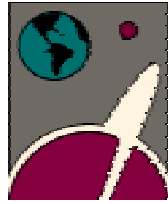


The Outer Limits



The North Carolina Space Grant Consortium

Duke University ,North Carolina A&T State University, North Carolina Central University , North Carolina State University, University of North Carolina-Chapel Hill, University of North Carolina-Charlotte, University of North Carolina-Pembroke, Winston-Salem State University

Year 1998 Issue 2 _____ Summer 1998

Project TEAM SCIENCE.....A Science Enrichment Program



Ndaona Chokani, Associate Professor in Mechanical and Aerospace Engineering at NC State University participates in many outreach projects for the NC Space Grant Consortium.

I listen and I forget. I see and I learn. I Do and I Understand. - Chinese Proverb

"As exemplified by the above Chinese proverb, the opportunity to have a hands-on experience enables students to make the previously tenuous connections between theory and practice."

Loaves and Fishes: This past summer twenty-five 3rd-8th grade girls and boys enrolled in summer classes at Loaves and Fishes (LAF) to conduct science experiments. The science project was sponsored jointly by LAF and the NC Space Grant Consortium. LAF is not-for-profit organization that began in 1982 as a summer enrichment program for 12 1st and 2nd grade children from low-income families in Raleigh's inner city. Today LAF serves 60-65 children in grades K-12; all the children are identified and referred by their public school teachers as "children at risk of school failure" because of their need for individual assistance in the early stages of academic and social development.

The LAF program provides after-school, evening and summer activities through which the K-8 children work on skill development. Dr. Ndaona Chokani, Associate Professor of Aerospace Engineering at NC State University designed and taught the science course. During the course, hands-on experiments were conducted.

These experiments demonstrated principles such as the conduction of electricity, refraction of light, relationship between air pressure and air velocity, and the effects of forces and moments. The goal of the experiments was for the children to become more comfortable with and interested in math and science. The experiments led to the construction and launch of model rockets. The launch of the rockets was conducted on July 2, 1997 two days before the arrival of the Mars Pathfinder spacecraft on Mars.

"The most important thing I learned this summer is that launching rockets is fun and science is fun!"

The children enjoyed watching their rockets reach heights of 300-400 feet. The rocket launches were reported by TV news channels FOX-22 and WTVD-11 and in the Raleigh News and Observer of July 3. One of the children, summed up his participation in the class by saying, "The most important thing I learned this summer is that launching rockets is fun and science is fun!"

Awards

1998-99 NC Space Grant Recipients

Undergraduate Scholarships

Michael DeCarli \$4,000

Advisor: Dr. Hugh Crenshaw

DUKE, Mechanical & Biomedical Eng.

Trent Kingery \$4,000

Advisor: Dr. Charles Hall

NCSU, Mechanical & Aerospace Engineering

Peter Bermel \$4,000

Advisor: Dr. Wayne Christiansen

UNCCH, Physics & Astronomy

Andrew Nyabnari \$4,000

Advisor: Dr. Shawn Sendlinger

NCCU, Chemistry

Andrew White \$4,000

Advisor: Dr. H.A. Hassan

NCSU, Mechanical & Aerospace Engineering

Elizabeth Shimps \$4,000

Advisor: Dr. Eric Davies

NCSU, Botany

Kia Gore \$4,000

Advisor: Dr. Elva Jones

WSSU, Computer Science

Shanta MacKinnon \$4,000

Advisor: Dr. John Mayfield

NCCU, Biology

Melissa Cifaldi \$3,000

Advisor: Dr. Ndaoni Chokani

NCSU, Mechanical & Aerospace Engineering

Linda Cowan \$2,000

Advisor: Dr. Niki Robertson

NCSU, Botany

Robert Harris \$2,000

Advisor: Dr. John Perkins

NCSU, Mechanical & Aerospace Engineerin

Cecilia Jung \$2,000

Advisor: Dr. Jack Edwards

NCSU, Mechanical & Aerospace Engineering

Rachel King \$2,000

Advisor: Dr. Ndaoni Chokani

NCSU, Mechanical & Aerospace Engineering

Brad Howard \$2,000

Advisor: Dr. Jack Edwards

NCSU, Mechanical & Aerospace Engineering

Brent Sentell \$2,000

Advisor(s): Drs. Charles Hall & John Perkins

NCSU, Mechanical & Aerospace Engineering

Jennifer Price \$2,000

Advisor: Dr. Ndaoni Chokani

NCSU, Mechanical & Aerospace Engineering

LaMesha Stephens \$2000

Advisor: Dr. Elva Jones

WSSU, Computer Science

Joseph Jenkins \$2000

Advisor(s): Drs. Devdas Pai & William Craft

NCAT, Mechanical Engineering

Constance Rogers \$500

Advisor: Dr. Fred DeJarnette

NCSU, Mechanical & Aerospace Engineering

Graduate Fellowships

Christopher Abernathy \$5,000

Advisor: Dr. Yogendra Kakad

UNCC, Electrical Engineering

Jonathan Baugh \$5,000

Advisor: Dr. Daxing Han

UNCCH, Physics & Astronomy

Kristi Dendy \$5,000

Advisor: Dr. James Rose

UNCCH, Physics & Astronomy

Gary Eichenbaum \$5,000
Advisor: Dr. David Needham
DUKE, Mechanical Engineering

William Martin \$5,000
Advisor: Dr. Mark Schulz
NCAT, Mechanical Engineering

Faculty Grants

Dr. William Allen Higher Education \$2,000
"HELOIS - Habitat Exploration Leaders in Outer Space"
NCSU, Electrical & Computer Engr.

Dr. Leonhard Bernold Higher Education \$2,000
"Sponsorship of a Student Team to Compete at 1998
Lunar Robotic Construction Competition"
NCSU, Civil Engineering

Dr. Christopher Brown Higher Education \$2,000
"Virtual Guest Lecturers: The Use of Video
Teleconferencing to Enhance the Content of "Space
Biology" (BO 277) at NCSU"
NCSU, Botany

Dr. Erick Cheek Outreach \$2,000
"Engineers Starter Program Support"
NCAT, Electrical Engineering

Dr. Ndaoni Chokani Research Seed \$5,000
"Research Seed Activities to Develop a Microgravity
Science Research Program"
NCSU, Mechanical & Aerospace Engineering

Dr. Laurens Howle Research Seed \$5,000
"Investigation of g-Jitter in Surface-Tension-Driven
Convection in Microgravity"
DUKE, Mechanical Engineering

Dr. Richard Layton Research Seed \$5,000
"A Multidisciplinary, Experimental Test Bed for
Research Topics in System Dynamics" NCAT,
Mechanical Engineering

Drs. Kasra Daneshvar, Tom DuBois, and Stephen Bobbio
Research Seed \$5,000
"Laser Rapid Prototyping Using Second Harmonic"
UNCC, Electrical Engineering

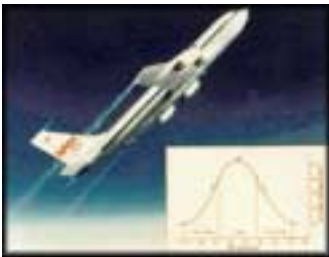
FEATURED SPACE GRANT PROJECTS

NC A&T State University Space Grant Program

As a member of the NC Space Grant Consortium, the NC A&T State University Space Grant Program supports new projects while also strengthening some of its existing programs. These are special initiatives which raise the level of the general public's knowledge of aerospace, science, design and technology through a number of space-related programs. Here are updates on a few of the projects that have been funded by Space Grant at NC A&T State University:

Particle Cloud Dispersion and Suspension under Reduced Gravity Conditions : Four Mechanical Engineering students from NC A&T State University participated in this year's "NASA Reduced Gravity Student Flight Opportunity" sponsored by the Texas Space Grant Consortium, and operated by NASA out of Ellington Field, Texas. The group, led by Dr. John Chen, Assistant Professor of Mechanical Engineering at NC A&T submitted a proposal in October 1997, and was one of 48 schools across the nation chosen to fly.

The goal of their experiment, 'Particle Cloud Dispersion and Suspension under Reduced Gravity Conditions,' was to determine the conditions necessary to uniformly disperse and statically suspend a cloud of sub-millimeter sized coal particles.



NASA 1998 Reduced Gravity Student Flight Opportunity

This determination was done by direct observation using a high-speed video camera. All four students had the opportunity to fly on the KC-135 aircraft, and the experiment was a success. Wide coverage of this activity was received in the local press.

Museum Experiment: Dr. Mark Schulz, Assistant Professor of Mechanical Engineering at NC A&T State University has been trying different experiments including lighting LED's, creating sounds, stopping vibration, and producing vibration using PZT patches. He also has an experiment that produces laser line patterns on a wall from vibration. A two beam experiment is now being built to show energy transfer from one structure to another. Thicker PZT's (\$250/each for two) are being ordered to give more force and a more dramatic effect. The final experiment is being decided upon which will either have a complex experiment with power amplifiers and signal generator, or a simple self-powered experiment.

The Greensboro Children's Museum : Dr. Richard Layton, Assistant Professor of Mechanical Engineering at NC A&T State University has been involved in an outreach project with the museum where an interactive display in motion control is planned for. A scale model of an amusement park ride, such as a Ferris wheel or a merry-go-round, is being built out of plastic building blocks with little plastic people along for the ride. The model, approximately 18 inches in any dimension, is motorized and illuminated, and motion and lights are controlled by children issuing commands to a computer. The Legos(TM) building blocks, motors, lights, controller, and computer card have been acquired. The model has to be created, the system has to be assembled, and the card installed in a computer and programmed.

NC Space Grant Higher Education Initiative project: At NC A&T State University, one undergraduate student, Brian Short, was hired to develop tabletop hands-on experiments for learning various concepts in heat transfer. The experiments will be completed this summer. In addition, Brian is developing multimedia modules to accompany each experiment. These modules serve to demonstrate the operation of the experiments, as well as to guide in the interpretation of the results.

Student Profile: (William Martin)

Year 1: William has built an experiment using bolted composite panels and developed an algorithm using accelerometer sensors that successfully detected small damages simulated by loosened screws. He extended this method to detect

damage without storing the historical frequency response data. He published three conference papers on his results. His method is a simple and accurate technique to detect damage to structures, and the method may have many practical uses. *Year 2:* The technical monitor, Mr. Chuck Wilkerson from NASA Marshall, has sent William a graphite epoxy 4' by 2' debris shield. William is going to put PZT patches on the shield for damage detection. He will also use a scanning laser doppler vibrometer for damage detection. William is expected to complete his MS work this summer and enter the Ph.D. program at NC A&T for the fall 98 semester. (*Editorial comment: William Martin made a presentation on his work with Dr. Mark Schulz at the 1997 Space Day Symposium.*)

HAPPENINGS

NC Central University Host of 1997 Space Day Symposium

Beyond the Earth - A Journey to the Future: Three high schools participated in the one-day symposium on November 8, 1997 and included Hillside High School, Jordan High School, and NC School of Science and Mathematics. Also participating were members of the NC Space Grant Consortium: Duke University, NC A&T State University, NC Central University, NC State University, UNC-Chapel Hill, UNC-Charlotte, and Winston-Salem State University. Speakers included presenters from NASA, NC Space Grant Consortium, University of Michigan, and NC Central University. Approximately, 115 students and teachers participated in the one-day symposium.

1998 Space Day Symposium , Saturday, November 14 "Global Warming"

NC Space Grant Consortium

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Website: <http://www.mae.ncsu.edu/spacegrant/index.html>

WELCOME!

Dr. Thomas Dooling
Coordinator
UNC-Pembroke

The University of North Carolina at Pembroke joins the NC Space Grant Consortium to become its 8th member of the NASA Space Grant College and Fellowship Program. Dr. Thomas Dooling from the Department of Chemistry and Physics will serve as Coordinator for the NC Space Grant Program at UNC-Pembroke.

Ms. Jean Page
Executive Director
NC Space Grant Consortium

Ms. Page joined the NC Space Grant Consortium as Executive Director in April 1997 and was formally associated with the Office of Research Administration at NC State University. Her principle responsibilities involve program management while coordinating the activities directed by the NASA Space Grant College and Fellowship Program.

NC Space Grant Consortium
NASA Space Grant College and Fellowship Program
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