

THE UNIVERSITY OF ARIZONA®

SAMEC Outreach Newsletter

News and Information from the University of Arizona Science and Mathematics Education Center. SAMEC is hosted by the College of Science and Lunar and Planetary Laboratory located in the UA Sonett Space Sciences Building.

Professional Development — Programs and Seminars

First Mars Image from HiRISE Camera

The High Resolution Imaging Science Experiment (HiRISE), an instrument on the Mars Reconnaissance Orbiter (MRO) mission that launched Aug. 12, 2005, began orbiting Mars on



This image illustrates processes that may have involved water both on ancient Mars (channels and eroded craters) and more recently in Mars' history (volatile-rich debris mantle). The box at lower right shows the position of a sample image offered in full resolution. (Image courtesy of NASA/JPL-Caltech/University of Arizona)

March 10th and arrived at Mars on March 23rd. The most powerful camera to ever leave Earth's orbit, HiRISE will investigate deposits and landforms resulting from geologic and climatic processes and assist in the evaluation of candidate landing sites for future landers, rovers, and possible human missions.

The HiRISE camera successfully took four images of Mars on March 23rd and a second set of Mars images on March 25th. These images will be the camera's only photos for the next six months while the spacecraft "aerobrakes" into a circular orbit for its science mission. Aerobraking involves dipping repeatedly into the upper atmosphere about five hundred times to scrub off speed and drop into successively more circular orbits.

How far away are Mars and the Mars Reconnaissance Orbiter today? It took about 13 minutes for the signal to reach Earth from the MRO. That means that the spacecraft and HiRISE were 13 light minutes away at that time, or about 145 million miles! The radio signal travels at the speed of light, or about 186,000 miles per second, or 700 million miles an hour. This distance changes continually; the distance between the Earth and Mars varies with time due to their different orbits around the Sun. Additional information is available at their website: <http://hirise.lpl.arizona.edu/>

Science Teacher's Colloquium Series

The UA Science and Mathematics Education Center is a forum for K-12 teachers to learn about cutting edge research at the University of Arizona.

- **Thursday: April 20, 2006 — 4:15 - 6:15 pm**

"Introduction to the Physics of our Star: The Sun"

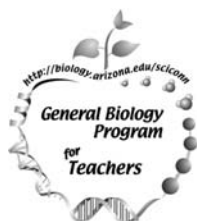
Dr. Joe Giacalone, UA Lunar and Planetary Laboratory
Location: UA Modern Languages Room 405

Dr. Joe Giacalone will talk about the structure of the sun including its interior and atmosphere, composition, interior and energy source. Dr. Joe Giacalone's core research interests include understanding the origin, acceleration, and propagation of cosmic rays, and other charged-particle species in the magnetic fields of space, and astrophysics. He is interested in the general properties of solar, interplanetary, and galactic magnetic fields.

Teachers and speakers are guests of the University of Arizona Science and Mathematics Education Center, the Lunar and Planetary Laboratory and the UA/NASA Space Grant Program, who are funding this program. Teachers are eligible to receive professional development credit. For additional information, contact samec@lpl.arizona.edu, 520/621-8309 or visit <http://samec.lpl.arizona.edu/profdevelopment/stcs.html> for updates.

For current information, visit SAMEC's Master Calendar at
<http://samec.lpl.arizona.edu/>

Summer 2006 courses for teachers



- * update your teaching skills and your science background?
- * pursue a master's degree in science?
- * follow your interest in biology by conducting biological research?

The University of Arizona has several biology classes you can take this summer as a non-degree seeking graduate student! Courses are designed for teachers with a good background in biology (a minimum of 18 units at the graduate and/or undergraduate level). For more information, or to request an application packet online, visit <<http://biology.arizona.edu/sciconn/Appform.htm>> or call 520/621-5903 or email <warder@u.arizona.edu>.

Summer Session I classes run June 5-July 7; Summer Session II classes run July 10-Aug 9. For more information, visit: <http://biology.arizona.edu/sciconn/>

Biology Update 1 (BIOC 623a)

Credit: 2 units of credit
Date: June 5-July 6, 2006 (SSI)
Time: 9-11:50 am TTh
Location: Koffler 510
Cost: \$509.23
Instructor: Jim Ware, M.S.

This course will focus on recent advances in the understanding of basic biology and on new applications in cellular and molecular aspects of biology. A limited number of \$250 scholarships are available to in-service middle/high school science teachers.

Genetics for Teachers (BIOC 650)

Credit: 3 units of credit
Date: June 5-July 6, 2006 (SSI)
Time: 9-11:50 am MWF
Location: Koffler 510
Cost: \$755.73
Instructor: Lisa Elfring, Ph.D.

Assuming no knowledge of molecular structure or chemistry, we will explore the nature of the genetic material and the qualities that make the key players (DNA, RNA, Protein) ideal for their roles. Along the way, we will pay close attention to the very simple but awe-inspiringly clever experiments that cracked the genetic code and illuminated its characteristics. We will build functioning bases out of Tinkertoys and Velcro and investigate on-line activities that recapitulate key explorations. As time permits, we will examine how a series of simple-minded machines achieve mind-blowing accuracies in copying and translating the code. A limited number of \$350 scholarships will be available to in-service middle/high school science teachers.

Secondary Biology Laboratory Curricula (BIOC 633)

Credit: 3 units of credit
Date: July 10-August 9 (SSII)
Time: 2-4:50 pm MWF
Location: Koffler 510
Cost: \$755.73
Instructor: Lisa Elfring, Ph.D.

What are the characteristics that most great instructional activities share? How can you modify an existing activity to increase student involvement, interest, and understanding? How can you make use of current events to communicate with students about the fun and complexity of doing science? And how do national and state science standards drive your curricular choices? In this three-unit class, we will explore these ideas by using and discussing exemplary curricula taken from a variety of sources. The emphasis will be for teachers to adapt classroom activities to reflect the results of research on teaching and learning in science, and to promote greater student understanding in biology. One unit of Independent Study is required for this follow up. A limited number of \$350 scholarships are available to in-service middle/high school science teachers.

Biology Update 2 (BIOC 623b)

Credit: 2 units of credit
Date: July 10-August 9 (SSII)
Time: 9-11:50 am TTh
Location: Koffler 510
Cost: \$509.23
Instructor: JodyLee Duek, Ph.D.

This course will focus on recent advances in the understanding of basic biology and on new applications in genetics, ecology, evolution and systematics. Weekend fieldtrips may be required. A limited number of \$250 scholarships are available to in-service middle/high school science teachers.

Recombinant DNA Techniques (BIOC 597a)

Credit: 2 units of credit
Date: July 10-28 only
Time: 8am-12:50 pm MWF
Location: Koffler 510
Cost: \$509.23
Instructor: Nadja Anderson, Ph.D.

Meet the molecules and tools used by researchers to make recombinant foods, sequence the human genome, and analyze stains on cocktail dresses! You will learn the techniques of modern molecular biology, gain comfort with “biology as a second language,” learn ways to teach about biotechnology using manipulatives and lab activities, and bring biotechnology into your classroom. A \$250 scholarship is available to in-service middle/high school science teachers.

Professional Development — Courses

Genes, Biotechnology, and the Environment (ECOL 508L)

Credits: 2 units of credit
Date: July 17-August 3
Time: 8:30-3:30 pm M-F
Location: Tucson High School
Cost: \$509.23
Instructors: Margaret Wilch, M.S. and
Nancy Moran, Ph.D.

Meet the molecules and tools used by researchers to make recombinant foods, sequence the human genome, and analyze stains on cocktail dresses! You will learn the techniques of modern molecular biology, gain comfort with “biology as a second language,” learn ways to teach about biotechnology using manipulatives and lab activities, and bring biotechnology into your classroom. A \$600 scholarship is available to in-service middle/high school science teachers.

Topics in Mathematics for Elementary and Middle School Teachers (Math 596F)

Credits: 3 units of credit
Date: June 5-23, 2006
Time: 1:00 - 3:45 pm Monday thru Friday
Location: TBD

This summer the Department of Mathematics and the Center for the Mathematics Education of Latinos/as (CEMELA) will offer Math 596F: “Topics in Mathematics for Elementary and Middle School Teachers.” The three-unit course will be held June 5 – 23, 2006 and will meet 1:00 – 3:45 p.m., Monday through Friday. The location for the course has yet to be determined as well as techniques to use in teaching these topics, but a middle school in the Sunnyside or Tucson Unified School District is being considered.

Because the course is a topics course, it will focus on connections across key areas in mathematics. The pedagogical approach will emphasize problem solving, use of technology, communication, and hands-on materials. A variety of topics in the elementary and middle school mathematics curricula will be examined to broaden and deepen teachers’ understanding of the content. Additionally, issues of language and culture will also be emphasized.

Registration for the course will be handled through the CEMELA office. If you are interested in the course and would like more information, please contact Kelley Merriam Castro at [520/626-7606](tel:520/626-7606) or kmerriam@email.arizona.edu. Preference for course enrollment will be given to teachers who are already participants in the CEMELA project, but the course will be open for other elementary and middle school teachers. Those not associated with CEMELA will be registered on a first-come, first-served basis.

Teaching High School Biology

Credits: 45 hours

Registration is currently underway for the following ASSET online course specifically geared for you as a High School Science Educator: Teaching High School Biology Grades 9-12. Teaching High School Biology helps educators learn inquiry-based approaches to teaching standards-based science topics, including genetics, evolution, and cell biology. Participants use multimedia to explore novel learning environments and methodologies that foster student interest, involve them in the research process, advance their critical thinking skills, and develop their conceptual understanding. (Aligns to Life Science Strand of AZ Standards)

Registration is as easy as ...

1. Log in to the ASSET Portal at: <http://www.asset.asu.edu>
2. Choose the *Current Course Offerings* from Shortcuts and click on *View All Courses*
3. Click on the Course Title for more information and registration (Registration fee \$21)

If you need assistance or have any other questions about ASSET, please feel free to contact us.

See you online,

ASSET Professional Development Team

asset@asu.edu

480/965-1004

Fall 2006 course for teachers

Microscopy Class for Teachers BIOC 597c

Credits: 1 unit of credit
Dates: Saturdays: Sept. 9, Oct. 7, Oct. 14 and
Oct. 28, 2006
Time: 9:00 am - 1:00 pm
Location: Marley 101B
Cost: \$290.00
Instructor: Dave Bentley and Patty Jansma

This graduate-level course will cover the basics of light and electron microscopy. The format will be hands-on laboratory exercises, including time on both the scanning and transmission electron microscopes. Alignment, adjustment and maintenance of light microscopes found in the classroom will be covered also. The goal of this class is to incorporate hands-on microscopy into your classroom curriculum. The Electron Microscopy Facility staff will be available during and following the course to assist you in executing this goal. Other forms of microscopy and their applications will be discussed, and handouts will be provided. This class may be taken whether you’re in a degree program or if you’re taking it as a non-degree student. Class size is limited to 8 persons. To enroll, contact Ellie Warder at warder@u.arizona.edu or call 520/621-5903. To avoid late penalties, you must be enrolled and have paid all your registration fees by August 21. (sorry, no scholarships available).

In this Math Links issue

- ¥ *Math Awareness Month*
- ¥ *New Start*
- ¥ *Physics Factory*

Do you have topics in mind that you wish to be addressed in **Math Links**? Please mail me your thoughts, suggestions or comments.

Kathleen Marrero
University of Arizona, Mathematics Department
617 N. Santa Rita, Tucson, AZ 85721-0089
marrero@math.arizona.edu

Check out our new website:
<http://math.arizona.edu/>

If you wish to get on the Math Department's email list, please contact me.

Math Awareness Month

April is Mathematics Awareness Month, and the theme this year is Mathematics and Internet Security. Every aspect of the Internet is impacted by security concerns: maintaining privacy of users, detecting and protecting against viruses, spam detection, and preventing theft of financial information. These tasks are performed so rapidly that we hardly notice them, but behind the scenes enormously elaborate computations are taking place that translate data into strings of binary information, encrypt them, transmit them securely to their destination, and decrypt them at the far end. The kind of computations that are used are based on simple properties of prime numbers, though great ingenuity goes into devising the methods that are actually used.

The University of Arizona Mathematics Department is putting on a week of presentations and exhibits relating to Internet Security from April 10th to 14th. Topics to be explored will include cryptography (in particular RSA and Diffie-Hellman techniques), coding theory, and related areas of mathematics.

Visit our website for a more detailed schedule of events:
<http://math.arizona.edu/events/maw.html>.

The national web page is: <http://www.mathaware.org>, at which background information and references can also be found. Questions may be directed to Chris Mikel at mikel@math.arizona.edu, or by phone at 520/626-9837.

New Start Summer Program Summer 2006

New Start Summer Program

Date: June 14 - July 23, 2006
Email: newstart@email.arizona.edu
Phone: 520/621-3160

Rise to the Challenge of Higher Education!

Your graduating seniors should be thinking about next year, but what about next summer? Tell them about the *New Start Summer Program!!!*

Students attending the University of Arizona in the Fall of 2006 should consider the New Start Summer Program, celebrating over thirty years of student success at the University of Arizona. This program, which started in 1969, is designed to ease students' transition between high school and college through various components. Students take a University level Math, English, or a general education course. These courses are supplemented with in class tutoring as well as free drop-in tutoring. Peer advisors provide valuable resources for students to use throughout their college years.

Overall, this seven week program coordinated by Kendal Washington-White offers a comprehensive orientation to the University of Arizona, a three to five unit academic course, registration for the fall semester, academic skills workshops, personal development, leadership training and social activities. New Start students are introduced to key resources and individuals to help foster their success at The University of Arizona.

There are numerous annual events of interest that add to the fun of this program. There is an opportunity for students to develop leadership skills through a program that gives back to the community. There is an involvement fair for students to learn information regarding the University's clubs and organizations. Monte Carlo Night is a fun night of dancing, games of chance and prizes. There is also a talent show, student academic conference, and a student awards ceremony.

In addition to the various programs offered, New Start provides waivers for ALL participants to cover the cost of their three to five unit New Start course. The costs for students include a \$75 program fee, student fees of \$20.50, U of A ID card \$20, and the cost of a textbook. New Start sends 2006-2007 Free Application for Federal Student Aid forms to program applicants. Students who complete these forms and who also qualify to receive need-based financial aid may be eligible to receive a Pell Grant for New Start. Email newstart@email.arizona.edu for more information.

Physics Factory

The Fall 2004 SAMEC Newsletter announced a new science outreach program, *The Physics Factory*, that would soon be taking off. A little more than a year later, *The Physics Factory* (<http://www.physicsfactory.org/>) is making a big splash in science education in Tucson. In fact we literally have big splashes, besides flame tornados, high voltage discharges, liquid nitrogen and other don't-try-this-at-home spectacular demonstrations that have teachers gasping as loudly as children. Just as importantly, *The Physics Factory* has a large and growing collection of hands-on devices that engage the curiosity of elementary and middle-school students as they explore the physical principles behind the surprising behavior. We have now begun a series of visits to local schools,



The flame tube makes an impressive grand finale at the U of A Physics Phun Nite (Image courtesy of The Physics Factory website).

ranging from short (approx 1 hour) presentations to single classes of 1st graders to long visits (half or whole day) in which several classes (potentially an entire school) participate.

We build almost all our equipment out of readily available materials (wood, metal, plastic) and parts salvaged from disused motors, TVs, computers, and other household appliances. Besides keeping our costs down, this kind of construction illustrates the basic physical principles by which real devices operate. Many of our demos are made by high school students working with mentors who are themselves slightly older students in science and engineering at Pima Community College or the University of Arizona. We find these students enjoy working with each other, and we encourage those who have made demonstrations to accompany us on visits to elementary and middle schools, so that they can show it to the younger students themselves. It is very inspiring for elementary-age children to see only slightly older students thoroughly engaged in scientific activities.

The Physics Factory received 501c(3) tax-exempt status in June



Kids from the audience get to control the patterns that the flame tube makes by pressing keys on the keyboard (Image courtesy of The Physics Factory website).

2005, so individuals, corporations, and foundations can now make tax-deductible contributions. In Fall 2005, we presented for the AIAA Kids Club, Junior Scientists' Day at UA Homecoming, El Tour Downtown Fiesta, Tucson Children's Museum, and the Parks and Recreation Department's Kidco after school program. In 2006 *The Physics Factory* has appeared at the Tucson/Pima Family Arts Fest, Valencia Middle School, and Lineweaver, Hughes, Donaldson and Rose Elementary schools, besides a couple of events with the UA Office of Early Outreach. We still have some spaces available, but call soon if you want us to visit your school or program!

If you want to learn more about *The Physics Factory* or set up a visit to your school or organization? Visit <http://www.physicsfactory.org>, email info@physicsfactory.org, and/or call us at 520/400-0980. The University of Arizona contact person is Dr. Bruce Bayly in the Mathematics Department.



The flame tornado, second only to the flame tube, makes its debut at the U of A Physics Phun Nite (Image courtesy of The Physics Factory website).

Professional Development — Workshops and Camps

Oceans: Ecology, Human Impact, and Sustainability

Date: Sunday, April 23, 2006
Time: 8 am - 5 pm
Location: Green Fields Country Day School,
6000 N Camino de la Tierra in Tucson
Instructor: Traci Holstein

This free, non-credit workshop will cover the basics of marine biology and ecology. We will begin with an overview of marine species, including performing some interesting dissections. Once you have fallen in love with these creatures, we will cover human impact on the ocean. A focus area will include an overview of the history of commercial fishing and the impact of that practice. We will also discuss other issues, such as habitat destruction, aquaculture, and pollution. Breakfast munchies and beverages will be provided. There will be a break for lunch; surrounding food venues include Sonic, Wendy's, Rubios, Eegees, Taco Bell, and Nico's Mexican Food. Please bring a notebook and an open mind! To register for this workshop, please email Traci Holstein at undrthc@cox.net.

Camp for Educators

Dates: June 29 - July 3, 2006
Location: Mt. Lemmon Observatory

The University of Arizona announces its eleventh Astronomy Camp for Educators. Astronomy Camps are immersion adventures in DOING science. Participants become astronomers operating large telescopes (12, 20, 40, 60, 61-inch diameters), interacting with leading scientists, and interpreting their own scientific measurements. The Camps are held in the "Sky Island" environment of Mt. Lemmon Observatory (9200 feet). Daytime activities include solar observing, interactive talks, inquiry-based activities led by astronomers and educators, tour of the UA Mirror Lab and other facilities, hiking in the unique "sky island" environment, plus a "swap meet" of teaching ideas and materials. For more information email dmccarthy@as.arizona.edu or call 520/621-5233. Visit our website at: <http://www.astronomycamp.org>



The Mt. Bigelow observatory on Mt. Lemmon

Inquiry Extravaganza: How to turn Your Cookbook Labs Into True Inquiry

Dates: Tuesday, July 18, 2006;
Repeat on Thursday, July 20, 2006
Time: 1-5 pm
Location: UA Main Campus (Building/Room TBA)
Instructor: Brenda Stolle, Glenbrook North High School,
Northbrook, Illinois

Have you always wanted to learn how to convert your old cookbook labs to inquiry activities? Are you looking for ways to keep your students engaged and active in their learning? Then this workshop is for you! This workshop will provide teachers with an introduction to inquiry teaching. We will then work together, with labs you will bring, to convert those old plug-and-chug labs into activities that will spark student interest and curiosity. Teachers will be required to bring two sample labs that they currently do that they wish to convert. A comprehensive guide to inquiry techniques will be provided along with examples of labs before conversion and after conversion. Enrollment is limited to 20 teachers per workshop; you only need to attend one day, as the same information will be presented both days. Sign up now by contacting Ellie Warder at 520/621-5903 or warder@u.arizona.edu.

Hydroponics in the Classroom

Dates: Tuesday, July 25, 2006
Repeat on Tuesday, August 1, 2006
Time: 1-4 pm
Location: UA Main Campus Koffler Bldg., Room 510
Instructor: James Stuart, Mt Ellis Academy, Bozeman,
Montana

Hydroponics is a useful tool in the classroom for students to study the structure and functions of plants. It is a soil-less way of growing plants that can maximize nutrient delivery and also control which nutrients plants receive. This gives students more control over how plants grow. This workshop will look at different hydroponic designs and provide methods for teachers to implement hydroponics as cheaply as possible in the classroom. A field trip is included in this workshop. You only need to attend one day, as the same information will be presented both days. To register for this non-credit workshop, contact Ellie Warder at 520/621-5903 or warder@u.arizona.edu.

Professional Development — Workshops

Solar Science Workshop for Teachers

Dates: July 10-12, 2006

Time: 8:00-4:00 pm

Location: UA Lunar and Planetary Laboratory
Kuiper Space Sciences Bldg., Room 330

Instructor: Don Adams, Vail High School

What causes the seasons?

Seasonal changes including temperature and length of daylight, indicate that the sun's light received by the Earth varies both throughout the year and at different latitudes. The Solar Science Workshop for Teachers will provide a venue for discussion and inquiry to help explain this phenomena.

The first explanation many people give for seasonal change is that the sun is at different distances from the Earth at different places in its elliptical orbit. It seems to make sense that it would be summer when the Earth is closer to the sun and therefore receiving more of the sun's energy, and winter when it is farther away. But how would this explain the fact that seasons are opposite in the Northern and Southern Hemispheres and much more extreme at higher latitudes than at the equator? (See insert for registration information)

Why do we study the sun?

The Sun is a source of light and heat for life on Earth. Our ancestors realized that their lives depended upon the Sun and they held the Sun in reverent awe. We still recognize the importance of the Sun and find the Sun to be awe inspiring. In addition we seek to understand how it works, why it changes, and how these changes influence us here on planet Earth. The Sun was much dimmer in its youth and yet the Earth was not frozen. The quantity and quality of light from the Sun varies on time scales from milli-seconds to

billions of years. During recent sunspot cycles the total solar irradiance has changed by about 0.1% with the sun being brighter at sunspot maximum. Some of these variations most certainly affect our climate but in uncertain ways.

For the application and more information visit our website at: <http://samec.lpl.arizona.edu/profdevelopment/solar.html> or contact samec@lpl.arizona.edu



A major solar flare was unleashed on Monday, April 2, 2001 at 21:51 UT. This big explosion, near the Sun's northwest limb, hurled a coronal mass ejection (CME) into space—but apparently not toward Earth (Credits: SOHO/EIT (ESA & NASA))

NASA Lunar Meteorite Sample Education

Learn about the legacy of the Apollo Moon missions and of meteorite mysteries. The NASA Lunar Meteorite Sample Education Program's goal is to provide educators with activities and resources that promote students' science process skills, as well as science and mathematic educational standards. These standards can be directly correlated to Arizona science and mathematic standards.

Workshop conducted at no charge within your own school or district office. Minimum of ten teachers or administrators required. Professional Development may be available through your school district. Workshop is three hours in length and is conducted during a week night or Saturday.

Workshop includes:

- * Background information on the Apollo Moon missions
- * NASA certification with proper procedures in handling and storing lunar-meteorite sample disks on loan from NASA Dryden Research Center
- * National activity matrices to assist in identifying your state's science process skills and Science / Mathematical educational standards
- * Classroom activities that promote problem-solving, communication skills, and teamwork, along with teacher's guides
- * NASA Educational Resources
- * Lunar and meteorite sample disk viewing

Contact: Sondra Geddes, Program Coordinator
NASA Lunar Meteorite Sample Education
661/276-2359
or Email sondra.geddes@dfrc.nasa.gov

TUSD's Alice Vail Middle School takes first in Arizona Science Olympiad

Alice Vail Middle School placed first in the finals at the Arizona Science Olympiad middle school competition. Hosted by UA's Science and Mathematics Education Center, the tournament was held on March 4th bringing approximately 500 students to the UA campus.

The students tested their rockets, catapults and robots, built machines on the spot to perform specific tasks and were quizzed on their knowledge of various scientific fields in 23 events. The Olympiad, held in the gym, on the mall and in the science labs of the UA.

Seventh grade student Sarada Devi Thanikachalam, says "We need to do more research in the bonding of oxygen and hydrogen." Her long-term goal is to become a doctor.

Elsa Schaub, science teacher at Alice Vail and coach of its Olympiad team, said the event is a "wonderful collective effort" that brings students, teachers and parents together for science education.

First-place teams in the middle- and high-school divisions of the Arizona Science Olympiad will compete in the national finals in May at the University of Indiana in Bloomington.

First Place Team (Middle School Division):

Alice Vail Middle School,

Tucson Unified School District

Coach: Elsa Schaub, science teacher

Students: Noah Brown, Addie Connor, Andres Camacho, Han Duerstock, Diliana Delatorre, Ryann Hernandez, Alex Hood, Amie Kilgore, Sergio Matias, Colfen Pierson, Mengda Qi, Shantidra Smith, Dylan Soukup, Sarada Thanikachalam, Julie Zang

First Place Team (High School Division):

Catalina Foothills High School,

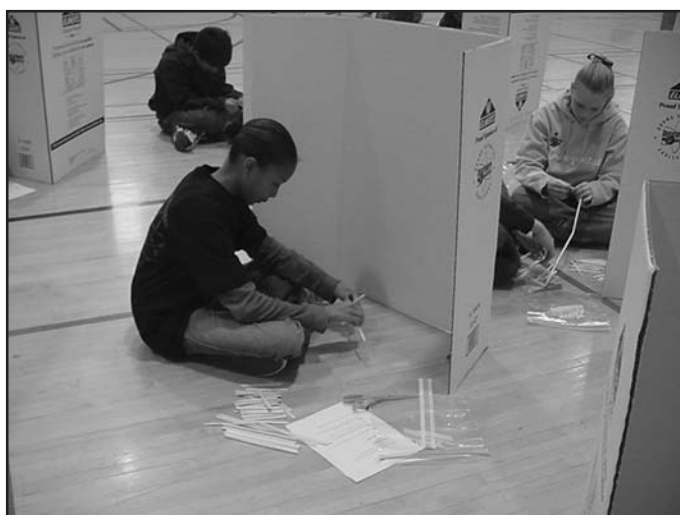
Catalina Foothills School District

Coach: Ann Marie Condes, science teacher

Students: Alissa D'Gama, Adrian Melia, Yunlin Zhang, Craig Call, Chris DeSa, Sang Moon, Jeff Brown, Alex Breslow, YoungRok Lim, Jenelle Wallace, Bing Han, Elizabeth Cameron, Alexis Smith



First place students from Alice Vail Middle School adjust their Wheeled Vehicle before their second "run."



In the Mystery Architecture event, students use their science process and inquiry skills to build a device that will be tested for strength.

Arizona Science Olympiad

The Science Olympiad was developed by teachers for teachers and their students. All of the events are linked to the National standards. Tournaments bring science to life by demonstrating how science works through problem solving and understanding of science concepts. The program consists of 23 individual and team events that encourage learning biology, chemistry, physics, earth science, technology and inquiry.

Science Olympiads are organized by volunteers. If you wish to become a sponsor or are interested in organizing a Science Olympiad team, please contact Selina Johnson, Division B State Director, samec@lpl.arizona.edu, <http://samec.lpl.arizona.edu/k12students/olympiad.html>

Southern Arizona Regional Science and Engineering Fair

Tyler Clark, a 17-year-old student from Salpointe Catholic High School, made eight appearances in front of a crowd of nearly 1,100 at the Southern Arizona Regional Science and Engineering Fair. It was held at the Tucson Convention Center.

He received awards in several categories from Raytheon Missile Systems and other sponsors. He joined creators of five other projects who qualified for expense-paid trips for themselves and their parents to Indianapolis May 6-13 to compete in the Intel International Science and Engineering Fair.

Another qualifier for the prestigious trip is 17-year-old Liz Baker, a senior at University High School. Her project included six years of research on human desires.

This will make the fifth trip to the international competition for Baker, said Shirley Briggs, director of the fair and the master of ceremonies at the awards program for junior high and high school students.

Elementary level students were honored at a program Thursday. In the two nights, 700 awards were presented.

Others who qualified for international competition include the team of Ariel Potter and Christine Pak of Rio Rico High School for their work on insulin resistance; Ahmed Badran of Tucson High Magnet School for his project on design and synthesis of a Gfp-based molecular switch; Emily Hartley of the Academy of Math and Science for “Hexaflexagons: Are You in the Group?”; and the team of David Charles and Patrick Brown of Salpointe Catholic High for “Bioremediation and Degradation of Treated Wood in Landfills.”

Four junior high students will go to Indiana as observers. They are Lyda Harris of Doolen Middle School for a project on what we send down the drain; Caroline Brown of Emily Gray Junior High for her “Investigation into Mobility Correlations of the Sonoran Desert Tortoise”; and Christian Suyat and Nicolas Baird of the Sonoran Science Academy for a cheap and portable method of fingerprint scanning.

Three teachers were recognized: Margaret Wilch of Tucson High; Ivan Yocum of Doolen Middle School and Ava Bemer of Billy Lane Lauffer Middle School.

For more results and information, visit: <http://www.sarsef.org> or contact Shirley Briggs, Director, 520/621-8646, email: director@sarsef.org

College of Science Summer Camps

A range of science and math-focused camps and workshops are available for young people. Many of these programs are traditional weeklong day camp experiences on the UA campus. Some of our premier summer camp programs take advantage of our close proximity to the UA's world-class telescope facilities on Mount Lemmon. All are designed to provide campers a research experience emphasizing hands on activity. For camp information visit their website at: http://cos.arizona.edu/sci_outreach/summer_camps.asp

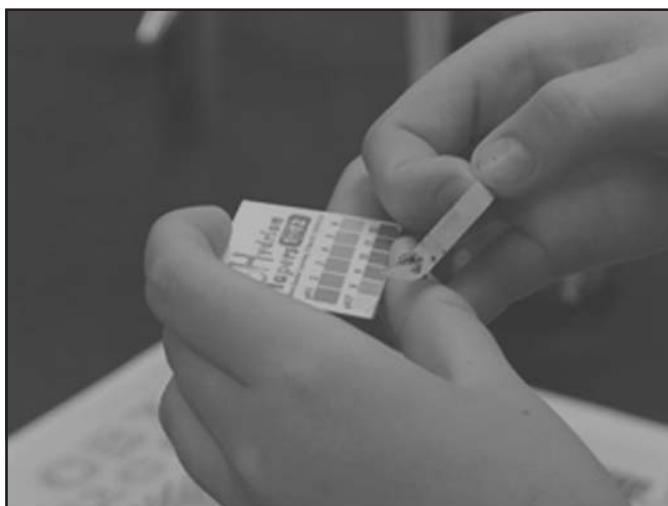


SummerFUSION Science Adventure camps, a partnership of the Flandrau Science Center and the University of Arizona College of Science, offers eight different programs for campers ages 4-15. Day camps focus on interdisciplinary science experiences, from Astronomy to Zoology.

Campers will make observations, conduct their own experiments, get to know scientists and explore the rich science research happening at the University and various field sites. Day camps also include an evening or overnight event for campers or campers and their families, giving families the opportunity to do science together. Overnight camps run for 5 or 10 days, and are facilitated by research scientists and experienced overnight program staff.

Astrotrek takes campers on a tour of major astronomical facilities in Southern Arizona, and includes daily (and nightly!) hands-on science activities. Campers also enjoy hiking, swimming and games. Astrotrek2 doubles the adventure, moving throughout the state to explore even more observatories and natural astronomical formations, such as Meteor Crater.

Registration is ongoing until camps are full. Last year we experienced many sell-outs, so we recommend you register early. University of Arizona faculty and staff receive a \$30 discount off each camp price. Scholarships are available; applications are due April 3rd, 2006 for priority consideration. Find more information, including registration and scholarship forms, at <http://www.flandrau.org>. Click on the SummerFUSION icon. See you at camp!



Student from SummerFUSION Science Central Camp uses pH paper to test if substance is an acid or a base



Fall Skywatchers

Flandrau Sky Information Available Free via Phone and the Internet

Flandrau provides free information about what's up in the night sky on both a free phone line and on the Internet. For the latest sky information call Flandrau's Astronomy Newsline at 520/621-4310. Likewise, the Flandrau Skywatchers Guide can be accessed via the Internet at:

<http://www.flandrau.org/astronomy/index.php>

What's Up PLANETS

Spring 2006 is an excellent time to see Saturn this year. Because Saturn has risen high enough in the sky during the evening hours, this spring offers good prospects for sharp views of Saturn's amazing rings in Flandrau's 16-inch observatory telescope. Good telescopic views should be available (weather permitting) when the telescope opens at 7 p.m. Saturn is in the constellation Cancer the Crab and is creeping away from the Beehive star cluster, (it passed just 0.61 degrees south-southwest of the center of the Beehive back on February 2). Saturn appears as a zero magnitude star-like object that does not twinkle. Also,

look for the waxing gibbous Moon near Saturn in the evening and late night sky of Thursday, April 6. Finally, as with any planet, viewing is dependent on atmospheric stability and conditions, and of course, the quality and size of the telescope used.

Mars continues to dim and shrink from its spectacular apparition in late October and early November and has faded substantially to magnitude 1.2 by early April. At only 5.8 arc seconds in apparent size in early April, Mars is too small for surface features to be seen, even in large telescopes. Mars is first found overhead at the start of evening twilight and appears as a fairly bright rusty-orange star-like object. Mars slowly can be first seen high overhead by around 7:45 p.m. in April. Mars is now moving east, out of Taurus, the Bull, and losing altitude each night along with the winter sky.

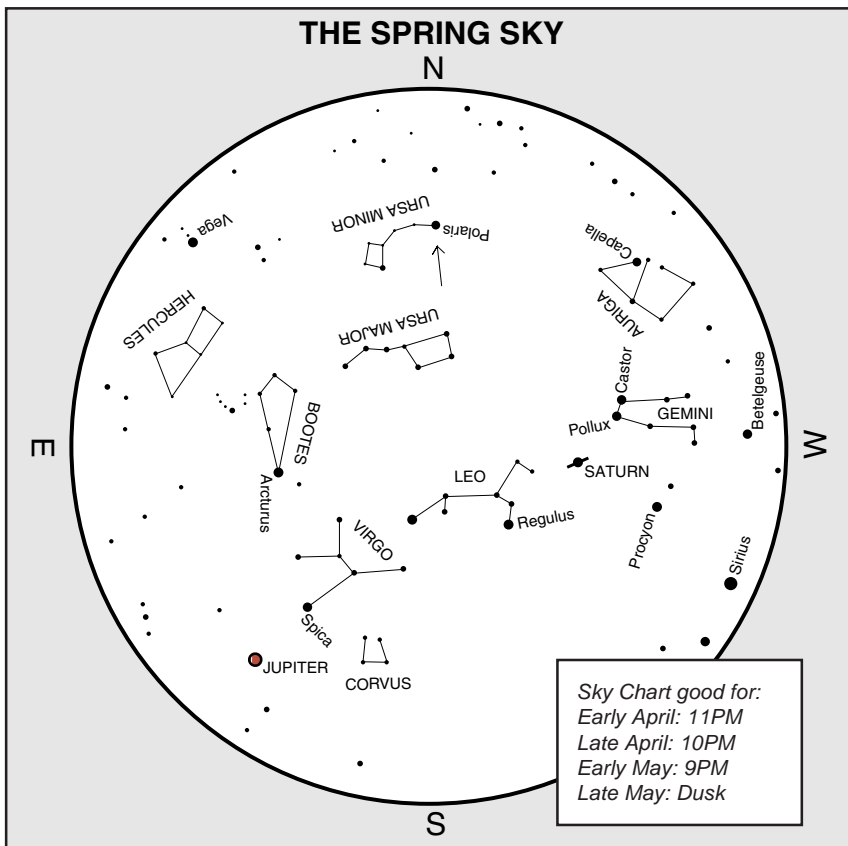
Bright Jupiter continues to rise earlier in the late night hours above the eastern horizon in Virgo. Jupiter rises by 8:45 p.m. during early April, and rises earlier and gains altitude all spring long. The thick waning gibbous Moon can be found rising along Jupiter at around 8:30 p.m. on Friday night, April 14.

The brilliant planet Venus is our 'morning star' this spring. As Venus is now receding from Earth it shrinks in apparent size in a telescope. In early April Venus appears in a quarter phase but shrinks to a gibbous phase later in the spring. To the unaided eye Venus appears as an intensely bright white star that does not twinkle. Finally look for the waning crescent Moon to rise close to Venus on the morning of Monday, April 24.

Elusive Mercury has one of its best apparitions of the year for the Southern Hemisphere in April, but is very low in the eastern morning twilight for Northern Hemisphere viewers. Not only it is very low, but very faint so the best chance to see Mercury will be in binoculars and low power telescope far below and 'left' or east of brilliant Venus. In a telescope Mercury will appear as a multi-colored star like object of about first magnitude in brightness.

Visitors to Flandrau's 16-inch telescope should note that the planets Mars and Saturn are the only planets visible in the telescope this April, while Jupiter will also be visible by May (after 8:30 p.m.). Flandrau's main exhibit hall and planetarium have been temporarily closed since September 6th but the telescope remains open, weather permitting Wednesday through Saturday nights (excluding select holidays). The telescope normally is open from 7-10 p.m.

Finally, remember that in spotting planets there is a general rule: 'stars twinkle, planets don't'. This is because stars are point sources of light; therefore starlight is easily disturbed and shifted by air currents in the Earth's atmosphere. However, when looking at Mercury right now, it may appear to twinkle somewhat; however, this twinkling is of a slower nature than the bright stars.



Resources

SPRING STARS

The Big Dipper is easy to find this spring in the northeast evening sky. Look for the Big Dipper high in the northeast 1-2 hours after sunset. Take the two ends stars off of the bowl (the Pointer stars Dubhe and Merak) and point to Polaris, the North or Pole Star. Polaris is a star of ordinary brightness, and marks the end of the handle of the Little Dipper. Polaris is a direct indicator of latitude and so is always found the number of degrees above the northern horizon equal to an observer's latitude. In Tucson look for Polaris 32 degrees (about 3 fists) above the northern horizon. Polaris stays put in the sky, so to the eye it doesn't appear to move. This is because Earth's axis is pointed towards Polaris in space.

The bright stars of winter are still visible in the evening spring sky, but set in the west earlier each night as we move later into spring. Look for Orion, the Hunter, and his shimmering belt of "three stars in a row" to find other sights in the sky. Orange Betelgeuse, the shoulder of Orion the Hunter, shines upper left of Orion's 3 glittering belt stars with blue white Rigel lower right. The Gemini Twins, the bright stars Castor and Pollux, twinkle left (east) of Orion. Take Orion's belt and point left to Sirius, the brightest star in all the heavens. Sirius is the nose of the Greater Dog (Canis Major), a companion to Orion in the heavens. By early and mid April, as the winter constellations set earlier in the west, Betelgeuse will be found directly above Orion's belt with Rigel below.

What's new?

Flandrau currently closed for renovation until September 2006

"*Flandrau Beyond Tomorrow*" is the newest phase in the evolution of the University of Arizona's most visionary project to date: the University of Arizona Science Center project in downtown Tucson. This new phase will actively involve community members in the design of exhibits, programs, and theater experiences for the new facility through participation in brainstorming sessions, collaborative discussions, and testing of new exhibits and programs.

Beginning in September of 2005 and continuing through the next few years, Flandrau will enter an innovative phase of community engagement in order to learn more about what regional communities want from and can offer to the new Science Center. As part of this process, the Flandrau Science Center building on the University campus suspended regular operations on September 6, 2005 and will re-open September 1, 2006. When it re-opens, the Center will be a living and working laboratory designed to offer the ultimate in sensory exploration with a set of prototype exhibits and planetarium programs for the public to experience and evaluate. For more information, see the Flandrau web site at: <http://www.flandrau.org>

The University of Arizona Mineral Museum will remain open this fall and winter by appointment only and is accepting school groups for visits: Call 520/621-4227 during normal business hours for information and details.

Also, the Flandrau telescope will remain open for viewing from 7-10 p.m. Wednesday-Saturday, weather permitting, during the temporary closure of Flandrau's main building. Flandrau's 16-inch observatory telescope is the only free public telescope open on a regular basis in the state of Arizona.

Finally, a special event on the UA mall in front of Flandrau Science Center with solar and night telescope viewing this April include "*Telescopes for Telethon*" on Saturday April 29 (from 3-10 p.m.). "*Telescopes for Telethon*" benefits the Muscular Dystrophy Association (MDA). During this event the planets Mars, Saturn and Jupiter will be visible, weather permitting. See the Flandrau web site at <http://www.flandrau.org> for more details about these interesting events!



<http://samec.lpl.arizona.edu>

The *SAMEC Newsletter* is published by the University of Arizona *Science and Mathematics Education Center*, with support from the departments of *Mathematics* and *Planetary Sciences*, and the *UA/NASA Space Grant Program*. The newsletter is distributed in the spring and fall and carries articles, information and notices of interest to the science and mathematics K-12 teaching community in the state of Arizona. Address all correspondence to:

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**SAMEC Outreach
Newsletter**

News and Information from the University of Arizona Science and Mathematics Education Center. SAMEC is hosted by the College of Science and the Lunar and Planetary Laboratory located in the UA Sonett Space Sciences Building.



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**"Nature of Light" Workshop for Middle and High School
Science Teachers July 2006**

Not so long ago in a galaxy not so far away. . .

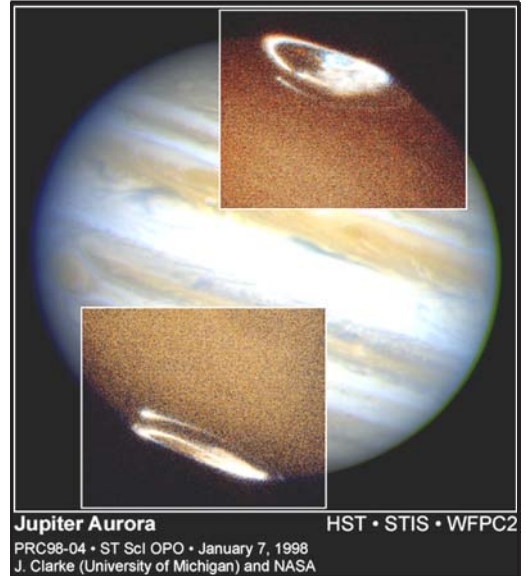
. . . the Hubble Space Telescope was born, ready to peer into the vast unknown, offering mankind a peek at our ancient Universe.

The *Nature of Light* Workshop for Teachers is designed to explore planetary phenomena through the Hubble Space Telescope. Highlights of the planetary science observations with Hubble Space Telescope (HST) have changed our understanding of the physics of planetary atmospheres and beyond.

Unlike ground-based telescopes, Hubble was designed to observe near-infrared and ultraviolet light. Hubble's extremely high resolution and sensitivity have made unique observations of objects with the Solar System possible. Hubble's "eyes" have seen unprecedented detail in Jupiter's auroras. Auroras can be seen at both Jupiter's poles but only in ultraviolet light.

For the application and more information visit our website at:

<http://samec.lpl.arizona.edu/profdevelopment/light.html> or contact samec@lpl.arizona.edu



Jupiter Aurora HST • STIS • WFPC2
PRC98-04 • ST Sci OPO • January 7, 1998
J. Clarke (University of Michigan) and NASA

The Hubble telescope has captured a complete view of Jupiter's northern and southern auroras. Images taken in ultraviolet light show both auroras, the oval-shaped objects in the inset photos (Image courtesy of John Clarke, University of Michigan, and NASA).

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