Washington University’s Education 6000 Hands-On Science K-8 courses are designed for practicing teachers who want to bring standards-based science inquiry to their own students. The courses combine graduate level teaching methods, undergraduate level science content, and elementary-middle school investigations.

For fall, Washington University Science Outreach offers two courses in the series: Education 6003 Force and Motion, and a new course, Education 6013 Earth Systems. Details for both courses are below.

**Location:** WU main campus
**Credit:** Three graduate credits in education
**Cost:** $200 plus optional parking fee
**Register:** Contact Amy O’Brien, (314) 935-9342, obrien@biology2.wustl.edu, or return form on page 7.

### Edu 6013 Earth Systems

This new course in the Education 6000 Hands-On Science K-8 series explores water cycle, erosion, the earth’s composition, weather patterns, geology and natural resources. Those enrolled in the course will receive classroom materials including rocks, minerals, weather instruments, geology tools, and more.

**Instructors:** Mark Kalk, Marty Galganski, and faculty guest lecturers from Earth and Planetary Sciences, Washington University; Eric Jonland, St. Louis Science Center; and Sharon Kassing, Saint Louis Zoo

**Dates:** Wednesdays, 4:30-7 p.m., Sept. 1-Dec. 15, 2004

### Edu 6003 Force and Motion

Discover how forces, work, energy, buoyancy, gravity, free fall and motion affect objects. Those enrolled in the course will receive sinking and floating materials, including cylinders of different densities, a student balance, a spring scale, plus an STC Student Activity Book on Sinking and Floating. Teachers will also receive force and motion materials, including a stopwatch and ticker-timer, simple machines, and a small K’NEX car, and an STC Student Activity Book on Motion and Design.

**Instructors:** Patrick Gibbons, professor of physics, and Jack Wiegers, adjunct instructor

**Dates:** Tuesdays, 4:30-7 p.m., Sept. 7-Dec. 21, 2004

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Julie Dennison holds up a cage so her students at Maplewood-Richmond Heights Early Childhood Center can observe the day-old mice burrowed in the bedding. Dennison received the mice and cages from Washington University through the spring 2004 Education 6002 Heredity and Life Cycles course. “I’ve never really dealt with science, so this is a change,” says Dennison. “The class is phenomenal. We’re given guidance, all materials, and everything we need to do inquiry science.” Education 6000 is supported by the Howard Hughes Medical Institute and the National Science Foundation.
This summer, the Tyson Field Science Program staff will offer a series of programs designed to help teachers of grades 2-8 teach ecology concepts using outdoor resources. Programs range from a single session to two to four full days in the outdoors. For information and registration, contact Marty Galganski, (314) 935-8437, e-mail mgalganski@biology2.wustl.edu., or visit the field science website at www.biology.wustl.edu/tyson.

**Water-ful Inquiry Series**

**Reflections on Water**
For teachers of grades 3-6; June 8-11, 9 a.m.-3 p.m. $75
Hike the creek, canoe the Meramec River, and discover human and geologic factors that influence water movement and quality.

**The Thirsty Forest**
For teachers of grades 6-8; June 29-July 2, 9 a.m.-3 p.m. $75
Follow a rain event as it moves through a forest ecosystem. How does water interact with the abiotic and biotic environment? Explore soils, watersheds and stream dynamics using a variety of tools.

**Earth Science Connection Series**

**Earth Science & More Science**
For teachers of grades 3-5; August 2-3, 8:30 a.m.-12:30 p.m. $25
Field and classroom activities integrate physical, chemical, and ecological concepts related to geology at Tyson. Match local district, state and national standards to activities for use in the field and in the classroom.

**History & Science Come Alive in the Hollow**
For teachers of grades 3-5; June 14-15, 8 a.m.-4 p.m. $50
How was the land used at Tyson from the 1800s to the 1950s? Tour Tyson's ghost mining community. Match local and national standards to activities for use in the field and in the classroom.

**Ancient Paths to Science, History and Geography**
For teachers of grades 3-5; June 16-17, 8 a.m.-4 p.m. $50
Individual and team problem-solving activities developed around evidence of Native American use of the land at Tyson. Match local district, state and national standards to activities for use in the field and in the classroom.

**Earth Science Connections**
For teachers of grades 6-8; $120/team
Spend the day at Tyson and team up with the TFSP staff to study ancient history/archeology, physical topography, language arts in nature, or mathematics. Then, custom-design a unique field experience for your team. Call to reserve a design date this summer for your team, and a field trip date for your students in fall or spring.

**The Campfire Series**
Join our lively discussions around the campfire, and create interdisciplinary classroom activities that highlight scientific wonder and investigation. Assessment tools and literature included.

**Women in the Wilderness**
For teachers of grades 2-5; Session A: June 8, 3-9 p.m. $16; Session B: July 14, 3-9 p.m. $16
Discover stories of women who connected to nature and made contributions to science and society through their art, explorations, writing, and experiments.

**What Makes a Rainbow?**
For teachers of grades 2-5; Session A: July 15, 3-9 p.m. $16; Session B: August 3, 3-9 p.m. $16
Readings and activities relate to a diverse group of extraordinary scientists of yesterday and today. Develop lessons that encourage innovation in science for your students.

The Tyson Field Science Program is supported by the Gaylord Foundation, the Friends of Tyson, and other donors.

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**Fall 2004 Education 6005 Scientific Inquiry for the Classroom Teacher: Learning Science through Inquiry Using Local Science Institutions — for teachers of grades K-8**

Get an introduction to teaching inquiry-based science lessons that use the resources at the Missouri Botanical Garden, Saint Louis Zoo, St. Louis Science Center, and Tyson Research Center. Learn how to teach both site-based and classroom investigations. An implementation project using institution resources in connection with school curriculum is required. Classes will meet at the institutions with some Saturday visits required.

Instructors: Educators from St. Louis science institutions, and faculty from Washington University Department of Education

Dates: Tuesdays, 4:30-7 p.m., Sept. 7-Dec. 21, 2004, with some weekend hours.

Details provided prior to registration.

Credit: Three grad. credits in education
Cost: Registration $200
Register: Contact Debbie Barco, (314) 935-4594, dbarco@artsci.wustl.edu

Education 6005 is supported by the National Science Foundation.
How can teachers make field trips to the St. Louis Science Center, the Missouri Botanical Garden, or the Saint Louis Zoo tie in to school curriculum? That’s the question a group of teachers, scientists, and museum educators set out to answer in fall 2000. As a result, this group has developed six curriculum units on different topics for grades 3-12. The units contain hands-on classroom investigations that can be extended and reinforced through field trips to the Science Center, Garden, or Zoo. During 2003-04, a group of teachers has been pilot testing the units. Thank you to these individuals for their efforts in piloting and giving feedback to the writers.

For more information on the Outreach Partnership and the curriculum, contact Mark Kalk, coordinator, (314) 935-8138, kalk@biology2.wustl.edu.

The Outreach Partnership is supported by a Science Education Partnership Award from the National Institutes of Health, National Center for Research Resources.

Saint Louis Zoo

The Ethogram and Animal Behavior Research: in your classroom and at the zoo (grades 5-8)

Writers: Janet Crews and Carol Stephenson, Wydown Middle School (Clayton), Terrilyn Clardy, Sumner (St. Louis Public); Stan Braude, Washington University

2003-04 pilot testers: Kathy Alt, Millstadt School (Belleville Township); Rosalynn LeNoir, McNair Sixth Grade Center (University City); Deborah Lee and Antoinette Lockett, Johnson-Wabash Elementary (Ferguson-Florissant)

Missouri Botanical Garden

These units include outdoor activities at the MBG Shaw Nature Reserve or at WU Tyson Research Center.

The Life of a Litterbug: the ecology of populations & communities (grades 5-8)

Writers: Michele Dodds, Pattonville Heights Middle; Phyllis Balcerzak, Washington University

Aquatic Ecology and Human Impact (grades 9-12)

Writers: Michele Dodds, Pattonville Heights Middle; Phyllis Balcerzak, Emily Whitney, Jane Walker, Marty Galganski, Washington University

2003-04 pilot testers: Phyllis Blalock-Patton, Lilly-Freeman Elementary (East St. Louis); Pam Elliott, Lafayette (Rockwood); Cindy Farris, Fox Senior; Jean Lake-Brown, Wichita High School Northeast; Gloria Hardict-Ewing, Galactic Center (Hazelwood); Brian Murphy, Valley Park Senior

St. Louis Science Center

Health in Today's World (grades 3-5)

Writers: Cindy Encarnacion, Debbie Wudtke, Laura Sturmels, St. Louis Science Center; Mark Kalk, Washington University

2003-04 pilot testers: Jen Fulton, Jill Hill, and Beth Hogan, Bierbaum Elementary (Mehlville); Kaye Hartweger, St. Peters School (St. Louis Archdiocese); Kathie Reuter, Kratz Elementary (Ritenour)

The Continuity of Life: a unit on genetics (grades 7-8)

Writers: Gary Schoenberger, Gotsch Intermediate (Affton); Brenda Tyndal, Nottingham Middle (St. Louis Public); Cindy Encarnacion and Debbie Wudtke, St. Louis Science Center; Victoria May, Washington University

2003-04 pilot testers: Gene Coffman, St. Francis of Assisi; Kathy Costello, Millstadt School (Belleville Township)

The Fundamentals of Life: a unit on cell biology (grades 7-8)

Writers: Gary Schoenberger, Gotsch Intermediate (Affton); Brenda Tyndal, Nottingham Middle (St. Louis Public); Cindy Encarnacion and Debbie Wudtke, St. Louis Science Center; Victoria May, Washington University

2003-04 pilot testers: Kathy Costello, Millstadt School (Belleville Township); Kathy Sanford, Jennings Junior High; Rebecca Westerling, Northwest Middle (St. Louis Public)
DNA Science Days provide a preview of college science and of college life

The lab itself doesn’t look much different from one you might find in one of St. Louis’s older high schools. Antique glass fronted cabinets line the room, which is filled with black topped wooden lab benches. The students are from a local high school biology class. But despite the old fashioned surroundings, the equipment is very modern. And the students are using a high tech tool called polymerase chain reaction (PCR) to analyze their own DNA.

The lab is in one of Washington University’s historic buildings, and the group is participating in the DNA Science Days program, a one-day molecular biology lab and introduction to the campus. It’s an exposure to both the science and the living accommodations that are part of the undergraduate experience at Washington University.

With help from Susan Flowers, program coordinator, the students quickly review the steps of how PCR amplifies DNA fragments, then they begin to take their own DNA samples from cheek cells. Flowers draws on her own experience as a graduate student and a lab technician to give the students some context for what they are doing.

“I encourage them to ask about the science, but also to ask about college, careers, salaries, and anything else they can think of,” says Flowers. “The day starts out very science-oriented, but when they return from the campus tour, they have more questions about what it’s like to attend a research university, to major in science, or to live on campus.”

Jennings High School biology teacher Aaron Green brought his students to campus in January. “It’s a good experience for them,” he says. “We do labs, but nothing like this. They don’t see the different between high school and college. Today, they found out.”

The DNA Science Days program is recommended for advanced high school biology students who have had some exposure to genetics. The day-long program is free, and includes the lab materials, bus transportation, and lunch. DNA Science Days are booked for the spring 2004 semester, but if you are interested in bringing a class in the fall, contact Flowers at (314) 935-8271 or e-mail flowers@biology2.wustl.edu.

DNA Science Days are supported by the Howard Hughes Medical Institute, the Dana Brown Charitable Trust, and the Monsanto Fund.

The water cycle up close and personal
Corey Ann Burns examines the terrarium she created during a visit from Washington University’s Teaching Teams. Janice Phelps, teacher at Mason Elementary (St. Louis Public), invited the team in November 2003. For more information, contact Kristin Sobotka, (314) 935-7170 or kristin@biology2.wustl.edu. The Teaching Teams are supported by the Howard Hughes Medical Institute.
The Modern Genetics for All Students program combines teacher graduate education, teacher-scientist developed curriculum, lab materials support, and classroom assistance to help general biology students learn the fundamentals of DNA. In addition to receiving free equipment and perishable lab chemicals, teachers in their first partnership year can request teaching assistance from Susan Flowers, coordinator of the program.

Teachers from partner high schools may order lab materials anytime for preparation and delivery by Science Outreach staff. With the addition of four new schools in 2003, there are now 25 partner schools using the curriculum with nearly 4,000 students annually.

For more information about Modern Genetics, or to order lab supplies, contact Flowers, or Chris Mohr, lab manager, at (314) 935-8271, flowers@biology2.wustl.edu, or mohr@biology2.wustl.edu. To download a copy of the Modern Genetics curriculum, visit http://www.so.wustl.edu.

Modern Genetics is supported by the Howard Hughes Medical Institute, the Dana Brown Charitable Trust, and the Monsanto Fund.

Rachel McAuley (left), holds a test tube, while Katie Cross (right), records her observations of the DNA they have just extracted. The students are in Bridget Hanson’s biology class at Mehlville Senior High School. “This program makes it so easy for us to do these labs,” says Hanson. “And I think we were more excited than the students by how well it turned out.” Mehlville became a Modern Genetics partner school in 2003.
St. Louis MSP science clubs share after-school activities with a focus on learning

Concentration leaves furrows on the face of Devon Ward. He is captivated by a spinning top he has designed using a paper plate and a pencil, and he’s clearly invested in being the student whose top spins the longest. The competition to build the longest-spinning top engages a classroom of fourth and fifth grade students in design refinements through trial and error. The kids work with so much energy that it’s hard to believe these 10- and 11-year-olds have just finished school.

Every Wednesday after school at Nathaniel Hawthorne Elementary in University City, 20 students gather for a meeting of the science club. Working with them are a group of 12 student-mentors from University City High School. The high school students show an enthusiasm that is mirrored in the faces of the kids.

University City junior Ronald Bass has an awareness of the importance of mentoring that belies his age. “A lot of the students are male, and I have to be a really positive role model for them. It makes me happy to see that I can affect them in such a way,” he says. “I want kids to learn more and see why school’s not so bad. We play games and relate them to science, so the kids can relate fun to learning.”

“This unit helps the kids understand how inventions come about, and how scientists might go about perfecting an invention,” explains Carolyn Ikpeama, director of MSP community programs at the St. Louis Science Center. “Kids are learning that it’s science—and I can do it,” she says. The spinning tops activity is part of the Design It! curriculum, created by the Educational Development Center with National Science Foundation support.

One of the science club’s goals is to strengthen parent involvement in education. Once every month, parents join their children for the science club meeting. On a December evening, you can see the children’s excitement at being able to show their parents their tops. Many of the tops only spun for five seconds on the first week. But after refining their designs, many of the tops spin for 40 seconds or more.

“When they brought their parents, you could see they were proud they were part of an activity, part of a club. They were just beaming,” says Elliot Shostak, principal at Hawthorne. He adds, “I think one of the biggest attributes [of the club] is that it provides an opportunity for kids to channel energy into something positive after school.”

The science club at Hawthorne is one of the community programs sponsored by the St. Louis Math and Science Partnership (MSP). The partnership identified Hawthorne as the site for a pilot science club, and has plans to expand the program to additional schools in the partnership over the next three years. For more information about MSP parent programs and science clubs, contact Carolyn Ikpeama, (314) 289-1414, cikpeama@sjsc.org.

The St. Louis MSP partners are Ferguson-Florissant, Maplewood-Richmond Heights, Riverview Gardens, University City, and Webster Groves, plus Washington University, the St. Louis Science Center, and the Saint Louis Zoo. The partnership’s ultimate goal is to improve math and science achievement for students in grades K-12.

The Design It! curriculum is available at http://www.kelvin.com. The St. Louis MSP is supported by the National Science Foundation.
Take-a-Walk-on-the-Wild-Side summer camps
These summer camps for children are offered by the Wildlife Rescue Center and The Pointe at Ballwin Commons.
Information: (636) 394-1880 or wildliferescue@mowildlife.org. Held at the Wildlife Rescue Center in Ballwin. Camp for ages 6-7: June 14, July 12, 26, August 9. Camp for ages 8-14: June 21, July 19, August 2.

Nature and Science-Related Destinations
A master list of science programming and outdoor recreation areas in St. Louis and 11 counties in Missouri and Illinois, the site http://www.science4all.com is a wonderful resource for parents and teachers. The site is supported by Gateway to Science-St. Louis.

Science Outreach welcomes new database administrator
Science Outreach welcomed Lauren Marshall in December 2003, as a database administrator working on the St. Louis Math and Science Partnership. She is a former employee of the WU School of Medicine, where she worked on various research grants. Her background is in data analysis, collection, and design. In her free time, she’s a photographer and artist, and does web development projects.

Lauren Marshall joined the Science Outreach staff in December 2003.

Saint Louis Zoo
The Saint Louis Zoo offers a variety of teacher workshops during the summer. For information, call (314) 768-5466, e-mail educationquestions@stlzoo.org, or visit www.stlzoo.org.

Missouri Department of Conservation
The Missouri Department of Conservation offers teacher programs at various state parks and wildlife areas. For more information on these programs, visit www.mdc.state.mo.us/teacher/workshops.

Missouri Botanical Garden
The Missouri Botanical Garden offers a variety of programs for teachers at its various sites. For information, call (314) 577-5144 or visit www.mobot.org.

Education 6000 Hands-On Science K-8 Fall 2004 Registration
Please register me for (check): ☐ Education 6013 Earth Systems ☐ Education 6003 Force and Motion
I understand the $200 fee and additional parking fee will be collected on the first class day.

Name ____________________________ School ____________________________ Grade level ____________________________

Home address ____________________________ City ____________________________ State ______ Zip ______

Home phone ____________________________ School phone ____________________________ E-mail ____________________________

Send to Amy O’Brien, Washington University Science Outreach, One Brookings Drive, Campus Box 1137, St. Louis, MO 63130. Fax to (314) 935-4432 or e-mail obrien@biology2.wustl.edu.
Keeping Busy

Welcome and congratulations to these teachers who were accepted into the graduate certificate in science education program: Brendan Kearney, Rose Acres Elementary (Pattonville), Christina Lederer, Jana Elementary (Hazelwood), and Janice Phelps, Mason Elementary (St. Louis Public). Congratulations to Barbara Addelson, of the Missouri Botanical Garden, who completed her graduate certificate in December 2003.

Karen LaFever, eighth-grade science teacher at Parkway Central Middle School, received the $25,000 Milken Award in October 2003. The Milken Educator Award is given to educators who provide exemplary leadership and who work to promote excellence in public education.

Congratulations to the following St. Louis Public teachers who were selected to participate in this year’s Summer Research and Curriculum Enrichment Program: Laketia Hicks, Langston Middle; Madinah Wakil and Vivian Grigsby, both of Compton-Drew Middle; Margaret Presley, Stevens Middle; Kim Robinson, Blewitt Middle; and Bridgett Gordon, Career Academy. The teachers will participate in paid research internships at the School of Medicine from June through August. The program is supported by the Young Scientist Program at WU School of Medicine, and is open to teachers in St. Louis Public Schools. For information, contact Jennifer Mosher, (314) 362-4841, jmosher@watson.wustl.edu, or visit http://medicine.wustl.edu/~ysp/index.html.

Susan Nolkemper, St. Joseph’s Academy, prepares to do a polymer extraction during the Materials Science Saturday, March 13. Sophia Hayes, assistant professor of chemistry, and Jason Woods, instructor in physics, explained how the new interdisciplinary approach in materials science is creating advances in electronics and manufacturing. Each teacher who attended received a $50 gift certificate from Flinn Scientific. The workshop was supported by the Howard Hughes Medical Institute.