LESSON PLAN
Missouri Institute of Science and Technology professor Paul Worsey (seated) and his students detonate charges in the school’s private mine.

Why subject yourself to the dull buzz of fluorescent lights and endless data sets? Play with plastic explosives instead! These schools will make you wish class would never end.

MIND-BLOWING COLLEGE LABS
COOLEST SCHOOLS

BY RENGA MARIE PACCELLA
PHOTOGRAPHS BY JOHN B. CARNETT
SO YOU WANT TO... BLOW STUFF UP
WHERE: Experimental Mine, Missouri University of Science and Technology
DEGREE: Minor in explosives engineering, MS in explosives engineering
CAREERS: Demolition, mining, defense engineer
TYPICAL ASSIGNMENT: Cleanly shears 20,000 tons of limestone off a 50-foot-tall quarry wall.

By the time 23-year-old Chris Searing finished day one of his first explosives-engineering lab, he could prime and detonate a stick of dynamite. By the end of the course, he could walk into a mine shaft and blast a hole big enough to walk through. By graduation, he could blow up just about anything, professionally and utterly.

The program’s screening process rivals the CIA’s: Candidates must submit to an extensive background check, and non-citizens may have to work with the Bureau of Alcohol, Tobacco and Firearms. Students learn valuable industrial skills at the school’s 19-acre mine: how to implode buildings, design fireworks displays, blast smooth slices of stone off quarry walls, run pyrotechnics at rock concerts, and set off special-effects fireballs on movie sets.

And that’s just the undergrads. Missouri S&T also offers an MS in explosives engineering, the first formal program of its kind in the country. Searing, who is in the first year of his master’s, is focusing on shaped charges, small precision bombs that either slice like a knife or punch holes in metal. Other students are researching such topics as blast mitigation for the military and seismic changes in rock, for better mining. “These are guys and gals who make flamethrowers as teenagers and built jet-propelled go-karts just for fun,” says explosives-engineering professor Paul Worsey. It takes patience and smarts to do the job, he says, but the basic qualification is simple. “They like blowing stuff up.”

RISING STARS
Students learn how to scale trees in Myakka River State Park, Florida.

SO YOU WANT TO... CLIMB TREES
WHERE: Canopy Ecology/Biology, New College Florida, Peruvian Amazon
DEGREE: BS in environmental science, biology
CAREERS: Rainforest biologist, canopy ecologist, conservationist
TYPICAL ASSIGNMENT: Scale a 150-foot-tall tree in the Peruvian rainforest to collect native disease-fighting leaves for local shamans.

Watching sloths sleep sounds boring, but try it suspended 20 stories up in a rainforest and, says recent New College Florida graduate and biologist Bryson Voirin, “it will change your life.”

More than half of the world’s terrestrial species live in the treetops, and many animals never touch the ground. Unfortunately, most scientists never leave the ground, says canopy-climbing pioneer and ecologist Meg Lowman (a.k.a. Canopy Meg), which explains why they’ve documented fewer than 2 percent of forest canopies. New College students begin on Sarasota’s subtropical trees as early as freshman year (or earlier, through Lowman’s program at the North Carolina Museum of Natural Sciences) before they clamber up rainforest giants during a 10-day ecology course in the Amazon.

Students learn to conduct biodiversity surveys or radio-tag animals. Voirin, who tracked tree-climbing sloths as an undergrad, now climbs after them in Panama for the Max Planck Institute for Ornithology, collecting data that could help unravel the mysteries of human sleep. “From the time I was a kid climbing sycamores,” Voirin says, “I wanted to be one of those guys on National Geographic. Now I am.”
If you think college is all fun and games, well, it is—if you’re one of 90 lucky students in MIT’s most popular freshman elective. Each spring, 15 teams of six get a theme and $750 to design and prototype a toy or game. Past inventions include a one-wheeled motorized skateboard and a futuristic game of tag.

With a prototyping shop at their disposal, students can make almost anything. Last semester, Andrew Sommer’s team wanted to create wobbly robots with interchangeable appendages for a remote-control bumper-car game where kids knock off limbs for points.

They used just about every machine in the lab: a band saw and drill press to strip an off-the-shelf remote-control toy tank, a thermoformer to mold a new boxy body, a laser cutter to carve the remote controllers; even the coveted 3-D printer to make acrylic joints.

Play-testing determines success. Throughout the semester, teams hand their prototypes to visiting kids, whose feedback means more than any grade. “One thing I’ve learned,” says senior Michael Snively, whose class experience got him a summer gig at Hasbro. “You can never predict what kids will do with your toy.”
CSI: RALEIGH
Ann Ross [here with a skull] uses unsolved cases to teach forensic anthropology.

SO YOU WANT TO...

SWIM WITH SHARKS
WHERE: Marine Option Program, University of Hawaii
DEGREE: Marine Option Program Certificate (minor equivalent)
CAREERS: Scientific diver, marine biologist, maritime archaeologist
TYPICAL ASSIGNMENT: Dive along a coral reef in Hawaii

Undergraduate Jackie Troller plans to spend the better part of next summer in a century-old shipwreck. She will camp on the western coast of the Big Island, kayak 1,000 yards offshore, and dive the remains of the SS Maui, a steamship that ran aground in 1917. Ah, the drudgery of the Marine Option Program. The MOP curriculum reads like a Club Med itinerary: snorkeling, diving, boating, bird-watching, even painting the sea. Undergrads of all majors can apply to the 16-credit certification program, the hands-on equivalent of a minor: "We want them out in the field with mentors who can teach them real-world skills," says program coordinator and marine educator Jeff Kuwabara. MOP'ers take several day trips, tagging and observing animals, and many wind up in a two-week intensive scuba class in Kealakekua Bay. Senior Christian Clark has gone on two such trips and now works installing underwater equipment for the school's shark lab. "There would be 30 to 40 sharks swimming around me while I was working," says Clark, who hopes to land a job as a scientific diver, like many of the MOP alumni now employed at NOAA, Woods Hole and other institutes. "It was amazing."

SO YOU WANT TO...

SOLVE MURDERS
WHERE: Forensics Analysis Lab, North Carolina State University
DEGREE: BA or MA in anthropology, specializing in forensics
CAREERS: Forensic anthropologist, medicolegal death investigator, crime-scene investigator
TYPICAL ASSIGNMENT: Profile an unidentified skeleton

Months after a county cleanup crew found a skeleton in a swampy field in Rocky Mount, North Carolina, forensic anthropologist Ann Ross and her students zeroed in on an incisor. It established what other investigators couldn't: that the deceased was Elizabeth Smallwood, the sixth victim of the Edgecombe serial killer.

When new cases come in, students help Ross recover bones and collect data. Factors they consider include preservation, as in a frozen pond, or exposure to the sun, all of which can help establish time since death. Stakes are high. "You get it wrong, and you give someone an alibi," says recent graduate Sarah Cunningham.

The bulk of students' work—even the undergrads, who at other schools get only textbooks and photos—is analyzing unidentified human remains to create what's called a biological profile. To establish ancestry, they look at facial structure or map the skull using 3-D software Ross co-created. The femur reveals height, the pelvis biological sex, and the degeneration of the bones, age. Signs of disease, injury or trauma can also help in making an ID.

"It's the element of mystery that gets them," Ross says of her students. "But I think it's the voice for those who can no longer defend themselves that keeps them."
# PopSci's Awesome-Lab Ranking

**Amazing, Hands-On Programs That Are Almost Too Fun For Credit**

<table>
<thead>
<tr>
<th>SCHOOL</th>
<th>DEGREE</th>
<th>CAREER</th>
<th>LEARN TO</th>
<th>CONTACT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Missouri University of Science and Technology Experimental Mine</td>
<td>Minor or M.S., explosives engineering</td>
<td>Industrial demolitions</td>
<td>Blow things up extremely well</td>
<td>mining.mst.edu/research/depexpmine.html 573-341-6406</td>
</tr>
<tr>
<td><strong>2</strong> George Washington University National Crash Analysis Center</td>
<td>M.S., transportation safety</td>
<td>Safety engineer</td>
<td>Propel a sedan at 60 mph into a roadside planter</td>
<td><a href="http://www.ncac.gwu.edu">www.ncac.gwu.edu</a> 703-726-3600</td>
</tr>
<tr>
<td><strong>3</strong> University of Alabama at Huntsville Propulsion Research Center</td>
<td>B.S., aeronautical or mechanical engineering</td>
<td>Rocket scientist</td>
<td>Make things that go very fast and very far</td>
<td>prc.uah.edu 256-824-7200</td>
</tr>
<tr>
<td><strong>4</strong> Northern Kentucky University Barton Lab</td>
<td>B.S., geology or microbiology</td>
<td>Geologist</td>
<td>Study Martian living conditions here on Earth</td>
<td>cavescience.com 859-572-1405</td>
</tr>
<tr>
<td><strong>5</strong> University of Maryland Space Systems Laboratory</td>
<td>B.S., aerospace engineering</td>
<td>Astronaut</td>
<td>Test out new space-suit designs—in zero gravity</td>
<td>ssl.umd.edu 301-405-7353</td>
</tr>
<tr>
<td><strong>6</strong> Colorado State University Engines and Energy Conversion Laboratory</td>
<td>B.S., M.S., Ph.D., mechanical engineering</td>
<td>Mechanical or chemical engineer</td>
<td>Make a 2,300 hp engine stronger and cleaner</td>
<td>eecl.colostate.edu 970-491-4793</td>
</tr>
<tr>
<td><strong>7</strong> Texas Tech University Wind Science and Engineering Research Center</td>
<td>B.S., wind energy</td>
<td>Atmospheric scientist</td>
<td>Hurt planks at walls to measure hurricane damage</td>
<td><a href="http://www.depts.ttu.edu/wweb">www.depts.ttu.edu/wweb</a> 806-742-3476</td>
</tr>
<tr>
<td><strong>8</strong> Cornell University Game Design Initiative</td>
<td>B.S., computer science</td>
<td>Videogame designer</td>
<td>Create your own game</td>
<td>gdiac.cis.cornell.edu 607-255-9188</td>
</tr>
<tr>
<td><strong>9</strong> University of California at Merced Dawson Lab</td>
<td>Ph.D., marine biology</td>
<td>Marine biologist</td>
<td>Dive with jellyfish</td>
<td>mnd.ucmerced.edu 209-228-4056</td>
</tr>
<tr>
<td><strong>10</strong> Carnegie Mellon University Robotics Institute</td>
<td>B.S., computer science</td>
<td>Robo-entrepreneur</td>
<td>Design autonomous SUVs</td>
<td>ri.cmu.edu 412-268-3818</td>
</tr>
<tr>
<td><strong>11</strong> New College Florida Peruvian Amazon Field Course</td>
<td>B.S., environmental studies</td>
<td>High-canopy biologist</td>
<td>Climb 150-foot trees</td>
<td><a href="http://www.faculty.ncf.edu/lowman">www.faculty.ncf.edu/lowman</a> 941-487-4647</td>
</tr>
<tr>
<td><strong>12</strong> Massachusetts Institute of Technology Toy Lab</td>
<td>B.S., mechanical engineering, M.A., toy design</td>
<td>Toy designer</td>
<td>Build toys that kids actually like</td>
<td>web.mit.edu/sp.778/www/pages/tolylab.html 617-823-6016</td>
</tr>
<tr>
<td><strong>13</strong> University of Florida Lightning Research Laboratory</td>
<td>B.S., electrical engineering</td>
<td>Helicopter engineer</td>
<td>Catch lightning—millions of volts of it</td>
<td><a href="http://www.lightning.nce.ufl.edu">www.lightning.nce.ufl.edu</a> 352-846-3949</td>
</tr>
<tr>
<td><strong>14</strong> Montana State University Subzero Science and Engineering Laboratory</td>
<td>B.S., civil engineering</td>
<td>Avalanche forecaster</td>
<td>Look for life in 250,000-year-old ice cores</td>
<td><a href="http://www.coe.montana.edu/ce/subzero">www.coe.montana.edu/ce/subzero</a> 406-994-2111</td>
</tr>
<tr>
<td><strong>15</strong> Stanford University SLAC National Accelerator Laboratory</td>
<td>M.S., applied physics</td>
<td>Condensed-matter physicist</td>
<td>Capture 3-D images of molecules using powerful x-rays</td>
<td>slac.stanford.edu 650-926-3300</td>
</tr>
</tbody>
</table>

For the complete PopSci Awesome-Lab Ranking, visit [popsci.com/awesomelabs](http://popsci.com/awesomelabs).