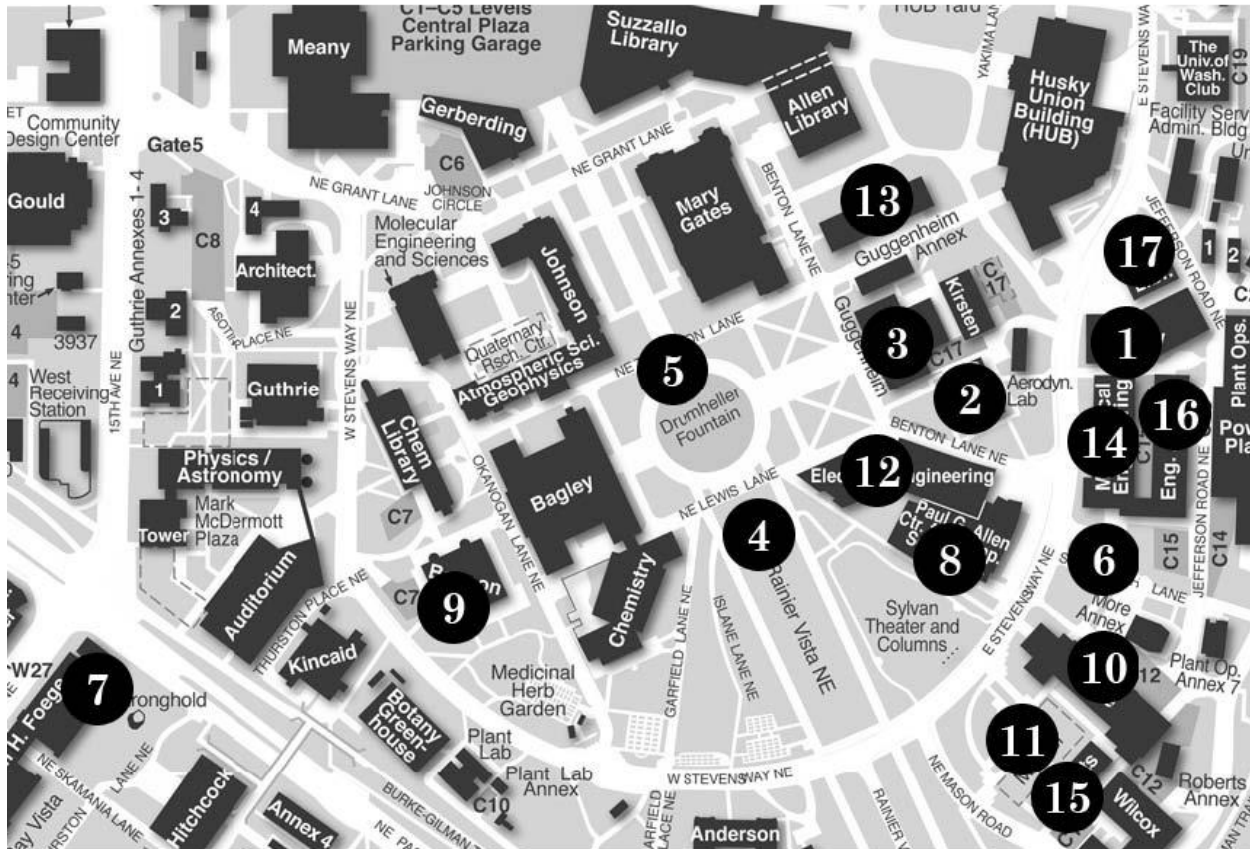
Use this Scavenger Hunt to explore Engineering Discovery Days and record what you learn! You do not need to follow the order – in fact, if everyone did, we would have a huge traffic jam! If a particular exhibit seems crowded, just move on and return later. Use your map to find the exhibits and be sure to answer at least TWO questions for both sections. Note that there are many more exhibits than represented in this scavenger hunt. Enjoy exploring all exhibits at Engineering Discovery Days. HAVE FUN!

## Department/Program Exhibits

- 1) **Does fusion power release greenhouse gases?**.....Aeronautics & Astronautics *AERB 4<sup>th</sup> Floor* (2)
- 2) **How much does it cost to launch a person into space?**.....Aeronautics & Astronautics *AERB 012* (2)
- 3) **What building in Seattle can the Mars Rover be dropped from and still drive away like nothing happened?**  
.....Aeronautics & Astronautics *DUBotics Rainier Vista* (4)
- 4) **How can you make a sketch without a pencil?**.....Bioengineering *Rainier Vista* (4)
- 5) **Why do some scientists want to go small when it comes to medicine?**.....Bioengineering *Rainier Vista* (4)
- 6) **What is the most common fuel made from yeast?**.....Chemical Engineering *Benson Hall* (9)
- 7) **How many Volts are needed to make a one-inch long arc in air?**  
.....Electrical Engineering *Paul G. Allen Center Atrium* (8)
- 8) **In which country did UW engineering students redesign a hatchery's incubation system?**  
.....Engineering Library *Engineering Library 1<sup>st</sup> Floor* (17)
- 9) **How hot does it get on the exterior of a space ship when it re-enters the earth's atmosphere?**  
.....Materials Science & Engineering *Mueller Courtyard* (11)
- 10) **What is the difference between your mass and your weight?**.....Materials Science & Engineering *Mueller Courtyard* (11)
- 11) **What color of Jell-o will absorb the light from a red laser?**.....Materials Science & Engineering *Drumheller Fountain* (5)
- 12) **If the volume of a sealed balloon is 1 Liter at the surface of the ocean, what will its volume be when it is taken to a depth of 10 meters (33 feet) under water? Why is this important information for scuba divers to know?**  
.....Mechanical Engineering *Drumheller Fountain* (5)
- 13) **What three things do you need to have fire?**.....Mechanical Engineering *MEB G32* (14)
- 14) **How does a concrete canoe float?**.....UW Concrete Canoe Club *Rainier Vista* (4)
- 15) **How do cells store the information that codes for biological processes?**.....Biomedical Engineering Society *Rainier Vista Friday* (4), *Foegen 1<sup>st</sup> Floor Lobby Saturday* (7)
- 16) **How many parts does the UW EcoCAR 2 have?**.....UW EcoCAR2 *Engineering Annex 101-1* (16)
- 17) **What process can be accomplished with 3D printing that no other manufacturing process can do?**  
.....Washington Open Object Fabricators (WOOF) *MEB G045* (14)

# ENGINEERING DISCOVERY DAYS

## Map of Exhibits and Buildings



**Welcome Tent/Programs/Information/  
Lost Children/Non-emergency Medical  
Needs\*:**

1- Loew Hall

**Aeronautics & Astronautics:**

2- Aerospace & Engineering Research  
Building (AERB)  
3- Guggenheim Hall  
4- Rainier Vista  
5- Drumheller Fountain

**Bioengineering:**

4- Rainier Vista  
5- Drumheller Fountain  
7- William H. Foege Bioengineering  
Building

**Chemical Engineering**

9- Benson Hall

**Civil & Environmental Engineering:**

10- More Hall  
4- Rainier Vista  
5- Drumheller Fountain  
6- MEB/More Hall Lawn

**Computer Science & Engineering:**

8- Paul G. Allen Center for CSE

**Electrical Engineering:**

8- Paul G. Allen Center for CSE  
12- Electrical Engineering Building

**Engineering Library:**

17- Engineering Library

**Human Centered Design & Engineering:**

13- Sieg Hall  
5- Drumheller Fountain

**Industrial & Systems Engineering:**

4- Rainier Vista

**Materials Science & Engineering:**

15- Roberts Hall  
11- Mueller Hall  
4- Rainier Vista  
5- Drumheller Fountain

**Mechanical Engineering:**

2- Aerospace & Engineering Research  
Building (AERB)  
14- Mechanical Engineering Building  
16- Engineering Annex  
4- Rainier Vista  
5- Drumheller Fountain  
6- MEB/More Hall Lawn

**Molecular Engineering and Sciences  
Institute:**

6- MEB/More Hall Lawn

**Student Programs, Societies &  
Community Organizations:**

4- Rainier Vista  
5- Drumheller Fountain

\*Call 911 for Emergency Medical Needs