This summer, Washington University offers three graduate courses for teachers that feature hands-on field ecology and tested classroom applications. Each course provides two hours of graduate credit and activities that assist students in meeting the National Science Standards. The courses meet at Washington University’s Tyson Research Center near I-44 and Antire Road, and take advantage of its 2,000 acres of Ozark oak-hickory forest, meadows, caves, springs and streams.

For K-8 Teachers: The Science of Nature
This series includes two courses that may be taken consecutively or individually. Investigative field studies in ecology focus on ecology interactions and changes as outlined in the Science Standards. Topics include animal camouflage and advertisement, amphibians and reptiles of Missouri, bones and teeth, the water cycle, grocery store botany, human impact on neotropic songbirds, food webs, solid and hazardous waste and more. Participants may choose to take the courses for either Biology or Education credit. Enrollment is limited to 20 teachers and applications are evaluated as received.

U29 Edu/Bio 4001, 2 hours credit
June 7-11 M-F 8:30-4:00
U29 Edu/Bio 4002, 2 hours credit
June 21-25 M-F 8:30-4:00

Instructors: Richard W. Coles, Ph.D., ecotour leader, former director of Tyson Research Center and Adjunct Professor of Biology, Washington University; Judith Tisdale, Science Department Head, Community School.

Area students exploring nature at Tyson Research Center.

ECOLOGY Continued on next page
Volunteer Teaching Teams target K-12 classrooms

It has been a very busy year for the Washington University Science Teaching Teams. The teams are comprised of biology undergraduates who volunteer their time to visit classrooms in the St. Louis area to present hands-on-science programs. We have grown from a group of 27 undergraduates last year to 47 this year. Last year we touched the lives of 2,928 students at 23 different schools, representing 12 different school districts all over the St. Louis metropolitan area.

This semester, we have developed 2 new topics that will be directed at high school classrooms. They are “Molecular Biology” and “Bioethics.” The Bioethics will also be done with grades 5-8. We are very proud of our undergraduate students, as they not only make the visits themselves, but have also developed the ideas for the teams they represent. So far this year, we have made 60 visits and are gearing up for more visits during the Spring Semester. We still have a few spots open in our schedule; if you would like one of our teams to visit your classroom, let us know.

The team topics include The Water Cycle, Simple Genetics, Mendel’s Genetics, Organic Chemistry, Plant Propagation, Matter- Physical and Chemical Changes, Dissection, Global Climate, Geology, Doing a Good Science Fair Project, Bacteria: Friends or Foes?, This is Your Brain, Bioethics and Molecular Biology.

Our students tell us that the teaching experience is one of the things they look forward to most in their very busy week here on campus, and they continue to be excited about the success of this program. For more information, or to schedule a teaching team visit to your classroom, contact: Elaine Alexander at 935-7170 or elaine@biodec.wustl.edu.

Ecology

For 9-12 Teachers: Field Ecology Laboratory

This graduate course is designed to supplement the traditional graduate level ecology course, Bio 419 (see bottom of next column). This laboratory course will provide the opportunity to practice investigative approaches used by research ecologists, and combines laboratory and field experiences. Topics include nutrient cycling, pollution of aquatic systems, two-species systems and measurements of community. Enrollment is limited to 20 teachers and preference will be given to those concurrently enrolled in Bio 419.

U29 Bio 4191, 2 hours credit
July 17-Aug 14 (Saturdays, 8:30 a.m.-4:00 p.m.)
Instructor: Phyllis Balcerzak, Ph.D., Aquatic Ecology and Instructor in Education, Washington University.

Fees
Course fees are waived due to funding from Missouri Coordinating Board for Higher Education. Participants pay only the registration fee of $50 per course.

Registration
The registration form for these courses is on page 7. For more information call Victoria May, Science Outreach Director, (314) 935-6846 or e-mail may@biodec.wustl.edu.

BIO 419, Ecology lecture course, 3 hours credit
July 12-Aug 13, M-F 9:10-4:50 am
A survey of ecological principles as they relate to populations and biological communities.
To register for Bio 419, contact WU Summer School Registration at (314) 935-6720. Course cost is $750 for teachers, a discount from the normal $1350.
Education 600: “Hands-On Science K-8,” is designed to provide activity-intensive science and math for elementary and middle school teachers. Each class is three credit hours, and is centered around experiments and their underlying scientific principles.

Two semesters of life science and two semesters of physical science are currently in the series; one semester of mathematics (Math 366, Mathematical Concepts of Grades K-8) will be added spring 00. Courses may be taken in any order. Classes are provided through the evening division of Washington University, University College, and meet Tuesdays from 4:30-7:00 p.m.

Edu 6001, Electricity and Magnetism, fall 99
Edu 6002, Heredity and Life Cycles, spring 00
Edu 6003, Force and Motion, fall 00
Edu 6004, Biological Form and Function, spring 01

Fees
Course fees are $200 per three credit hour course (a great bargain over the usual $750 per three credit hour course!). this includes both coursework and materials participants may take back to their classrooms. A few of the items teachers taking all four semesters receive to take back to their classrooms include: reference books, curriculum guides, electricity kits, magnets, a Brock microscope, an aquarium and supplies, and cages for small animals, totaling over $500 in value. In addition, loaner materials include classroom sets of Lego kits, Force and Motion Kits and additional reference books and videos. Partial funding for the materials is provided by the Howard Hughes Medical Institute Undergraduate Biological Science Education Program.

Registration
For more information about the Hands-On Science K-8, call Elaine Alexander, Science Outreach Coordinator, (314) 935-7170 or e-mail elaine@biodec.wustl.edu.

Science Education Certificate Program for K-8 Teachers
Washington University has established a University College certificate program in science education for in-service teachers. Candidates for this program are teachers at the elementary and middle school level who are currently interested in teaching science but do not have a college degree in science.

WHY TAKE AN EDU600 COURSE?
• specifically designed for K-8 teachers
• taught by experts in the scientific field working with a classroom teacher
• topics that meet the national and state science standards
• lessons and experiments ready to take back to your classroom
• course cost includes many books and classroom supplies
• access to loaner kits and equipment, books and videos
• access to Washington University facilities: library, writing lab, computer lab, athletic facilities and more
• an entry into the Science Certificate or the MA in Education Programs

Program Requirements
1. Completion of fifteen credit hours of approved coursework at Washington University, including a minimum of six credits of Education 600, “Hands-On Science: K-8” (one semester each in physical and life science) and at least 3 credits of coursework offered through the natural science or math departments. The remaining credits for the certificate will include undergraduate natural science and math courses as well as selected science education courses.

2. Development of a portfolio of applied classroom activities. These materials will document the impact of the program on your teaching. The portfolio will include new or adapted activities.

Teachers currently enrolled in Education 600 may apply these courses to the certificate program.

For further information, contact Victoria May at 935-6846 or may@biodec.wustl.edu.
**Brain Awareness Week Event**

Bring your students to Hands-on Neuroscience at the St. Louis Science Center, Saturday and Sunday, March 13 and 14, 1999 (10:00 am to 5:00 pm on Sat. and Noon to 5:00 pm on Sun). This event is sponsored by Washington University Medical School and provides information and entertainment for adults and students.

Talk with scientists who do brain research and see some of the equipment they use; watch electricity come out of a cricket leg; put on special glasses to see brain cells in 3 dimensions; test your sense of balance on the Swedish balls and Babs board; look inside a brain from someone who had Alzheimer’s disease; hold a real human brain; and much more.

For more information contact Rachel Locke, Ph.D., Planning Director at Washington University Neuroscience Institute, WUMS, 314-362-6697. Also, to schedule a “Hands-On Neuroscience Activity” at your school, contact Dr. Kathy Mann-Koepke, Education Director, Alzheimer’s Disease Research Center, Fax (314) 286-2763 or e-mail hon@neuro.wustl.edu

**Biodiversity Workshop At The Garden**

The Missouri Botanical Garden is hosting a workshop on “Biodiversity: A Road Map for Education & Conservation Strategies” Thursday and Friday, April 22 and 23, 1999 (4:30 pm to 9:00 pm on Thursday and 9:00 am to 4:00 pm on Friday) This workshop will feature Jane Elder and Marian Farrior of the Biodiversity Project and Doug Ladd of the Nature Conservancy. Registration is free but limited to 50 people. Call 314-577-5144 for more information.

**Amazon River Biodiversity Conference**

Mid-America Aquacenter and St. Louis Children’s Aquarium are sponsoring the 1st International Conference of the Amazon River on March 22-26, 1999. Over 30 representatives from all over the world will be attending. The conference consists of several 2 ½-hour sessions, each composed of a presentation and a discussion.

This is an opportunity for high school biology/ecology classes. Cost is a $1 donation payable at the door.

For more information call Kara Dees at 314-647-9594.

**Professional Conferences**

- The National Biology Teachers Conference next year will be held Oct 27-30 at Fort Worth, Texas. Deadline for program proposals is March 15th.
- The National NSTA meeting will be in Orlando April 6-9, 2000. Deadline for program proposals is May 1, 1999.

- St. Louis will be hosting the NSTA convention in 2001!

**Plants In Space Video Resource Guide**

Are you searching for a life science activity for your classroom? NASA’s new “Plants in Space” Video Resource Guide features an experiment utilizing data from plants in microgravity. The guide contains instructions for establishing an experiment for corn seeds by placing them in different environments, graphing their growth, and comparing the results with corn seeds that were flown on the Space Shuttle. The “Plants in Space” Video Resource Guide and information for ordering the “Plants in Space” videotape are available on NASA Spacelink at the following Internet location: http://spacelink.nasa.gov/products/Plants.In.Space

**Receive your Master of Arts in Biology**

Washington University’s Master of Arts in Biology program provides opportunities for advanced study that can be applied to a variety of fields, including teaching, science-related business and applied fields of technology. Students who need to update their knowledge of science at the graduate level may pursue specializations as biotechnology, ecology and population biology and other areas of the biological sciences.

This degree is for:

- individuals who need graduate course work to prepare themselves for career advancements or changes,
- individuals who would like academic training in emerging biological fields such as recombinant DNA science,
- secondary school teachers who need more advanced knowledge in biological disciplines to enhance their teaching and improve professional standing.

For more information, contact University College at 935-6700.
**Have A Question That Stumps You???
**

Visit the laboratory that never sleeps at the Mad Scientist Web Site: www.madsci.org

Students can ASK-A-SCIENTIST a question, visit the MAD Labs or find science resources on the web. This site is based at Washington University Medical School and funding is provided by Howard Hughes Medical Institute.

**Need A Speaker for Your Science Class?
**

The Academy of Science of St. Louis has enrolled nearly 600 professional scientists who volunteer their time to make presentations in classrooms. The “Speakers for Science” are research scientists, engineers, and computer and medical specialists. Areas of expertise cover more than 100 fields. For more information, call the Academy of Science at (314)533-8083.

**Wetland Workshop
**

The Missouri Botanical Garden and the Missouri Department of Conservation present Wetland Wonders, A Workshop for Teachers, Saturday, May 22, 1999, 8:30 a.m. - 3:30 p.m. at Shaw Arboretum, Gray Summit, Missouri. Fee: $20

Celebrate American Wetlands Month by incorporating wetlands into your curriculum. This workshop features multiple sessions focusing on background information, curriculum and wetland resources. Come explore the Arboretum’s wetlands and participate in hands-on activities.

Registration deadline is May 3rd. For information please call (314) 577-5144.

**Worms Workshop
**

Missouri Botanical Garden presents Worms: Eat Your Garbage, Workshop for Teachers K-12, March 20, 1999 1-4 pm. Fee: $10 (includes materials and activities).

Earthworms play an important role in nature’s recycling. They also make great classroom pets.

**Teachers Preschool-3 Workshop
**

Missouri Botanical Garden presents Primarily GEMS: Great Explorations in Math and Science, Workshop for Teachers Grades Preschool-3, April 10, 1999, 9 a.m.-4 pm, Fee: $30

Experience three hands-on GEMS units geared to preschool and primary students. The three units include: Buzzing A Hive; Eggs, Eggs, Everywhere; and Treasure Boxes.

For more information about these opportunities available at Missouri Botanical Garden call 577- 5144.

**Environmental Education Courses
**

The Missouri Department of Natural Resources offers five environmental education courses for teachers during the 1999 spring and summer sessions. Registered participants may choose topics including cave science, waste management, sedimentary geology, stream ecology and investigating environmental issues.

For information call 1-800-361-4827 or (573) 526-6627.

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**Field trip! Take the kids to Tyson and experience nature’s classroom
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The Field Science Program at Washington University’s Tyson Research Center offers field trips for pre-school through grade 12. Preschool programs provide opportunities for young children to develop intellect, language, and social skills. Topics offered this spring are: Bird Songs, Paleontology for Preschoolers, Pond Animals, and Tracks and Traces. K-12 programs are designed to stimulate student interest in the natural environment, as well as to stress observation, analytical thought, and cooperation. All of the topics offered have connections to national, state, and local science standards. Authentic assessments to do with your students are suggested. The following topics are offered in April and May: Aquatic Ecosystems, Bird-watching, Discovering Nature Through the Arts, Flowering Plants, Forest Ecology, Geology, Insects, Non-flowering Plants, and Weather and the Seasons.

Field trips are offered in the summer (June and July), on request. Summer topics for K-12 are: Aquatic Ecosystems, Flowering Plants, Geology, and Weather. Preschool topics are offered: Paleontology, Pond Animals, and Tracks and Traces.

The Field Science Program is self-funded, so there is a fee for the field trips. Please call Janice Starke at 935-8437 for more information.
For many of us, the great scientific discoveries of the modern age— the Big Bang, evolution, quantum physics, relativity— point to an existence that is bleak, devoid of meaning, pointless. But in *The Sacred Depths of Nature*, eminent biologist Ursula Goodenough shows us that the scientific world view need not be a source of despair. Indeed, it can be a wellspring of solace and hope.

This eloquent volume reconciles the modern scientific understanding of reality with our timeless spiritual yearnings for reverence and continuity. Looking at topics such as evolution, emotions, sexuality, and death, Goodenough writes with rich, uncluttered detail about the workings of nature in general and of living creatures in particular. Her luminous clarity makes it possible for even non-scientists to appreciate that the origins of life and the universe are no less meaningful because of our increasingly scientific understanding of them. At the end of each chapter, Goodenough’s spiritual reflections respond to the complexity of nature with vibrant emotional intensity and a sense of reverent wonder.

A beautifully written celebration of molecular biology with meditations on the spiritual and religious meaning that can be found at the heart of science, this volume makes an important contribution to the ongoing dialog between science and religion. This book will engage anyone who has ever been mesmerized— or terrified— by the mysteries of existence.

Ursula Goodenough is a Professor of Biology at Washington University. One of America’s leading cell biologists, she is the author of a best-selling textbook on genetics, and has served as President of the American Society of Cell Biology and of the Institute on Religion in an Age of Science. She and her family live in St. Louis, Missouri and in Chilmark, Massachusetts, on Martha’s Vineyard.
**FREE STUFF**

**Posters**
Posters (some with teachers guides) are available from Tufts University’s Wright Center. The series includes *Human Genome, Electromagnetic Spectrum, Earth Anatomy, Cosmic Evolution* and *Venal Pool Life*. Send a request on school stationery for specific posters to Wright Center, Dept. W, Science and Technology Center, Tufts University, 4 Colby St., Medford, MA 02155. You can view the poster online at this URL: [http://www.tufts.edu/as/wright_center/svl/posters/posts.html](http://www.tufts.edu/as/wright_center/svl/posters/posts.html).

**Posters**
Order “The Year of the Ocean,” poster with original art by Steven Shachter. Call 1-888-4-YOTO98 and leave a voice mail message containing your name and address.

**Experiments/Activities**
Demonstrations/experiments from Flinn Scientific: this latest group of biology- and environment-related activities includes “Rainforest Diversity,” which illustrates the concept of species diversity; “Diffusion in Agar Cells,” which allows students to explore the relationship between diffusion and cell size; and “Respiration vs. Photosynthesis,” which allows students to observe an apparent “reversal” of photosynthesis. Contact Flinn Scientific, Inc., PO Box 219, Batavia, IL 60510; 1-800-452-1261; e-mail flinn@flinnsci.com.

**Jobs in Ecology**
Several publications are available from the Ecological Society of America. “Careers in Ecology” is a brochure for high school and college students with information on paths to becoming an ecologist and the many options available. Two-to-four page fact sheets cover such topics as invasive species, biodiversity, coral reefs, and global climate change. “Issues in Ecology,” a series of four-page brochures on environmental issues, were prepared by a panel of distinguished scientists with the help of a science writer and are suitable for the general public. The brochure “What Does Ecology Have to Do with Me?” introduces the science of ecology and its role in human society. Contact ESA, 2010 Massachusetts Ave. NW, Suite 400, Washington, DC 20036-1023; 202-833-8773; e-mail esahq@esa.org.

**Booklet on “The Cell”**
*Inside the Cell*, a newly revised booklet for high school and college science students and teachers describes the critical functions of the organelles found in the cell. The booklet aims to help readers better understand today’s basic biomedical research. Write to *Inside the Cell*, NIGMS Public Information Office, Bldg. 45, Rm. 1AS.25, Bethesda, MD 20892.

**Books on Climate**
Order your set of up to 30 copies of *Our Changing Climate*, a publication designed to raise the level of public awareness on issues dealing with global climate change, released by the National Oceanic and Atmospheric Administration. The publication discusses historical events attributed to climate and socioeconomic impacts of climate patterns. Request publications on school letterhead. Contact UCAR, Joint Office for Science Support, Attn.: Leilani Pena, PO Box 3000, Boulder, CO 80307-3000; 303-497-8666; fax 303-497-8633; e-mail rtn@joss.ucar.edu.

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**REGISTRATION FORM FOR SUMMER ’99 ECOLOGY COURSES**

A registration fee of $50/course will be collected the second day of class. For Bio 419 lecture registration, contact WU Summer School at 935-6720.

| Name ________________________________ Address ____________________________________________ |
| City ____________________ State____________________________ Zip ________________________ |
| Home Phone ________________________________ Work Phone ________________________________ |
| School _____________________________ District _____________________________ Grade _____ |

SEND TO: Vicki May, Washington University, Campus Box 1137, St. Louis, MO 63130