A Living Laboratory

Hundreds of K-12 students visit the ITL Laboratory annually, many to participate in hands-on engineering workshops or learn about the engineering student projects at the twice yearly Design Expos (in December and April). Pick up a self-guided tour brochure at the lobby kiosk and explore the many interactive lobby exhibits that introduce engineering, technology and science to students and the public. This collection of interactive exhibits and kinetic sculptures capture the interest of budding engineers of all ages. Some exhibits are designed to collect data for use in university-level coursework.

In a way that may not be obvious at first glance, the ITL Laboratory is unlike any other educational facility in the world because the facility itself is an integral part of the undergraduate engineering curriculum. We call this “Building-as-a-Learning-Tool” (or BLT). Many ITLL building systems and components are instrumented so we can take the “pulse” of the “living laboratory.” Students monitor the building’s structural, electrical, mechanical and other systems through a network of 312 embedded sensors. Look for the 11 BLT signs that explain specific features (use the self-guided tour brochure), or visit the ITL web site for sensor data and more information (http://blt.colorado.edu).

“...one of the finer teaching environments on the planet.”
— Hewlett-Packard Company
Engineering Educator Newsletter

Integrated Teaching and Learning Program and Laboratory

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We welcome you to the Integrated Teaching and Learning Laboratory, housed in the Drescher Undergraduate Engineering facility. This building is home to the Integrated Teaching and Learning Program, a nationally recognized leader in engineering education.

Using interdisciplinary, hands-on approaches and leading-edge technology, engineering students at CU-Boulder gain the understanding and confidence to succeed. The Program reflects the contemporary world of professional engineering by supporting students working in teams on real-world projects, learning open-ended problem-solving skills critical to their field. Program components include first-year design and build courses, sophomore- and junior-level experimental hands-on learning courses, an invention and innovation course, and multi-disciplinary senior design projects.

The ITL Vision was developed by faculty, students and industry representatives who were passionate about making changes that would better prepare engineering graduates for the 21st century:

To pioneer a multidisciplinary learning environment that integrates engineering theory with practice and promotes team-oriented problem solving skills.

Opened in 1997, the building is named after CU engineering alumnus John Drescher (EE ’32) who was the first major contributor. The names of significant contributors — alumni, foundations and corporations — are engraved on the lobby wall.

A design/build ToolShack in the lower (2B) level provides student access to compressed air-powered hand tools (drills, sanders, dremels and sockets). Scheduled courses use the Active Learning Center throughout the weekdays. Students are free to study in this “smart” room when no classes or events are scheduled. Check the weekly schedule posted on the north entry door.

You may sign up for free (or low cost) tech workshops on topics such as strain gauges, soldering, LabVIEW software, CAD/CAM software, circuits, Manufacturing Center, etc. Details may be found on the ITLL web site.

A vending machine in the Student Lounge offers CD-RW and zip disks, safety glasses and dry erase markers.

Consumption of food and beverages is not allowed anywhere in the two lab plazas or near any computers and equipment. Otherwise, eating is allowed in the ITL Laboratory, although the preferred location is the Student Lounge on the top floor, south end (it has vending machines, too).

We ask that no bicycles, skateboards or roller blades be used or stored in the building. Pets are also prohibited. Protect your access to the building and the safety of everyone — do not prop doors or let in people with your code. Also, keep your access PIN and password confidential.

Three courtesy telephones are provided in the facility, one in each lab plaza and another in the Student Lounge. In addition, students taking courses in rooms ITLL 150 or 160 have access to a telephone in their classroom. Dial 7 or 8 for an outside line.

A public lost and found is located in the upper cabinet near the north sink in the HP Lab Plaza. High value items (keys, wallets, calculators, phones) are turned into the nearby Administrative Office.

ITL web site:
http://itll.colorado.edu
Cool Stuff

Engineering students may sign up to use the 18 group study rooms located along the bridges linking the ITL Laboratory to the Engineering Center and Discovery Learning Center. Each room includes whiteboards, a computer with Internet access and a laptop Internet/network jack. Some rooms contain “smart” white boards. To use, please follow the procedure and honor code posted by the sign-up sheet on each door.

The ITL Laboratory has the largest Windows XP network for students on campus. You have access to workstations and equipment reserved for engineering students only. Log onto a computer to see the full list of software or view the FAQs on the ITLL web site.

The unique LabStations, located throughout the two lab plazas, offer a wealth of capabilities. All of the virtual and desktop instrumentation, data acquisition and signal conditioning is controllable via LabVIEW programming. The breakout panel on each side provides the ability to access most internal signals and send signals to connected experiments. Each LabStation also contains an assortment of Hewlett Packard desktop instrumentation (signal generator, oscilloscope, multimeter and counter) connected to the workstation. More detailed specs are available on the web site. You may use the LabStations as part of a course, or use them on your own, when no class is scheduled in the lab plaza. Always check the lab plaza schedule posted near the entry.

Experimental modules hook-up to LabStations for course demos, labs and homework. Sign-up for module use on the wall board located at the south end of the HP Lab Plaza (level 1). Pick up the direct line wall phone to ring for help. View the Module Directory on the ITLL web site for a description of all available experimental modules in topic areas such as thermodynamics and heat transfer, fluid mechanics, materials and structures, and measurement and instrumentation.

The ITL Credo, prominently displayed on a lobby wall, underscores the importance of hands-on learning — our inspiration:

I hear… I forget
I see… I remember
I do… I understand
— Confucius, c. 500 BC

Student Contributions

The ITL Laboratory facility and resources are exclusively for CU-Boulder engineering students, faculty and staff.

Engineering students played a significant role in the creation of the ITL facility and program. Their input continues to shape it today.

- Engineering students lobbied the legislature for state funding.
- Students partnered in the design of the curriculum and facility.
- A portion of construction funding was provided by the student-run Engineering Excellence Fund, EEF.
- Currently, half of each engineering student’s EEF differential tuition and fees goes to the ITL Laboratory for ongoing operations and support.
- Students conduct tours and orientations; ensure safety and security during evenings and weekends; and work as TAs, equipment repair and technology staff. See the ITLL web site for job descriptions.

ITL web site:
http://itll.colorado.edu
Access & Benefits

After completing a 30-minute mandatory orientation tour and signing a usage contract, access to the ITLL doors and computer network is granted to engineering students, faculty and staff. Via e-mail, you will be issued a confidential PIN and password that will be in effect for your entire stay at CU-Boulder engineering.

Use the four-digit PIN with your Buff OneCard to enter the building during scheduled after-hours times when the doors are locked. Access hours are posted at each card reader and the ITLL web site. Follow the instructions posted near each card reader at the five exit doors: south door, northeast door, bridge doors (connecting to the Engineering Center and the Discovery Learning Center), and 2B south patio door. During fall and spring semesters, the facility is unlocked Monday - Friday, 8AM-5PM and locked (but accessible using your PIN) an additional 36 hours during evenings and weekends.

Use your network password to log onto any of the 150+ workstations in the ITLL network, including wireless access using your personal laptop. Save your work to your personal folder located at Z:\yourlogin. From outside of the ITLL, you may use ftp to access your folder. Follow instructions under the FAQs on the ITLL web site.

As an ITLL network user, you have access to three printers, one on each level of the ITL Laboratory. In addition, students taking courses in rooms ITLL 150 or 160 have access to a printer in each of these rooms. For help with the printers (jams, more paper, etc.), call the Equipment Checkout Office using the wall phone at the south end of either lab plaza or call 303-735-0133 (5-0133 from any on-campus phone). This office is located at the south end of the Brodia Lab Plaza in room ITLL 2B14. Network users may also use three color scanners, located at the north and south ends of the HP Lab Plaza, and in the level 1 Student Lounge. Just logon and follow the posted instructions. An Office Corner located at the north end of the HP Lab Plaza provides staplers, scissors, tape, paper cutter, three-hole punch, etc. The nearest public copy machine may be found in the Engineering Library in the Mathematics Building.

At the beginning of each academic year, every network user is provided with a no-charge 100-print quota. If you run out, additional prints may be purchased (50 for $5) at the ITLL Administrative Office (room ITLL 1B40). Printing a two-sided document uses two “print units” from your quota. Users may also purchase color printing ($1 each), and transparencies ($1 each) at this same office.

We always welcome feedback from ITL users, so if you have something to say, please take advantage of the anonymous suggestion form on the ITLL web site:

http://itll.colorado.edu

Academic Resources

The curriculum-driven design of the ITL Laboratory supports a variety of learning styles. The three-level facility features design/build project rooms; an active learning center; five “smart” rooms; a computer network integrating all experimental equipment throughout two large, open laboratory plazas; student design studios, 18 group study rooms; and student-centered, technology-rich Electronics and Manufacturing Centers. Call 303-735-1920 to reserve a room.

Electronics Center — For electronics and circuitry help, see the Electronics Center Manager at the end of the bridge connecting to the Engineering Center (room ECCE 167). Drop-in to use the soldering stations, electronics workbenches with tools and cables, sheet metal shear/break/roller, PC board drill and etching station. Many small circuitry parts and wire are available for purchase. Sign-up for the two-hour Introduction to Soldering workshop.

Manufacturing Center — Stop in for help from an experienced instrument maker to use a range of fabrication equipment, including conventional and CNC machines. Bring your own safety glasses. See the ITLL web site for descriptions of all the equipment. Sign up for the free Introductory Safety Certification Workshop (1 hour) and various other specific machine and tool workshops (may be a small fee for materials). Many small parts (screws, fasteners) and stock material are available for purchase. CAD/CAM help is available to prepare files for machining.

Checkout Equipment — A wide range of general, measurement and testing equipment (such as fans, pumps, motors, amplifiers, calipers, pressure gauges, sensors, thermometers, multimeters, strain gauges, power supplies), tools, supplies and AV equipment (digital and still video cameras, slide projectors, overhead projectors) are available for checkout for academic purposes. See a complete list on the ITLL web site. A classroom public address system is available for instructors using the two lab plazas. Visit the Equipment Checkout Office located at the south end of the Brodia Lab Plaza in room ITLL 2B14, or call by picking up the direct line wall phone at the south end of the HP Lab Plaza or calling 303-735-0133 (5-0133 from on-campus).