

Winter 1-1-2009

## The Scientist, Winter 2009

San Jose State University, College of Science

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**Inside this issue:**

Message From the Dean	1
Special Gathering at the Dean's Home	1
SJSU Botany Garden Makeover	2
HAMI-SJSU-SCRIBE Program	4
Master of Biotechnology Program	5
Study Abroad Summer 2009	6
Biological Oceanography	7
Invertebrate Zoology	7
Phycology	8
Dr. Gilles Muller Receives the Dreyfus Foundation Teacher-Scholar Award	8
Teaching Open Source Software	9
Top Rated Job: Mathematician	10
Precalculus Workshops	10
News From Physics and Astronomy	11

## MESSAGE FROM THE DEAN

Dr. J. Michael Parrish



Friends of the College of Science:

The economy is on everyone's mind these days, and the uncertainties in the California state budget continue to make front page headlines. You may wonder how are these economic events affecting San José State and the College of Science in particular. Our campus has experienced explosive growth in the past two years, and we are currently about 14% over our enrollment target set by the chancellor's office. This target number is extremely significant because it represents the funding level provided by the CSU system for state support of California resident students. In-state tuition covers 30% of a student's educational costs. This year,

we have had to call on virtually all available resources to provide instruction to all matriculated students.

For 2009-2010, the CSU system and SJSU specifically have been declared as impacted, which means that for the first time all eligible students will not be admitted to the university. Those most likely to be impacted will be entering frosh or transfer students who reside outside of SJSU's service area of Santa Clara County. We are proud of our record of access to all students, so this will be a difficult change for the campus. However, impaction has been mandated by the CSU system, and it should allow us to offer quality instruction to stu-

dents who are currently enrolled.

On a more optimistic note, this year I have been part of a campus wide task force to look at ways to more effectively embed sustainability in our curriculum and our practices as a campus. An emphasis on sustainability is one of President Whitmore's top initiatives, and it provides a wonderful opportunity for partnerships to develop across colleges, and between the university, city and regional governments, and the growing green tech industry in the valley. I should have more to report on this emerging topic in the next newsletter.

*Dr. J. Michael Parrish*

## SPECIAL GATHERING AT THE DEAN'S HOME

BY DEAN PARRISH

Science is increasingly moving towards interdisciplinary approaches, which calls for better communication among departments. To that end, my wife Karen Giles and I held the first-ever college-wide potluck for tenured and probationary faculty on Saturday, Feb. 7<sup>th</sup> at our house. About 60 faculty and families attended, representing all of the CoS departments, and the weather cooperated to allow all to enjoy the brief respite from clouds and rain. I don't know if any new projects were hatched, but those attending seemed to enjoy mingling with their peers from other departments, many of which they had never met previously.

NEWS FROM THE DEPARTMENT OF BIOLOGICAL SCIENCES

***THE SJSU BOTANY GARDEN MAKEOVER:  
Volunteers gather from around campus and  
San José to clean-up and restore SJSU's home  
for native plants***

By Dr. Nishi Rajakaruna & Suzie Woolhouse

The SJSU Botany Garden is one of a handful of green spaces in the city of San José dedicated to California's native plants. The Garden had its origins in the mid 1980s when a lawn outside Duncan Hall was cleared and converted to a home for native plants and a habitat for wildlife. Over the years the Garden has been cared for by students, staff, and faculty of the Department of Biological Sciences and the now disbanded SJSU Botany Club. The Garden has served as a natural laboratory for a number of courses, including *Plant Biology* (Biology 1), *Plant Taxonomy* (Botany 104), *Plant Morphology* (Botany 105), and *Plant Communities of California* (Botany 165). Whether learning the basics of plant biology or studying the reproductive biology of native species, the Garden—located outside the Department of Biological Sciences (Fig. 1)—provides easy access for students.



Fig. 1: The SJSU Botany Garden outside Duncan Hall

Over the years the Garden has become somewhat overgrown (Fig. 2), providing habitat for wildlife in the middle of the city as well as a quiet, secluded place for studying between classes. However, it has also provided a haven for unsavory activities ranging from drug-use to vandalism. The majority of signs providing botanical information for species had been trampled and broken, and the garden had become littered with cigarette butts, beer cans, bottles, clothing, pipes, and even syringes and condoms (Fig. 3).



Fig. 2: Many plants in the Garden were overgrown or covered with weedy vines



Fig. 3: Just a few items discovered during the clean-up effort

Because the Garden serves as an outdoor laboratory for teaching and a model display of our native plants, it was important to restore the Garden and come up with a plan to maintain it over the coming years. With help from past and present faculty including Dr. Wayne Savage, former Chair of the Department of Biological Sciences; Dr. Pat Pizzo, former Professor of Engineering; Kevin Bryant, the president of the Santa Clara Valley chapter of the California Native Plant Society (CNPS) (<http://www.stanford.edu/~rawlings/blazcon.htm>); and Christian Bonner from Our City Forest (<http://www.ourcityforest.org/>)—among many other volunteers—we began planning how best to restore the Garden.

Over a period of two days in December, nearly 60 volunteers came together to help clean-up the Garden. The effort began with a pruning workshop offered by Christian Bonner from Our City Forest (Fig. 4). During the workshop, volunteers learned the basics of pruning woody plants



Fig. 4: Christian Bonner conducting the pruning workshop for SJSU students and other volunteers

and the ways Our City Forest contributes to greening our city. Over the course of the two days, volunteers participated in pruning, raking, weeding, and lugging piles of debris to compost bins provided by Dennis Suit and the SJSU's Grounds Crew (Fig 5). Dennis and Christian graciously provided us with the bulk of the tools needed to achieve this effort.

This volunteer effort brought together past and present faculty and staff of the Department of Biological Sciences, students from Biology, Environmental Studies, and Geology, members of the co-ed service fraternity Alpha Phi Omega, members of CNPS and Our City Forest, and a few master gardeners from the Bay Area (Fig.

(Continued on page 3)

## THE SJSU BOTANY GARDEN MAKEOVER

(Continued from page 2)

6). Everyone had fun, learned something new, and most importantly, made important



Peruvian Lily, *Alstroemeria* in the Botany Garden, 2003

personal and professional connections within the SJSU community and with botanically inclined citizens of the Bay Area. Freshmen who had just completed Biology 1 (*Plant Biology*) worked alongside seniors from Botany 165 (*Plant Communities of California*) and graduate students from the Departments of Biological Sciences and Environmental Studies. It was wonderful to see so many students, staff, faculty, and community members sharing and learning from each other. The effort also provided an important occasion for students with interests in botany to make profitable connections with members of CNPS. Suzie Woolhouse, senior in Environmental Studies and co-organizer of this collaborative clean-up effort, was offered a position on the board of CNPS; Suzie will be the first board member for CNPS serving in the capacity of student liaison. Both Suzie and Mike Fong, an incoming graduate student in Plant Biology, were also recent recipients of CNPS scholarships to attend the CNPS 2009 Conservation Conference: Strategies and Solutions (<http://www.cnps.org/cnps/conservation/conference/2009/>).



Fig. 5: Volunteers worked for two days to clean-up the Botany Garden

Over the Spring Semester, Suzie Woolhouse and Brittany White, a recent Biology 1 student, will intern with Dr. Nishi Rajakaruna, new faculty member in Plant Biology, and Jenny Cross, Plant Biology Technician, to help make the Garden a better tool for education and a safe-haven for native plants on campus. Their tasks will include bringing in approximately 20 new native species to the Garden through propagating and transplanting, creating and updating interpretive signs for the Garden, working on a website and pamphlet to inform the public and students about the species in the Garden, organizing monthly weeding sessions to maintain the Garden, working on lesson plans or docent programs that can be incorporated into Garden tours and other outreach activities, and finding ways to establish better links between students of botany and the outside botanical community. They will also look into raising funds to install an iron fence with an appropriate botanical theme to replace the dilapidated, white plastic fence currently separating the Garden from the adjoining soccer field. If you are interested in getting involved in the upcoming activities of the SJSU Botany Garden, please contact Dr. Nishi Rajakaruna ([Nishanta.Rajakaruna@sjsu.edu](mailto:Nishanta.Rajakaruna@sjsu.edu)) or Suzie Woolhouse ([szwoolhouse@yahoo.com](mailto:szwoolhouse@yahoo.com)).

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Fig. 6: A group of volunteers after the clean-up on Day 1

## HHMI SJSU-SCRIBE Program By Dr. John Boothby

Fall 2008 marked the first semester of the Howard Hughes Medical Institute grant (PI Julio Soto, Co-PIs Susan Lambrecht and Cleber Ouverney) to fund curriculum development and support undergraduate students to carry out independent research at SJSU. The overall goals of the program - known as SCRIBE (Support for Curriculum and Research, Inquiry-Based Enhancement) - are to engage students in research over two years, have them present posters at scientific meetings, and be better prepared for applications to Ph.D. and/or Medical Schools. The eleven students selected in this first cohort had an average GPA of 3.74 and they come from the Departments of Biology, Chemistry, and Justice Studies (Forensic Science). Students receive a stipend and some funding for traveling expenses to present at conferences and laboratory reagents and/or equipments.

### 2008-2010 SCRIBE Students and Mentors – First COHORT

Student	Department
Maria Bangal	Biology
Thomas Burke	Biology
Jason L. Choi	Biology
Natisha Crittenden	Biology
Douglas Fox	Chemistry
Helen Gravilova	Biology
Andrew J. Ingram	Chemistry
Philip Knezevich	Biology
Brian Kwong	Biology
Katherine Lai	Biology
Clarissa Trogdon	Justice Studies

### Research Summary of the Laboratories Involved:

#### The Abramson Lab (Immunology)

Research with focus on mucosal immunity: 1- Pathogenesis strategies applied by *Bordetella pertussis* that trigger tolerance in host. 2- Analysis of circulating immune cells with gut homing surface molecules as a tool to follow the course of inflammatory bowel diseases. <http://www.biology.sjsu.edu/facultystaff/tabramson/tabramson.aspx>

#### The d'Alarcao Lab (Organic Chemistry)

Our research applies the tools of organic chemistry to solving problems in biology and medicine including exploring new approaches to cancer therapy, diabetes therapy and drug delivery.

<https://ncs.science.sjsu.edu/helpdesk/directory/profile.asp?id=662>

#### The Honda Lab (Entomology)

The three main research interests in my lab are: 1) Use and development of molecular markers for phylogenetics, taxonomy, and population genetics (particularly insects); 2) Forensic entomology (both field studies investigating important insects associated with human remains and use of molecular markers for insect species identification); and 3) Insect ecology and bionomics (particularly in the areas of applied entomology [urban, medical, and agricultural entomology], and insect behavioral ecology).

<http://www.biology.sjsu.edu/facultystaff/honda.aspx>

#### The Lambrecht Lab (Botany)

Research in my lab focuses on impacts of global change, including climate change and exotic species invasions, on native plant physiology, reproduction, conservation, and diversity.

<http://www.biology.sjsu.edu/facultystaff/lambrecht/slambrec.aspx>

#### The Lee Lab (Forensic Science)

We develop sensitive genetic tests to be applied in forensic identification of criminals, especially for low volume samples and samples that have undergone degradation.

<http://www.sjsu.edu/justicestudies/faculty/lee/index.htm>

#### The Muller Lab (Inorganic Chemistry)

We use circularly polarized luminescence to understand (i) the enantioselective recognition of biomolecules (i.e. amino acids) and (ii) the relationships between the chiral structures of proteins and their ability to bind metal ions.

<http://www.chemistry.sjsu.edu/gmuller/>

#### The Ouverney Lab (Microbiology)

Students in my lab investigate the microbial ecology of emerging human pathogen models by type and function through culture-independent modern molecular techniques. <http://www.biology.sjsu.edu/facultystaff/ouverney.aspx>

Questions should be addressed to Cleber Ouverney, Email: [ouverney@email.sjsu.edu](mailto:ouverney@email.sjsu.edu) Phone: 408-924-4806

(Continued on page 5)

## HHMI SJSU-SCRIBE PROGRAM

(Continued from page 4)

### The Soto Lab (Cell Biology)

My research lab is working in identifying, cloning, and expressing disintegrins involved in inducing apoptosis of cancer cells. In addition we are investigating mRNA sequence elements involved in mRNA localization, anchorage, and stability in the early embryo. <http://www.biology.sjsu.edu/facultystaff/soto/soto.aspx>

### The VanHoven Lab (Genetics)

The focus of my research is to understand the molecular and genetic mechanisms by which neurons identify the correct partners and form appropriate synaptic connections during the development of the nervous system.

<http://www.biology.sjsu.edu/facultystaff/mvanhoven/mvanhoven.aspx>

### The B. White Lab (Molecular Biology)

Notch is an inducible transcription factor that plays important roles in a large number of cellular processes including cell growth, differentiation, and maintenance of terminal cell types. Notch has also been implicated in leading to a number of human diseases including cancer (leukemia, breast, and prostate), CADASIL, Allagilles syndrome, and Alzheimer's disease. The White lab works on understanding the regulation of Notch signaling in both normal and diseased states.

<http://www.biology.sjsu.edu/facultystaff/white.aspx>



*Dr. VanHoven, Dr. Soto, Dr B.White and Dr. Ouverney with some of the new HHMI SJSU-SCRIBE Students*

## MASTER OF BIOTECHNOLOGY

By Dr. Sally Veregge

The Professional Science Master of Biotechnology Program (MBT) was established at San José State University in 2003 with the help of a grant from the Sloan Foundation, awarded to three faculty members in the College of Science's Department of Biological Sciences (William Murray, Chris Brinegar, and Sally Veregge). The program is unique in that it integrates advanced, hands-on laboratory courses with business and professional development courses and an industry internship to prepare graduates for a variety of jobs in the biotechnology and pharmaceutical industries.

Graduates hold positions in research, product development, project management, marketing, market analysis, sales, quality, regulatory affairs, and clinical affairs. They are employed in many companies including Genentech, Abbott, Roche, Applied Biosystems, Agilent Technologies, Affymetrix, Frost and Sullivan, Illumina, and others.

The Program has graduated 62 students, 95% of whom have gained jobs in the biotechnology or pharmaceutical industries. The MBT Program is one of about 100 Professional Science Master's Programs started across the country with the support of the Sloan Foundation. For more information about Professional Science Masters, go to [www.sciencemasters.com](http://www.sciencemasters.com).

For more information about San José State's MBT Program go to [www.science.sjsu.edu/mbt](http://www.science.sjsu.edu/mbt) and contact [sveregge@email.sjsu.edu](mailto:sveregge@email.sjsu.edu).

Pictured below (left, front) is Jarred Lyons, an MBT student, and his industry mentor, Don Peters of BD Biosciences (left, 2nd row). Jarred graduated in 2008 and is now a marketing professional in a biosciences company on the East Coast.



## STUDY ABROAD SUMMER 2009

### SUMMER 2009 IN NEW ZEALAND AND AUSTRALIA

By Dr. Shannon Bros-Seemann



The program has two components, Ecology/Conservation and Culture, which may be taken together or students may elect to take only one component. The purpose of the courses is to introduce students to the rich culture and biodiversity of New Zealand and northeastern Australia. Even though the two countries are separated by a relatively narrow body of water, they are distinct and have unique heritages. The Maori are the indigenous Polynesian people of New Zealand, while the Aboriginal people are indigenous to Australia. However, both countries have been heavily influenced by other nations, and their populations today are also comprised of Europeans, Asians, Pacific Islanders, and others. The two countries also have very different plants and animals. By offering the courses together and visiting the same sites with all the students, we hope to provide a wonderful introduction to the diverse human and natural worlds of these two amazing places.

**Program Dates:** June 1- June 22

**For more information visit:** [http://www.sjsu.edu/depts/studyabroad/students/flp\\_australia\\_newzealand.htm](http://www.sjsu.edu/depts/studyabroad/students/flp_australia_newzealand.htm)



### AN AMAZONIAN ADVENTURE

By Dr. Cleber Ouverney  
Professor of Biological Sciences



In the summer of 2008 Assist. Professor Cleber Ouverney from the Biology Department organized a Faculty-Led Program to the Amazon Forest. Seventeen SJSU participants, including faculty and students, joined the adventure over three weeks, when they explored the history, ecology, and cultural aspects of the largest rain forest on the planet.

Some activities included camping along a tributary of the Amazon River for two nights, forest walks, swimming with Amazonian dolphins, visiting an Indigenous tribe, meeting with scientists from three academic institutions, watching an outdoor opera, and eating lots of exotic foods. Upon returning to the USA the students had to write a report on their personal journey. One student wrote: *"As I ponder upon those experiences, I am grateful that I had the chance to be in the Amazon. I not only had a wonderful time, but also learned much about a new culture and about myself. The Amazonian experience surely was a great life experience."* Dr. Ouverney is currently recruiting for a second trip in the summer of 2009. **Applications are due soon.**

For more information, go to [http://www.sjsu.edu/depts/studyabroad/students/flp\\_amazon.htm](http://www.sjsu.edu/depts/studyabroad/students/flp_amazon.htm). You may also contact Dr. Ouverney directly by phone 408-924-4806 or email [cleber.ouverney@sjsu.edu](mailto:cleber.ouverney@sjsu.edu).



## NEWS FROM MOSS LANDING MARINE LABS

### INVERTEBRATE ZOOLOGY



Dr. Jon Geller

Dr. Geller has published one new paper, and two are accepted or in revision. "Pathways of invasion of a northeastern Pacific acorn barnacle, *Balanus glandula* Darwin 1854 in Japan and Argentina" was published in Marine Ecology Progress Series. "Genetic patterns across multiple introductions of the globally invasive crab genus *Carcinus*" has been accepted at Molecular Ecology, while "The distribution of benthic invertebrate communities at three seamounts off Southern and Central California, USA" (from the thesis of lead author Lonny Lundsten, former Invertebrate Zoology lab member) is in revision for Marine Ecology Progress Series.

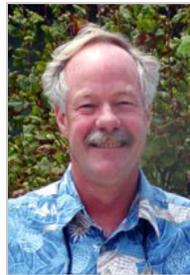
Graduate students in the Invertebrate Zoology lab are making progress on thesis research topics Erin Jensen is studying the role of environmental complexity on learning in *Octopus*; Amanda Kahn is studying reproduction and recruitment of deep sea sponges; Shelby Boyer's project is on zooxanthellae-coral interactions; Heather Hawk is investigating the genetics of threatened populations of abalone; Tommy Knowles' project in the potential consequences of climate change for jellyfish development; and Hilary Hayford is continuing her studies of thermal ecology of intertidal limpets.

In 2008, the Invertebrate Zoology lab concluded a study of cryptic invasive species of bryozoans and an investigation of quantitative PCR as applied to the enumeration of larvae in plankton. A major new project is an investigation of genetic diversity and cryptic species in exotic sponges of the genus *Halichondria* in California. This work is funded by the California Department of Fish and Game. Dr. Geller also joins colleagues from UC Berkeley and the Smithsonian Institution in a DNA bar-coding project on the French Polynesian island of Moorea. Dr. Geller's component of this Moore Foundation funded project is the invertebrate larvae in plankton- he will be sequencing larvae in parallel with ongoing bar-coding of adult reef invertebrates.

The major fieldwork on this project will occur in late October. Finally, Drs. Geller and Welschmeyer have received funding from the National Oceanographic and

Atmospheric Administration for a project to provide physiological verification of viability assays that are being considered for federal and state ballast testing regulations.

### BIOLOGICAL OCEANOGRAPHY



Dr. Welschmeyer

Dr. Nick Welschmeyer and the Biological Oceanography Lab are currently working on several funded research projects. Welschmeyer recently attended the California Prevention First conference (Sept. 9-10, 2008) where he presented an overview on regulatory ballast treatment testing protocols, "Ballast

Tank Organisms: Wanted Dead – NOT Alive". Welschmeyer continues active participation in technical panels for the California State Lands Commission (CSLC) and NOAA concerning regulations for ballast treatment systems.

Graduate student, Chris Scianni, completed his thesis last semester titled, "Oxygen-based validation of a new dilution protocol for microzooplankton grazing rates". Chris now works full-time for the California State Lands Commission (Sacramento) regulating aquatic invasive species in California.

Sara Smith completed her Masters thesis presentation this semester titled, "Flow cytometric analysis of phytoplankton community structure and viability in Elkhorn Slough CA". Sarah is now in the Ph.D. program in biological oceanography at Scripps.

Greg Rau, Steve Bollens and Welschmeyer have prepared the first draft manuscript describing their study of CO<sub>2</sub> as a potential biocide for ballast treatment technology; CO<sub>2</sub> could be potentially recycled from ships' engine exhaust for this purpose. The results so far bear directly on understanding current oceanic CO<sub>2</sub> acidification problems.

Welschmeyer completed work with Kevin Arigo (Stanford University) on physiological aspects of dominant Antarctic phytoplankters, *Phaeocystis antarctica* and *Fragilariopsis cylindrus*; two papers were submitted for publication this summer summarizing this work.

## NEWS FROM MOSS LANDING MARINE LABS

### PHYCOLOGY



*Dr. Mike Graham*

Lots of activity has occurred within the Phycology Lab since the Spring 2008 Governing Board meeting. Jenn Jorve successfully defended her MS thesis on the microclimate under intertidal algal canopies and began her PhD at the University of British Columbia, Aurora Alifano defended her MS thesis on the effects of drift kelp on intertidal sea urchin populations, and Max Overstrom-Coleman Selena McMillan, and Rose Romero are soon to follow.

Three new students joined the Lab (Brynn Hooton, Sara Hutto, and Sonya Sankaran), and Kyle Demes returned from a summer Smithsonian Fellowship in Fort Pierce Florida. SJSU undergraduate student Sam Rivera traveled to Chile with Dr. Graham to study the effects of salmon farming on seaweed nutrient uptake and CSUMB undergraduate Gabe Rodriguez was awarded an NSF Fellowship and is now enrolled in the PhD program at UC Santa Barbara. The current lab supports a total of 1 undergraduate and 10 graduate students.

This summer, Dr. Graham traveled to Japan to chair an international workshop on the causes and consequences of kelp deforestation. Dr. Graham and his graduate student Arley Muth also initiated a 4-year NSF-

funded study of the effects of climate change on kelp recruitment. As part of the project, Dr. Graham participated in an NSF funded TV series to air on the Science and Research channels discussing future climate effects on ocean systems.

Dr. Graham and his graduate student Thew Suskiewicz also began a 3-year study to develop methods of strain selection and preservation of seaweeds in relation to ongoing collaborative activities in seaweed/abalone aquaculture, including the novel technique of kelp silage. Dr. Graham was also part of a collaborative NASA proposal to study the effects of climate change on kelp systems using satellites and ocean circulation models. Finally, Dr. Graham is missing the Fall Governing Board because he is traveling in Chile to collaborate on a 4-year grant from the Chilean government to study the dynamics of Chilean kelp populations with former MLML visiting scientist Dr. Alejandro Buschmann.

In addition to serving as associate editor for Ecology/Ecological Monographs, Journal of Phycology, and Encyclopedia of Ecology, Dr. Graham is working on revisions of a book submitted to University of Chicago Press ("Natural History: Timeless Readings Of Adventure, Discovery And Science") with Joan Parker and Dr. Paul Dayton, he submitted three papers for review, and published three papers. Finally, in June, Dr. Graham was accepted as a Fellow to the California Academy of Sciences.

## NEWS FROM THE DEPARTMENT OF CHEMISTRY



*Dr. Gilles Muller*

### THE 2008 DREYFUS FOUNDATION'S TEACHER—SCHOLAR AWARD GOES TO....

Dr. Gilles Muller. He is the recipient of one of the highly competitive Henry Dreyfus Teacher-Scholar awards issued by the Camille and Henry Dreyfus Foundation, which is dedicated to the advancement of the chemical sciences. To learn more about this award, go to: [http://www.dreyfus.org/awards/henry\\_dryfus\\_teacher\\_award.shtml](http://www.dreyfus.org/awards/henry_dryfus_teacher_award.shtml).

The award comes with an unrestricted research grant of \$60,000. Congratulations to Dr. Muller for this outstanding recognition of his roles as an outstanding teacher and mentor for undergraduate scholarly research!

## DEPARTMENT OF COMPUTER SCIENCE

### TEACHING OPEN SOURCE SOFTWARE

by Cay Horstmann

In the last few years, *open source software* has risen from relative obscurity into an important force in software development, and it is changing the way in which we teach computer science. As the name indicates, open source software comes with the source code so that anyone can study how it works. To be truly called “open source”, it must also come with a liberal license that allows anyone to modify the code and to distribute the modifications.

Open source started in the 1980s, when early visionaries became disenchanted with the unwillingness of commercial vendors to make improvements to their programs, either to further their commercial interests or simply because it wasn't worth their trouble. I remember when Richard Stallman, a fiery revolutionary with long hair and an unkempt beard visited SJSU late in the '80s. He told us about the “four freedoms” of software and how users were fools to put their trust (and money) into proprietary software. I thought he was crazy. At the time, I ran a small software company that produced a nifty DOS program for editing scientific documents, and I wasn't about to give the source code away. Well, Stallman was right. A few years later, my company went under, stranding its users, and those who instead opted the open-source TeX program were looking pretty smart.

Open source software is usually free of charge, but for the more complex offerings, you are wise to get a service contract to maintain or host it properly. This financial freedom, however, is not as important as the freedom to use the software as you wish. Commercial software vendors increasingly control what you can do with their products and when you can do it. Consider for example the hassle of the “Windows Genuine Advantage” mechanism that cripples your machine when Microsoft no longer believes that you properly licensed it (perhaps after a motherboard upgrade). Or, my latest iPod that I can load up music and podcasts from any source, as long as that source is iTunes—which doesn't even run on my favorite operating system.

It took a long time for open-source contributors to assemble a critical mass of software, but now there is an abundance of programs, from operating systems to databases, word processors, and web browsers, not to mention huge numbers of highly specialized tools. Re-

markably, much of this software is written not by wild-eyed revolutionaries but by commercial enterprises that see the benefit of a common software infrastructure.

How does this affect the teaching of computer science? First, we now have at our disposal a large collection of excellent tools at no cost. In a beginning class, I teach Java (an open-source programming language) using Eclipse (an open-source development environment). In my software engineering course, I use open-source tools for databases, build and test automation tools, project management, and documentation. What about quality? Now the closed-source products are the primary cause for pain, such as when Alice is buggy on Macs or the Blackberry emulator crashes on Vista. In the area of development tools, most closed source software has been eclipsed by superior open source alternatives.

More importantly, open source programs are an ideal vehicle for teaching how to work with large amounts of code and internationally dispersed software teams. That is what we do in our experimental class on open source development, a combined offering for senior undergraduates and graduate students (who get to work a bit harder). Students learn how to build and improve complex projects, and how to have their improvements accepted by the community. In addition, they learn about the legal and business aspects of open source software.

I offered this course for the first time in Fall 2007, and again as part of the summer school in Yverdon, Switzerland, where students from Swiss and American universities spend three weeks to learn about cool computer science topics. The course will again be offered in Spring 2009.



The open source course in Yverdon, Switzerland, Summer 2008

## NEWS FROM THE DEPARTMENT OF MATHEMATICS

### **MATHEMATICIAN, THE TOP RATED JOB ACCORDING TO THE 10 BEST JOBS IN AMERICA TODAY** by Tony Lee ( [www.CareerCast.com](http://www.CareerCast.com) )

Remember that kid in elementary school who always had a pencil and calculator nearby, and while the rest of us drew pictures, read comic books or played cards, that kid was happily crunching numbers -- for fun. Fast forward 20 years or so, and it turns out that kid probably has one of best careers around today, according to an exclusive new study of the nation's best and worst jobs.

Compiling research on 200 different positions, this year's JobsRated.com report ranks mathematician as the country's best job, followed by actuary and statistician -- three jobs for which a calculator and solitude are prerequisites. On the opposite end of the spectrum, the Monty Python troupe made famous the song, "I'm a lumberjack and I'm OK." Unfortunately, our study finds that lumberjacks have the nation's worst job, followed by dairy farmers and taxi drivers, which seems to bear out the old grade-school adage that "it's better to earn a living with your head rather than with your hands."

Of course, it doesn't take much effort to determine that mathematician is a more attractive job to most people than lumberjack. But ranking 200 jobs from best to worst is no easy feat. To compile this year's report, researchers relied on five criteria to compare jobs as different as librarian and sheet metal worker. Those criteria: stress, physical demands, hiring outlook, compensation and work environment (for more info on scoring, visit [http://www.careercast.com/jobs/content/JobRated\\_Methodology](http://www.careercast.com/jobs/content/JobRated_Methodology) ).

If advanced equations aren't your strong suit, however, there are plenty of other jobs that score well, too. After the top three math-oriented careers, the rest of the top 10 read like a who's who of well-educated professions:

#### **1. Mathematician**

Applies mathematical theories and formulas to teach or solve problems in a business, educational, or industrial climate.

#### **2. Actuary**

Interprets statistics to determine probabilities of accidents, sickness, and death, and loss of property from theft and natural disasters.

#### **3. Statistician**

Tabulates, analyzes, and interprets the numeric results of experiments and surveys.

See <http://www.careercast.com/jobs/jobsRated> for the remainder of the article.

Also see:

[http://www.math.sjsu.edu/math/announcements\\_092/best\\_job.htm](http://www.math.sjsu.edu/math/announcements_092/best_job.htm) for more information about careers related to mathematics.

### **PRECALCULUS WORKSHOPS**

**By Dr. Brad Jackson**

In the Fall 2008 semester the Math Department implemented a precalculus workshop Math 19W to accompany its Math 19 Precalculus course. All students registering for Math 19 Precalculus are now required to register for Math 19W Precalculus Workshop as well. Math 19 students who want to drop the Math 19W workshop must have a B or higher in Math 8 College Algebra and Trigonometry or receive a sufficiently high score on the mathematics placement exam. These students are allowed to drop Math 19W by obtaining the permission of the math office. Precalculus workshops meet one hour twice a week. In the precalculus workshops, students work on problems in small groups assisted by a workshop facilitator. Before the workshops were implemented in Fall 2006, 60% of the Math 19 students passed and 33% got A's and B's. In Fall 2008, 70% of the Math 19 students passed and 42% got A's and B's. We modeled our precalculus workshops after the highly successful calculus workshops at CSU, LA. At CSU, LA workshops raised the passing rates in the first 3 quarters of their calculus sequence from about 50% up to roughly 75%.

Professor Mani Subramaniam, who developed the system of calculus workshops at CSU, LA gave a talk in the SJSU Math Dept. colloquium last spring describing their calculus workshops and how they work. Professor Saleem is the workshop coordinator for

*(Continued on page 11)*

## NEWS FROM THE DEPARTMENT OF MATHEMATICS

### PRECALCULUS WORKSHOPS

(Continued from page 10)

the precalculus and calculus workshops at San Jose State. The workshops have been jointly sponsored by the math department and the College of Science STEP grant administered by Dan Walker and Maureen Scharberg. Starting this spring semester the Math Dept will be implementing Calculus I workshops as well. Students taking Math 30P will be required to register for Math 30W Calculus I workshop. Math 30 students can sign up for Math 30W on a voluntary basis but are not required to do so. Math 30/30P students who got a B or higher in Math 19 Precalculus are allowed to drop Math 30W Calculus I workshop after obtaining permission from the math office. Math 31W Calculus II workshops will be implemented in the fall. They will be offered to all Math 31 Calculus II students on a voluntary basis. We hope to duplicate as much as possible the success of the Calculus workshops at CSU, LA here at San Jose State.

## NEWS FROM THE DEPARTMENT OF PHYSICS AND ASTRONOMY

By Dr. Michael Kaufman

In December, past and present members of the department gathered to celebrate the retirements of Professor Joe Becker, Professor Les Tomley and technician Pat Joyce. Between them, they represented some 70 years of service to the department. Both Becker and Tomley are participating in the Faculty Early Retirement Program and will continue to be seen wandering the halls of the Science Building.

The Department is also celebrating the release of a new textbook by Professor Patrick Hamill. "Intermediate Dynamics," published by Jones and Bartlett, is written for junior-senior level physics majors, and is based on lecture notes Hamill developed while teaching Advanced Mechanics over more than 15 years. The book covers the mechanics of particles and solid bodies. For more information, see <http://www.jbpub.com/catalog/9780763757281/>

This November, Professor Alejandro Garcia traveled to Germany to attend an invitation-only workshop at Mathematisches Forschungsinstitut Oberwolfach. Traditionally referred to simply as Oberwolfach, the institute is perched on a hillside above the tiny hamlet of Oberwolfach-Walke in the Black Forest. At this week-long workshop a handful of international scientists and mathematicians gathered to discuss the topic of "Numerics for Kinetic Equations." During this same trip Prof. Garcia also visited the Filmakademie Baden-Württemberg, one of Europe's top film schools for animation, as part of his National Science Foundation project "Physics for Animation Artists."



Dr. Alejandro Garcia

Assistant Professor Monika Kress attended the conference "New Light on Young Stars: Spitzer's View on Circumstellar Disks,"



Dr. Monika Kress

where she presented a paper on the chemistry of protoplanetary disks. Conference details can be found at <http://www.ipac.caltech.edu/spitzer2008/>. Kress will give a seminar on her work to the Earth and Space Sciences Department at UCLA on February 5.



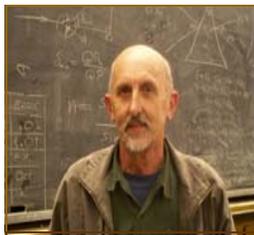
Dr. Brian Holmes

Professor and Maestro Brian Holmes' *Amherst Requiem* was premiered in November by the Stanford Symphonic Chorus, Vivace Youth Chorus, Heidi Melton, soprano; and the Peninsula Symphony. The performances, at Stanford's Memorial Church, were conducted by Mitchell Sardou Klein. Four pieces for children's chorus and piano were published by Brichtmark Music Publishing in January. *I shall keep singing!*, a work for chorus and harp, will be performed by the High School Honors Chorus at the National Convention of the American Choral Directors Association in Oklahoma City in March. Holmes has received commissions to write new choral music from the San Jose Music Study Club and The Choral Project.

(Continued on page 12)

NEWS FROM THE DEPARTMENT OF PHYSICS AND ASTRONOMY

(Continued from page 11)



Dr. Carel Boekema

Professor Carel Boekema reports that Mallory Kato, Saba Hashemi, Ruth Herrera and Janice Wong (leader & former REU-Physics student) will present their research at the 4th Annual Women in Physics Conference at USC in January. All three are members of WiSE: Women in Science & Engineering at SJSU. USC and WiSE @ SJSU are sponsors of the trip. Kato et al's presentation is entitled: "Search for predicted loop currents in GdBCO: a MaxEnt-mSR study." A manuscript is in preparation, reporting on the observed hints of these loop currents, and thus a plausible magnetic origin for cuprate superconductivity. With adjunct professor Friedemann Freund, Boekema recently carried out muon-spin research on a single MgO crystal, at the ISIS particle physics facility in the UK ( http://www.isis.rl.ac.uk/ ). The study is part of a major NASA Ames project on pre-earthquake phenomena. Cameron Teichgraber, another former REU student now working at NASA Ames, participated in the experimental run at ISIS and is a leader in the MaxEnt-mSR.

Professor Michael Kaufman taught a MUSE seminar for the first time this fall, entitled "Going to the Moon: Human Exploration Past, Present and Future."



Dr. Michael Kaufman

The interdisciplinary course covered many aspects of humanity's relation to the Moon, from mythology and calendars, through literature, science fiction and film, as well as the space race and the future exploration plans of many nations. Kaufman borrowed Apollo lunar samples from the Johnson Space Center for use in

the class, while students planned and hosted a Moon-viewing party in front of Tower Hall, with student research posters, music and telescope viewing. Kaufman also reports that the Department's Research Experiences for Undergraduates program just received funding from the NSF to carry it through this summer, it's 20th consecutive year of operation. The program provides support for student research projects, for both SJSU undergraduates and 6-8 summer visitors. For more details, see:

http://www.physics.sjsu.edu/index.php?q=node/77

The College of Science hopes that you enjoyed the Winter 2009 edition of The Scientist. We look forward to your comments or suggestions to make future issues of our Newsletter even better.

Cher Jones
Editor
sjones@science.sjsu.edu

THE SCIENTIST

Editors:

- Cher Jones
J. Michael Parrish
Maureen Scharberg

Coordinator:

- Cher Jones

Layout & Design:

- Leo Hernandez

Contributors:

- John Boothby
Shannon Bros-Seemann
Jon Geller
Mike Graham
Cay Horstmann
Brad Jackson
Michael Kaufman
Tony Lee
Cleber Ouverney
Michael Parrish
Nishanta Rajakaruna
Sally Veregge
Nick Welschmeyer
Suzie Woolhouse

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College of Science
San José State University
One Washington Square
San José, CA 95192-0099
http://www.science.sjsu.edu

Note: Past Newsletters can be viewed on website.