PAIR FINAL REPORT

California State University Northridge

P.I. Carol Shubin
November 30, 2005

The CSUN NASA Partnership Award for the Integration of Research into Undergraduate Education (PAIR) Program started May 31, 2000 and ended August 31, 2005. The program was enormously successful. This report will detail the program accomplishments and student success records.

The stated goal of the project was to implement an interdisciplinary, integrated program designed to attract, retain and expand access to research experiences for undergraduates from historically underrepresented students in Science, Mathematics, and Technology disciplines. We promised to increase the number of underrepresented students interested in pursuing graduate careers in science and mathematics. Our student tracking data clearly demonstrates that we delivered on our promise.

Faculty members worked in interdisciplinary teams to create curriculum based on their research. Students received intensive training in a highly focused environment. Students worked collaboratively on research problems that were carefully designed and mentored by the faculty.

We created six mathematics-based projects centered around analyzing data sets from NASA and other sources aimed to

1. provide an academically enriched, financially supportive program that

exposes science and mathematics majors to advanced scientific research;

2. strengthen students' research abilities, particularly analytic skills and computer proficiency, i.e. to store, access, manipulate, model, simulate, and compute with a variety of data types;

3. create and publish and disseminate a manual based on our courses.

Student Success Statistics from the CSUN PAIR Program

Ethnicity

African American	4	6%
Deaf/Disabled	2	3%
Latino	29	41%
Native American	4	6%
Other	33	47%
Total	70	

Seventy students completed the program. The numbers below list the cohorts and research assistants in the program by year. Note some students were in the cohort and research assistants at the same time, some cohort members became research assistants in the following year, some students were only in the cohort, and not all research assistants were in the cohort. Also several students were in more than one cohort.

Year 1: 24 cohort students and 5 research assistants
25% of cohort was from underrepresented groups
40% of research assistants were from underrepresented groups

Year 2: 16 cohort students and 3 research assistants
50% of cohort was from underrepresented groups
67% of research assistants were from underrepresented groups

Year 3: 18 cohort students and 5 research assistants
72% of cohort was from underrepresented groups
60% of research assistants were from underrepresented groups

Year 4: 5 research assistants**
60% of research assistants from underrepresented groups

Year 5: 6 cohort students and 15 research assistants
67% of cohort was from underrepresented groups
80% research assistants was from underrepresented groups

** We only listed the 5 students who were research assistants for more than 6 months. Some students had research assistantships which overlapped with Cohort 3 and 5. Others had short research assistantships (i.e. under two or three months). They are not listed.

Number by major

Biology	4	6%
Chemistry	1	1%
Computer Science	6	8%
Earth Science	1	1%
Engineering	13	18%
Geological Sciences	4	6%
Mathematics	28	40%
Physics	14	19%
Psychology	1	1%
Total	72	100%

Two students were double majors in Math and Physics.

Graduation Statistics

Graduated BS/ BA	58	83%
Current undergraduates	11	16%
Deployed to Iraq	1	1%
Enrolled in post-bac programs (after graduation)	46	79%
Working at technical firms or NASA	11	22%

Of those that went on to work, most said that they plan to get an advanced

degree after they made some money.

Master's Degree	Completed	In Progress
MS computer science	1	1
MS engineering	1	5
MS geography		1
MS geology/geophysics	2	1
MS math obtained	7	7
MS Physics	4	7
MS Special Education		1
Total	**15**	**23**

66% have entered MS programs

26% of those who graduated have obtained their MS degrees

40% of those who graduated are still working on their MS degrees

17% of those who graduated are Pursuing Doctorates

PhD computer science	1
PhD engineering	1
PhD molecular biology	1
PhD pharmacology	1
PhD physics	3
Total	**7**

71% of those pursuing doctorates are from underrepresented groups

Teaching credential	1	8

Note: some of the students who are working on their doctorates have obtained their MS degrees while others have not. Several students are simultaneously working on their Master's degree and teaching credential.

CSUN PAIR graduation rates far exceed the College norms. The most spectacular result of the program is seen in the number of students that continue their education past the BA and BS. We have clearly achieved our goal of preparing underrepresented students for advanced scientific work.

How was this student success achieved?

We held 11 classes, each with over 48 hours of direct instruction, during summer and intersession. These intensive classes were held four hours a day, 2 hours of lecture and 2 hours of computer laboratory work with the faculty remaining in the computer laboratory after classes. Each class led up to a student team research project which the student presented on the last day of the class. During the semester we meet for a weekly seminar of guest speakers on topics related the classes. Students received stipends and course credit for the PAIR courses.

Cohort 4, 2004-2005
[The CSUN PAIR project received a no cost extension for 6/2004-8/2005.]

1. Required Math 483 Math Modeling, held Fall 2004, TTH 11-12:15, Student project: Voice Recognition, held January 2005, Profs. Horn and Shubin.

2. Required Math 480 Partial Differential Equations, held Spring 2005, TTH 12:30-1:45, Student project: Diffusion Tensor Imaging, held June 2005, Profs Alekseenko, Horn and Shubin.

Cohorts 1-3, 2000-2004

3. Analysis of Solar Physics Data, held January 2001 and June 2002, Profs. Cadavid and Walton.

4. Global Positioning System: Theory, Data Analysis and Modeling held June 2000, January 2002 and June 2003**,** Profs. Horn, Shubin and Simila.

5. Proteomics, held in August 2001 and January 2003, Dean. Carroll and Prof. Clevenson,

6. Satellite Navigation and Orbit Determination, Held in June 2000 and August 2002, Prof. Horn, Dr. Varadi (UCLA), Dr. Shapiro (JPL)

The CSUN faculty who participated in developing the curriculum and teaching the courses include Alexander Alekseenko (Math), Cristina Cadavid (Physics), Edward Carroll (Biology and former Dean of Science of Math), Larry Clevenson (Math), Werner Horn (Math), Gerry Simila (Geological Sciences), and Steve Walton (Physics). In addition, Bruce Shapiro (JPL), Tony Freeman (JPL), Ferenc Varadi (UCLA), Ken Hurst (JPL), Greg Lygenza (Harvey Mudd and JPL) assisted in the PAIR courses. Each one made a unique contribution as a scientist and a teacher.

Required seminars

Students were required to attend two semesters of seminars which met weekly. Seminar speakers included researchers from UCLA, USC, Caltech, JPL, UCR, UCSD, Big Bear Solar Observatory, CIT, and of course CSUN. For a change of pace, we tried student working seminars, i.e. seminars where students worked through research papers (Fall 2003). We are continued this model the extension year, Fall 2004-Spring 2005. Students presented talks on their projects. We also brought in speakers from graduate schools and students

attended NASA job recruitment conferences.

Required GRE preparation

Students were required to attend three GRE sessions given by Cathy Coyle Thompson. In addition the PAIR grant paid for tuition and study materials for any GRE preparation courses, such as the Extended Learning Bobrow GRE preparation class.

Field Trips

Students went field trips to JPL and San Fernando Observatory. They visited Bahzad Bavarian's laboratory as well as Ed Carroll's laboratory and the CSUN DNA sequencing facility.

Seven students went to the PAIR Summit. I accompanied them to Washington, D.C., Virginia, and we visited Goddard Space Center. I also journeyed to Washington DC with Jose Ceja (who is now pursuing his doctorate in Physics at UCI). He presented a poster on his research in the Capital Building. He and I lobbied for increased funding to the National Science Foundation for undergraduate research and visited the offices of Howard Berman, Barbara Boxer, and Diane Feinstein. It was a thrill. (Several students attended the MAA meeting in Las Vegas this past October. Here I thought it best to let them go alone!)

Research Assistants

Another large component of the NASA PAIR project was to provide individual research experiences for students. Students had a variety of on and off-campus internships that typically lasted a year. There were expected to work

40-80 hours a month and received a stipend of $1000 per month. Research assistants are required to turn in weekly progress reports and give presentations to the other research assistants about their projects. Students were placed in projects most closely meeting their interests.

Research experiences	**Number of Students**
CSUN/ San Fernando Observatory	22
Jet Propulsion Laboratory/Goddard	9
Huntington Medical Research Institute	3
USC Bioinformatics Program Summer 2004 and 2005	5
LAUSD Middle School after school NASA Program	2

Note that some students worked at both JPL and CSUN. Details can be found in the Appendix.

Students were encouraged to enter student research competitions. I am a strong proponent of honing student presentation skills. Seminars were given on preparing posters and students gave practice talks to their fellow students. The results are quite impressive.

Student Science Competition and Student Poster/Paper Presentations

CSUN Sigma Xi	17
CSUN Student Research and Creative Works Symposium	20
Other talks/posters (off campus)	16
PAIR Summit Washington D.C.	7

Prizes

CSUN Sigma Xi

Tracy Purdam, graduate, 1st place, 2005

Modesty Briggs and Sarah Neyer, undergraduate, tied for 2nd place, 2005

Kevin Berry, undergraduate, 3rd place, 2004

Elizabeth Bell, undergraduate, 1st place, 2002

Joel Noland, undergraduate, 2nd place, 2002

Jose Ceja, undergraduate, 3rd place, 2002

Arwen Vidal, undergraduate, 1st place , 2001

Elizabeth Bell, Jose Ceja, Greg Frye, undergraduates, 2nd place, 2001

Jose Ceja, undergraduate, 3rd place, 2001

CSUN Student Research and Creative Works Symposium

John Sikora, graduate, 2st place, 2001

Tracy Purdum, graduate, 1st place, 2004

Jennifer Wright, undergraduate, 1st place, 2001

Details can found in the Appendix. Note PAIR students who won as graduate students performed their research assistantships as undergraduates. Only the presentation was given after they had graduated.

In general, we did not stress writing research papers. Unlike laboratory sciences where there is a lot of useful work that can be performed by student, mathematical research is, in general, too difficult for an undergraduate to meaningfully participate. It is extremely unlikely that even a master's degree student can lend a hand unless the work is of a numerical nature. The purpose of the NASA PAIR program was to give students meaningful research experiences in their fields and not to write papers in which they did not make a serious or

significant contribution. Nonetheless, 8 students did publish papers, see Appendix for details.

So what was the student response the program? I am pleased to say that the students thrived. Included at the end of this statement is an appendix with our student success results.

It is interesting to ask, **"Why did the students do so well?"** We did not try to select only "Star" students. Any student with over 2.0 GPA was eligible although I believe that the lowest GPA students entered had a 2.3. There is no question that the financial instinctive was a key factor. (Students received $1000 for completing a course. My guess is that it worked out to $8-10 per hour.) I think the intensive structure with the strong group interaction really helped to pull the weaker students along. There was a strong faculty concern for the students built up by the long work hours together. I think that the students felt that their success was important to the faculty.

When we selected groups of students to work together we tried to pair up "like-learners." We had high expectations of all groups of students, but given their different majors and strengths, the projects were tailored accordingly. We felt that really strong students would end up taking over the student project if we paired strong students with weak students. Instead, we tried to level the playing field by making more demanding assignments and project for the better prepared and more gifted students. We had high expectations of all groups of students, but given their different majors and strengths, the projects were tailored accordingly.

I wanted students with disabilities to have access to the program. The program

was made available to a Deaf student (but it required employing three interpreters and additional unanticipated cost of $10,000). Another student had hearing and visual disabilities that we needed to accommodate. It is my hope that they can make the PAIR materials available to the Deaf Community. (They are both interested in teaching Math and Special Education.)

Another important factor in the success of the program was the length of time spent in the cohort and as a research assistant. Student improvement was readily observed over the year. If the student remained an addition year as a research assistant, the improvement was even more marked. The enriched experience of seminars given by leaders in research and field trips, strong encouragement to enter student competitions and take GRE preparation classes, as well as stipends for books, all added to the student success record. In addition, students were offered course advisement. We brought in recruiters for doctoral programs. We sent students off to check out doctoral programs and sent them to job fairs.

The students enjoyed the non-professional interactions such as Thanksgiving Dinner at my house and our pizza parties and end of the year NASA PAIR Graduation Awards party at my house and at the University Club. We mentored the students. We believed that the students could do the work and we expected them to succeed. We cared about their problems which included difficult family situations, health problems, and financial hardships. All of this added up and is reflected in the student success record.

NASA PAIR classes served as a “boot camp” for more advanced work in

math, science and engineering. The courses were very intensive and faculty and students became very close during the experience. The first 20-30 of instruction was lecture and computer lab based. During this time students were introduced to the basic instructional material. This period ended with a mini-project that gave the student an indication of how to proceed with the larger student research project which consumed the remaining 20 + hours. Students worked in small groups that were selected based on their the backgrounds and abilities. Groups were given individualized projects and a sample of these projects can be found on the webpage http://www.csun.edu/~nasacsun/presentations.html

Faculty team taught interdisciplinary classes that were derived from their research. Faculty overviews of the courses can also be found on the above mentioned webpage. The main point is that the faculty each designed a research project which was real and cutting edge. For example, biochemist Ed Carroll provided electrophoresis gels from his lab. He wanted to have the unknown molecules determined by their molecular weights. After transforming the gel data to computer files (a non-trivial step). We used software developed by a student research assistant John Handy for reading the gels. (This student is now working on a PhD in Bioinformatics at UCLA.) Another approach to the gel digitalizing problem was to use Photoshop to transform the gel data (pictures) into numerical data that could be processed using Excel. The statistician Larry Clevenson introduced statistical modeling techniques. Then students worked in small groups to discovered the molecular weights of the gels from Ed Carroll's laboratory. Ed did not know the proteins before hand. The students were

really helping him with a part of his current research.

Another example of the interdisciplinary team approach can be found in our GPS course. Gerry Simila provided GPS data from the Northridge Earthquake. He explained basic plate tectonics and stress-strain models from Geology. Math modeling was performed on the data using Matlab and JPL's DISLOC. Students learned about elasticity and crack models from mathematicians Werner Horn and myself. They learned numerical methods and used these methods to determine the location of the Northridge fault (which did not rupture the surface). In this case, at the end of the class they could compare their results with those obtained by USGS and JPL researchers (after they made their student presentations). The students' models predicted the fault to be very close to the predictions of Caltech and JPL scientists. Student research assistant was part of the teaching staff Arwen Vidal. (She is presently working on her doctorate in Geophysics at UC Boulder and has a prestigious Sloan Fellowship.) In addition, I'd like to note that the original GPS class was quite different from the second two. The student research project in the two later classes was based on the PAIR research assistant Mario Martinez's project which he completed under Werner Horn's direction.

The unsung heroes of the project were the participating faculty who worked exceptionally hard. Each had a unique style but had a common interest in student success. The faculty presented courses that we part of their research efforts. We had faculty development meetings and strategic planning meetings to set common goals and standards. We had meetings to discuss the

student admissions and success. We discussed student research progress and had special research assistant seminars. We worked on presentations for NASA PAIR site visits.

PAIR faculty, our Advisory Board, the Chairs of the various departments in the College of Science and Mathematics, and our former Dean and co-PI Ed Carroll have had meetings to discuss the institutionalization of the NASA PAIR courses into the standard CSUN curriculum. All of the PAIR classes can be taught as part of the CSUN standard curriculum. However, the majority of the classes are electives and not core classes. Only the GPS and Solar Physics classes show promise of being incorporated in the core Geology and Physics curriculum at this time.

We have been working very hard to publish manuals detailing our new Courses which was a stated goal in our proposal. We were disappointed that NASA has given us very little support in this direction. After months of inquiry, I was finally given a name of someone in the Education Products Division who could give us guidelines for our publishing our educational materials. We will attach draft versions of several of our courses. We are still in the process of creating on-line web versions of these courses which we hope will be posted on the NASA educational products webpages.

We have disseminated results of CSUN PAIR at international, national, and local meetings and educational workshops. In September 2005, I was invited to go to Santiago, Chile, for an NSF conference “Educando a los ingenieros para la era de la informacion.” I was invited to speak about the PAIR program in

Marseille, France. I also gave two talks at the Joint National Meeting of the American Mathematical Society and the Mathematical Association of America. In addition, two articles detailing the PAIR program's success are in preparation.

The following Appendix best explains the results of the CSUN PAIR program. The Appendix contains our tracking records. It clearly shows that the CSUN PAIR program has increased the number of underrepresented students interested in pursuing graduate careers in science and mathematics.

Appendix - CSUN PAIR Graduates

Student Accomplishments

Cohort 1: 2000-2001

1. Advani, Vijay MS Computer Science 8/2002.
Male, Southeast Asian

2. Bennett, William
Current Status: working on BS Secondary Teaching Math (3/2005).
Male, Caucasian, disabled

3. Birss, Stephanie BS Math 8/2001, MS Math 6/2003
Current status:
teaching at CSUN as of 11/2003.
Awards:
Math Dept 5/2000 - Outstanding Academic Achievement as Graduating Senior.
Math Dept 5/2003 - Outstanding Academic Achievement as Graduate Student.
Female, Caucasian

4. Casey, Ryan BS Math 6/2002, Minor in Bus. Administration.
Current status:
working at Lennar Corp. as of 11/2003.
Awards:
Math Dept 5/2002 – Outstanding Academic Achievement as Graduating Senior.
Male, Caucasian

5. DelReal, Gariella BA Math Secondary Teaching 6/2001.

Current status:

last known status teaching

Female, Hispanic

6. Diaz, Robert BA Math Secondary Teaching 6/2001 & MA 8/2004.

Current status:

teaching at CSUN until 6/2005, teaching at CS Fullerton starting September 2005

Awards:

Math Dept 5/2004 – Outstanding Academic Achievement as Graduate Student.

Math Dept 5/2004 - Certificate for Outstanding Teaching Associate.

Male, Hispanic

7. Glueck, Ruben MS Math 5/2002.

Current status: working

Posters:

2002 - 7th Annual Research Sym. "An Intriguing Inequality".

Male, Causacian

8. Handy, John*

Current status:

working on PhD at UCLA & working at Northrop Grumman as of 2003.

Internship:

with Mike Harrington, HMRI.

Posters:

2001 MAA Student poster session CSU Fullerton.

Presentations:

2001 Sigma Xi Comp. "Assoc. Spinal Fluid Compounds with Brain Disease from Computer Anal. Of Electrophoresis Gels"

Male, Caucasian

9. Holguin, Patricia BA Math Secondary Teaching 6/2001.

Current status:

working on credential as of 2003.

Female, Hispanic

10. Hules, Jeremy BS Astrophysics 6/2001

Current status: Working on MS and Credential as of 5/2005.

2005 – Sigma Xi - graduate **3st place** "Quantitative Stability and Flexibility Relationships within the Protein Thioredoxin"

Male, Caucasian

11. Imteaz, Adm BS Computer Science 12/2001.

Current status:

taking class for MS in Electric Engineering as of 2005.

Male, Southeast Asian

12. Linck, Rebecca* BS AstroPhysics 12/2001

Current status: taking class at CSU Bakersfield, Education as of 2003
Working at Kern HS District

Internship:
with Joan Feyman & Alex Ruzmaikin, JPL.

Posters:
2001 MAA Student poster session CSU Fullerton.

Presentations
2001 Sigma Xi Comp. "A Study of Coronal Mass Ejections and their Correlated Solar Activity Centers"

Female, Caucasian

13. Martinez, Mario* BA Math 12/2000 MS 6/2002

Current status:
Teaching CSUN, LA Valley College, COC and CSUCI as of 2003

Internship:
with W. Horn

Presentations:
2001 MAA Student poster session CSU Fullerton
2001 Sigma Xi Comp. "Modeling the Effect of an Earthquake with a Blind Thrust Fault"

Male, Hispanic

14. Murtaza, Ishtiak* MS Physics 8/2002

Current status: teaching

teaching at CSUN as of 2003

Internship:
with S. Walton

Posters:
2001 MAA Student poster session CSU Fullerton

Male, Southeast Asian

15. Noland, Joel BS Math Physics 8/2002

Current status:
working on MS as of 2003

Awards:
2002 Sigma Xi Comp. - Undergrad **2nd place**

Male, Cascasian

16. Pham, Phuong BS Math 8/2001

Current status:
working on MS and Teaching Credential at CSUN as of 2005

Posters:
2002 - 7th Annual Research Sym. "Leonard Euler with p series"

Female, Asian

17. Shapiro, Shawn BS Geology 6/2001 & MS 8/2004

Current Status: working

Awards:

Geol. 1999: Lorence G. Collins Scholarship
Geology 2001: Outstanding Senior Student Award
Geology 2004: Outstanding Graduate Student Award
Other Professional Awards and Acknowledgments: Geology (no date)

Male, Causcasian

18. Sherry, Mike MS 12/2002

Current status:

Teaching at various schools Junior College Math as of 11/2003

Awards:

Math Dept. 5/2000 – Outstanding Academic Achievement as Graduating Senior
Math Dept 5/2003 – Outstanding Academic Achievement as Graduate Student
Math Dept 5/2003 - Certificate for Outstanding Teaching Associate

Male, Causcasian

19. Srichoom, Nisakorn BS Math 6/2002

Current Status:

Working on MS MATH & teaching at CSUN as of 2005

Posters:

2002 - 7th Annual Research Sym. "Pythagoras and Pythagorean Thm"

Awards:

Math Dept. 5/2002 - Outstanding Academic Achievement as Graduating Senior
Math Dept 5/2002 - Certificate for Outstanding Tutor

Female, Asian

20. Ta, Jacquelyne BS Math 6/2002

Current Status: working

Awards:

Math Dept. 5/2002 – Outstanding Academic Achievement as Graduating Senior

Female, Asian

21. Tovar, Mayra BS Math 6/2001 & MS Physics 8/2003

Current Status:

working on PhD at Ohio as of 2005

Internship:

Summer 2001 internship at Goddard

Awards:

Math Dept. 5/2001 - Outstanding Academic Achievement as Graduating Senior
2003: Sigma Pi Sigma, the Physics Honors Society
Physics 2003 - Adrian Herzog Outstanding Graduate Student Scholarship

Female, Hispanic

22. Tran, Lihn BS Math 6/2001

Current Status:

working on MS MATH and teaching credential as of 2005

Internship:

with W. Horn (dropped out)

Posters:

2002 - 7th Annual Research Sym. "What is Continued Fraction?"

Awards:

5/1999 - College of Science and Mathematics Outstanding Junior Award
Math Dept. 5/2001 - Outstanding Academic Achievement as Graduating Senior

Female, Asian

23. Vidal, Arwen* BS Geophysics 6/2002

Current Status:

working on PhD at UC Boulder as of 2005

Internship:

with Bruce Banerdt, JPL and G. Simila

Posters:

2001 - MAA Student poster session CSU Fullerton
11/2002 - presented poster at NASA PAIR Summit Meeting

Presentations

2001 - 6th Annual Research Sym. "Mathematical Modeling of Surface Water Basins on Mars Based on Altimeter Data"

Awards:

1999 - 4th Annual Research Sym. - undergrad **2nd place**
2001 Sigma Xi Comp. -Undergrad **1st place**
Geology 2002 - Outstanding Senior Student Award
Geol. 2002 - Nathan O. Freedman Memorial Award for Outstanding Graduating Senior
Other Professional Awards and Acknowledgments: Geol. (no date)
SLOAN Fellowship for PhD at UC Boulder

Female, Hispanic and Native American

24. Wright, Jennifer** BS Math 12/2001

Current status:

working on MS Math as of 2005

Internship:

with E. Carroll/L. Clevenson

Posters:

11/2002 SCCUR - poster presentation
11/2002 - NASA PAIR Summit Meeting

Presentations:

2002 Sigma Xi presentation

Awards:

2001 - 6th Annual Research Sym. - undergrad **1st place**

Female, Caucasian

(*) were in Cohort 1 and Research Assistants
(**) became research assistant in 2001-2002

Cohort 2: 2001-2002

1. Bell, Elizabeth* BS AstroPhysics 6/2002 & MS in Physics 6/2004

Current status:
Working at Boeing as of 2004 2nd level engineer/analyst
Internship:
with A. Cadavid
Posters:
2001 – 6th Annual Research Sym. "The Scaling Laws and Energy Content of the Solar Magnetic Field"
Awards:
Sigma Pi Sigma, the Physics Honors Society:2004
2001 - 6th Annual Research Sym. - graduate **2nd place** poster -co-author w/ Fyre and Ceja "Simultaneous Evershed Flow Velocity Measurement of the Solar Chromosphere and Photosphere"
2002 Sigma Xi Comp. - undergrad **1st place**
Publications:
6/2002 – Amer. Astro. Soc. New Mexico Presentation "Mesogranulation from Principal Component Ana. Of SVST Photospheric Continuum Images"
Female, Hispanic

2. Briones, Marisa** BA Honors on Biology 8/2004
Current status:
Working on PhD as UCLA, Biology as of 2004
Internship: A. Metzenburg
Posters:
2004 - 8th Annual Research Sym. "Mutational Analysis of Dyskeratosis Congenita"
Female, Hispanic

3. Calvillo, Lucy** BS Math 6/2004
Current status:
Intern at Medtronic Minimed planning to work on MS
Internship:
with W. Horn
Posters:
2002 - 7th Annual Research Sym "Determining the Location of the Northridge Blind Fault"
11/2002 - NASA PAIR Summit Meeting
Publications:
2004 Math Journal - "Simulating the Motion of Frog Sperm"
Female, Hispanic

4. Ceja, Jose BS Physics 6/2001 & MS Physics 8/2003
Current status:
Working on PhD at UC Irvine
Internship:
Worked with S. Walton
Presentations:
2002 Mr. Science goes to Washington - CUR (joint with Bell and Frye)
6/2002 American Astro. Soc. New Mexico Presentation "Preliminary Analysis of Stokes Profile via the Levenberg-Marquardt Method at the San Fernando Obs." (?published?)
Awards:
Physics 2001 - John W. Nagle Outstanding Senior Award
Physics 2003 - C.Y. Liang Outstanding Graduate Student Award
Physics 2003 - Adrian Herzog Outstanding Graduate Student Scholarship

2000 - 5th Annual Research Sym. - Undergrad **3rd place**
2001 - 6th Annual Research Sym. - graduate **2nd place** poster -co-author w/ Fyre and Bell
2001 - Sigma Pi Sigma, the Physics Honors Society
2001 Sigma Xi Comp. - undergrad **3rd place** "Detecting Transits of an Extra-Solar Planet"
2002 Sigma Xi Comp.- graduate **3rd place**

Publications:

2002 Amer. Astro. Soc. Meeting - Co-Author "Polarization of the Sodium D-Lines in Mercury's Atmosphere"
2003 Solar Physics journal - Co-Author "Temperature Dependence of Molecular Line Strengths and Fei 1565 nm Zeeman Splitting in a Sunspot"
2004 Astro. -"Nonlinear Squares Analysis of Strokes Profiles"

Male, Hispanic

5. Cooper, Ken** BS Physics 6/2003

Current status:

Working on MS at CSUN until 6/2004

Internship:

JPL Image Processing 5/2002-6/2003, HMRI Summer 2004

Awards:

Sigma Pi Sigma, the Physics Honors Society:2003
Robert Romagnoli Physics Graduate Scholarship: 2003

Male, Caucasian

6. Falkowski, Barbara BS 12/2002 Physics, MS 6/2005

Current status:

Working on PhD in Physics at UC Riverside

Internship: not PAIR internships

Center for Computational Materials theory at CSUN
California High School Cosmic Ray Observatory

Presentations:

2001 – 6th Annual Research Sym. "Ab Inito Calculation of Growth of Amorphous Silicon"
2003 – 8th Annual Research Sym. "Analysis of Cosmic Ray Energy Spectra"
2004 – 9th Annual Research Sym. "Analysis of Short-Range Correlations in Simulated Cosmic Ray Air Showers to Determine the Mass of the Primary Particle"

Female, Caucasian

7. Fyre, Gregory BS Physics 6/2004

Current status:

Working on Credential at CSUN & working at Discovery Prep. Charter School Pacoima

Awards:

2001 - 6th Annual Research Sym. - graduate **2nd place** poster -co-author w/ Ceja and Bell
Physics 2003 - C.Y. Liang Memorial Scholarship
Physics 2004 - John W. Nagle Outstanding Senior Award

Male, Caucasian

8. Ghods, Kamyar BS Civil Engineering 8/2003

Current status:

Working for Riverside County Flood Control & Water Conservation District as of 2003

Male, Persian descent

9. Hernandez, Cesar* BA Biology 12/2002

Current status: unknown

Internship:

with Ed Carroll

Posters:

2001 - 6th Annual Research Sym. "Characterization of the 29.7Da Glycoprotein from Egg Jelly of the Frog Lepidobatrachus Laevis"

Presentations:

2002 Sigma Xi

Male, Hispanic

10. Maravilla, Alicia** BA Math 6/2003

Current status:

Working on MS at CSUN at of 2005

Internship:

JPL 2003 and USC Bioinformatics Summer Institute 2004

Posters:

2002 - 7th Annual Research Sym. "Comparing Six Numerical Methods for Speed of Convergence"

11/2002 - NASA PAIR Summit Meeting

Female, Hispanic

11. Patel, Falgun** BS Computer Science 6/2003

Current status:

Working at Country Wide Home Loans (Database) as of 11/2003

Internship:

JPL 10/2002-9/2003

Male, Southeast Asian

12. Pham, Thao BA Math 6/2002 &

Teaching Credential at San Diego State University, 12/2003

Current status:

Working at San Diego Unified School District teaching 8th math as of 11/2004

Female, Asian

13. Phillips, John Paul

Current status:

Working at CSUN on credential Ed. Specialist in Special Ed. Work with A. Alekseenko on a project in 2004

Posters:

2002 - 7th Annual Research Sym. "The History and Significance of The Number e"

Male, Caucasian, Deaf

14. Purdum, Tracy BA+** Earth Science 6/2004

Current status:

Working on MA in Geography at CSUN as of 11/2004

Internship:

JPL

Awards:

Geology 2004 - Outstanding Senior Student Award

2004 - 9th Annual Research Sym. - graduate **1st place** "Binary Classification of Geologic Spectra from NASA's EO-1 Satellite"

2005 – Sigma Xi - graduate **1st place** "Classification of Geologic Formations in Hyperspectral Imagery"

Female, Caucasian

15. Rosales, Jennifer BA Biology 6/2002

Current status:

At USC Pharmacy PhD and working at Walgreens, health related

Female, Hispanic

16. Smith, Celia** BS AstroPhysics 6/2003

Current status: unknown

Internship:

S. Walton

Posters:

11/2002 - NASA PAIR Summit Meeting

Publications:

2003 American Astronomy Society - Co-Authored "A Comparison of Summed Continuum and Call K-line Images"

Female, African American

(*) were research assistants in Year 2
(**) became research assistants in Year 3
(+) was in Cohort 2 and 3

Cohort 3: 2002-2003

1. Austin, Crystal

Current status:

-working on BS Electrical Engineering and working at Technicolor

Female, Native American

2. Bermudez, Jorge BS Computer Engineering 6/2004

Current status:

Working on MS at CSUN 2005

Male, Hispanic

3. Berry, Kevin** BS Math and Physics 6/2004

Current status:

Working at NASA/GSFC, plans to enter MS program at John Hopkins in 2006

Internship:

HMRI

Presentations:

3/2004 Sigma Xi presentation

Awards:

5/2002 - College of Science and Mathematics Outstanding Junior Award
Math Dept. 5/2004 - Outstanding Graduating Senior Award

Male, Caucasian

4. Cadman, Kathleen** BS Physics 6/2004

Current status:

Working on MS at CSUN

Internship:

Research with Dr. Doty

Female, Caucasian

5. Casillas, Maria**

Current status:

Working on BS in Chemistry at CSUN and working at QUALCOMM 11/2004

Female, Hispanic

6. Diaz, Milton BS Manufacturing Systems Engineering 6/2005

Current status:

Post-bac with in Manufacturing Engineering, working at Teledyne

Internship at HYDREL and Teledyne

Male, Hispanic

7. Donich, John BS Geology 12/2004

Current status:

Working on MS Earth Science Education Program at City College of New York.Employed as teacher in Manhattan International High School.

Worked at GeoConcepts in 2004

Posters:

2004 - 9th Annual Research Sym. "Modeling of the GPS Displacements from the Sept. 28, 2004 (M=6.0) Parkfield, Ca. Earthquake"

Male, Caucasian

8. Fernandez, Maurice

Current status:

Working on BS in Mechanical Engineering CSUN as of 11/2005

Male, Hispanic

9. Gutierrez, Elizabeth BS Manufacturing Engineering 6/2003,
MS Engineering Management 6/2005

Current status:

Working on second MS in Public Administration. Working at LA City Department of Transportation as Transportation Engineer 2004 and 2005.

Presentations:

Speaker at 2003 graduation ceremony

Other:

Engineering Honor Society -treasurer/member
MECHA – coordinator
Attended NASA PAIR Summit Meeting 11/2002
Female, Hispanic

10. Lopez, Gerardo** BS Electrical Eng. 6/2004

Current status:
Working for Mattel, electronic toy group as of 10/2004
Internship:
B. Bavarian and JPl Elctrical Engineering Intern 2003-2004
Paper: Polmer Aerogels: theoretical attempts to control surface properties and elasticity of silica aerogels by Gerardo Lopez (CSUN) and Michael Pethov (JPL)
Male, Hispanic

11. Morales, Claudia BS Computer Science 6/2004

Current status:
Working on MS at CSUN & working for Amgen as of 10/2004
Internship:
Summer internship Amgen 2003 & 2004
Other:
Engineering Honor Society -webmaster
Female, Hispanic

12. Morataya, Oscar BS Mechanical Engineering 8/2004

Current status:
PhD program U Cincinnati Aerospace as of 10/2004
Internship:
Wright Patterson Air Force Base, working on hypersonic vehicle analysis
Boeing Co. honors co-op for a year
Male, Hispanic

13. Morris, Devin+**

Current status:
Working on BA Biology at CSUN
Internship:
USC Bioinformatics Summer Institute 2004. Internship with Dr. Mehr, 2005
Presentations:
2005 – Sigma Xi "Role of Intracellular Calcium in Glucocorticoid-Evoked Lymphoid Cell Apoptosis"
Male, African American

14. Sarabi, Elham BA Psychology 6/2004

Current status: unknown
Awards:
Psychology 2004 - Richard Coleman Award
Female, other

15. Simo, Aaron BS Applied Math 12/2002, MS Applied Math 6/2005

Current status:
working fulltime at JPL since 10/2004
Awards:
Math Dept. 5/2003 - Outstanding academic achievement as graduating senior
Male, Hispanic

16. Tam, Nernie BS Math 6/2003
Current status:
Working at WellPoint Health Networks as of 11/2003
Awards:
Math Dept. 5/2003 - Outstanding Graduating Senior Award
Math Dept. 5/2003 - Certificate for Outstanding Tutor
Female, Asian

17. Uribe, Maria+** BS MATH 6/2005 (in Cohort 3 and 4)
Current status: CSUN Teaching Credential Program
Working for LAUSD & completed BS in Mathematics at CSUN 3/2005
Internship:
Hurst 2004 & LAUSD (with Shubin) 2005.
She also attended USC Bioinformatics Summer Institute program Summer 2005
REU in Brazil (supported by Math NSF) Summer 2004
Other:
11/2002 - Attended NASA PAIR Summit
Presentations:
2005 – Sigma Xi "A Probabilistic Model for Guiding the Mars Rovers"
Female, Hispanic

18. Venegas, Antolino+** BS Mechanical Engineering 6/2005
Current status:
Entered MS Mechanical Engineering Program at CSUN, 9/2005
Internship:
Precor with Shubin
Male, Hispanic

(**) became PAIR research assistants in 2003-2004
(+) Part of PAIR research assistantship continued in 2004-2005

During 2003-2004, there was no cohort. All PAIR students were research assistants recruited from previous cohorts.

Cohort 4: 2004-2005

1. Briggs, Modesty BS Math 6/05
Current status:
started MS Math program at CSUN Fall 2005
Internship:
C. Shubin and A. Candel
Posters:

2004 – SCCUR “Exploring the Peddling Number of a Knesar Graph” -Wyels

Presentations:

2005 - 7th Annual Nebraska Conf. for Undergrad. Women in Math “Investigating Properties of Kneser Graphs”

2005 – Sigma Xi 2nd place “Investing Properties of Kneser Graphs”

Female, African American

2. Dawson, Shelby BS Geology June 2005

Current status: started MS program in Geology Fall 2005.
Employed at GeoConcepts.

Internship:

Catalyst Program Dr. Marsaglia,
PAIR research assistant with advisor D.Yule

Posters:

2004 – Co-authored S.C. Earthquake Center meeting “A 2000-Year-Long Record of Large Earthquakes on the San Bernadino Strand of the San Andreas Fault, San Gorgonio Pass, Southern California,"

Presentations:

2005 – Sigma Xi “A Quaternary Rate of Convergence Across the Sunland Fault and Related Folds Near Sunland, Ca.”

11/2005- traveling to Nepal for work on earthquake fault (with D. Yule and NSF support)

Male, Native American

3. Enriquez, Sylvia

Current status:

Working on BS Math 2005 (expected Fall 2005)

Internship:

Teaching after-school NASA science program to San Fernando Middle School students LA (advisor of C. Shubin)

Attended USC Bioinformatics Summer Institute 2005

Female, Hispanic

4. Gonzalez, David

Current status:

Working on BS Mechanical Engineering CSUN

Internship:

A. Alekseenko

Male, Hispanic

5. Lopez, Eloy

Current status:

Senior in Math, BS Math expected 12/2005

Internship:

M. Neubauer

Presentations:

2005 – Sigma Xi “Weighing Designs for One-Pan Spring Scales”

Paper in progress (with M. Neubauer and W. Watkins) *D-optimal (0,1)*

Weighing designs for 10 objects
Male, Hispanic

6. Milanova, Guergana a.k.a Grace Micheals

Current status:
Not currently taking classes at CSUN - Working on BS Computer Science 2005
Internship:
A. Alekseenko 10/2004-6/2005, Summer 2005 USC Bioinformatics Institute
Presentations:
2005 – Sigma Xi "Fiber Tracking Techniques in Magnetic Resonance Diffusion Tensor Imaging"
Female, Caucasian

7. Nemeth, Andrea BS MATH 6/2005

Current status:
Started CSUN MS 9/2005. Currently working in GK-12 program
Internship:
M. Schilling
Awards:
Math Dept. 5/2004 - Outstanding Junior Award
Presentations:
May 6, 2005 – Sigma Xi "Can we Predict Earthquakes"
November 11, CSUN 10th Annual Research and Creative Works Symposium
Female, Causcasian

8. Neyer, Sara

Current status:
Transferred to Carnegie Mellon Institute for BS Mechanical Engineering
Internship:
A. Alekseenko 9/2004-6/2005, Summer 2005 - internship at Carnegie Melon I Institute
Awards:
2005 – Sigma Xi **2nd place** "Analysis of Discrete Anisotropic Diffusion Eq. in Application to Neural Fiber Tracking"
Female, Causcasian, Veteran of War in Iraq

9. Pineda, Marvin

Current status:
working on BS Mechanical Engineering Fall 2005, BS ME expected 6/2006
Internship:
S. Prince
Male, Hispanic

10. Sardot, Tova Completed BS Physics June 2005

Current status:
Working with Dr. Kelson on Minimed grant
Internship:
E. Kelson
Presentations:
2005 – Sigma Xi "Alcohol Dehydrogenase Catalysts Bound to Fuel Cell Electrodes"

Female, Native American

11. Sikora, John BS Mathematics 6/2005

Current status:

started CSUN MS MATH program 9/2005

Internship:

A. Alekseenko

Presentations:

May 6, 2005 – Sigma Xi "Ridge Reconstruction Algorithm Diffusion Tensor Imaging"

November 11, 2005- 2nd prize, CSUN 10th Annual Research and Creative Works Symposium

Male, Hispanic

12. Rosalez-Paez, Jose

Current status:

Dispatched to IRAQ 3/2005

Internship:

B. Bavarian

Male, Hispanic

All students in Cohort 4 had research assistantships. In addition, 3 students from Cohort 3 had research assistantships which carried into 2004-2005.