Dear Friends:

Welcome to the second annual report for the Nuclear and Radiological Engineering and Health Physics (NRE/HP) program of the George W. Woodruff School of Mechanical Engineering. This report is for the past academic year, summer 2002 through spring 2003.

The NRE/HP program has been part of the School of Mechanical Engineering for twenty years. During the recent past, we have experienced an increase in freshman enrollment and student quality, as well as increased interest on the part of industry in hiring graduates from the program.

Early in 2002, the faculty developed a strategic plan for the NRE/HP program, which they began to implement during the past academic year. This was also the first year the program completed with a chair, Farzad Rahnema, and as an autonomous unit within the School of Mechanical Engineering. Also, we hired Dr. Cassiano de Oliveira to join the NRE faculty to add strength to the program.

Our programs continue to evolve and grow. The nuclear engineering faculty proposed phasing out the Master of Science in Health Physics and introducing a Master of Science in Medical Physics to provide broader coverage of the utilization of radioactive materials in the nuclear power industry and in the medical arena. The proposal involves a joint effort with Emory University, which will provide three of the courses as well as student internships. The degree will be from Georgia Tech. We hope that this program will be approved by the Board of Regents sometime in the fall of 2003.

I hope you find this report informative and that you will help us advance the program. Please address any comments about this report or the program to me at (404) 894-3200 or by e-mail to ward.winer@me.gatech.edu.

Ward O. Winer, Ph.D.
Eugene C. Gwaltney, Jr. Chair of the Woodruff School of Mechanical Engineering
INFORMATION

This report is published annually in the fall by the George W. Woodruff School of Mechanical Engineering at Georgia Tech. For more information about the undergraduate and graduate degree programs in nuclear and radiological engineering, please contact us by any of the following methods:

**Letter**  
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Associate Chair of the Woodruff School and Chair of the NRE Program  
George W. Woodruff School of Mechanical Engineering  
Georgia Institute of Technology Atlanta,  
Georgia 30332-0405

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404-894-3733

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**Online**  
http://www.nre.gatech.edu
Detailed information about the nuclear and radiological engineering/health physics program may be found online at http://www.nre.gatech.edu. In addition, copies of all our publications may be obtained online or by requesting a copy from the School. New this year are: *Nuclear Engineering and Health Physics at Georgia Tech (1958-1990)*, *2003-2004 Facts About the Woodruff School*, *2003-2004 Undergraduate Handbook*, and the *2003-2004 Graduate Handbook*. 

Copyright 2003 George W. Woodruff School of Mechanical Engineering GWW/RG0102003
Dear Colleagues and Friends:

Welcome to the second edition of the annual report for the Nuclear and Radiological Engineering and Health Physics (NRE/HP) program. First, I want to welcome Dr. Cassiano de Oliveira to Georgia Tech. He joined our program in August of this year as Professor of Nuclear and Radiological Engineering. He brings an expertise in the areas of computational radiation transport and radiative transfer.

I am pleased to report that our program has seen an increase in graduate and undergraduate student enrollment, as well as significant progress in the implementation of our strategic plan over the past academic year. We currently have 95 students in the undergraduate program, and 38 students in the graduate programs. This fall, the average SAT score and GPA of the 28 entering freshmen are 1344 and 3.71, respectively. The average GRE score and GPA of the ten entering graduate students are 1975 and 3.74, respectively.

In the past year, the NRE faculty has made the following progress in implementing the strategic plan:

- Created both a Certificate and a Minor in Nuclear and Radiological Engineering that is available to all engineering students;
- Revised the Master of Science in Nuclear Engineering program to be more flexible; it is now possible for well-motivated students to complete the new degree requirements within one year;
- Increased our graduate and undergraduate recruiting efforts;
- Created a new computer cluster in the Neely Nuclear Research Center with eleven PCs as well as peripherals, such as printers and backup systems;
- Upgraded the classroom computer dedicated to electronic presentations;
- Upgraded the nuclear radiation detection laboratory to accommodate fifteen students simultaneously, in anticipation of increased enrollment;
- Improved the academic advisement process. The Academic Office of the Woodruff School was remodeled to better accommodate students. One additional staff member and a Director of Student Services were hired. Furthermore, each student is now assigned a faculty advisor in addition to the academic advisor. A formal letter from the chair of the program is sent to inform new students of their assigned academic and faculty advisors;
- Formed a separate advisory board for the NRE/HP program. This board has strong representation from industry, national laboratories, and universities; and
- Added a new faculty member, Dr. Cassiano de Oliveira, this fall. The search for an additional faculty member will be conducted when relief from reduced state funding becomes available.

The undergraduate program was evaluated by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET) during Fall Semester 2002. The EAC reported that the program is well supported with faculty, staff, and funding to ensure continued education and training of students who will be able to contribute to the nuclear industry in a variety of areas. This is a strong program that demonstrates the use of constituent feedback to improve its existing processes.
I am also very pleased that our faculty has proposed to create a new Master of Science Degree Program in Medical Physics (M.S.M.P.) starting in Fall Semester 2004. If approved by the Institute and the Board of Regents, this will be a joint program between Nuclear and Radiological Engineering at Georgia Tech and the Radiation Oncology Department of Emory University. Students will be admitted into the program by the Woodruff School, register at Georgia Tech, and receive the M.S.M.P. degree from Georgia Tech. Emory will offer two new courses and co-teach an existing NRE course. Emory will also arrange for the students to be placed at Emory hospitals and clinic to gain the required 400 hours of clinical experience in radiation therapy, nuclear medicine, and diagnostic imaging. The new program will be offered through distance learning in addition to the traditional on-campus delivery method.

I hope that you find this report both interesting and useful. Please address any questions and comments about this report and the program to me at (404) 894-3718 or by e-mail to farzad.rahnema@nre.gatech.edu.

Farzad Rahnema  
Associate Chair of the Woodruff School  
Chair of the Nuclear and Radiological Engineering/Health Physics Program  
September 2003
**ACTIVITIES**

**Fall Picnic**

The NRE program sponsors two get-togethers for students and faculty: a picnic in the fall and a cookout in the spring. The picnic is an opportunity for undergraduate and graduate students in the NRE/HP program to meet and to get to know the faculty and staff. Dr. Ward O. Winer, School Chair, and other members of the Woodruff School Administrative Office, the Finance Office, and the Academic Office, who interact with persons in the NRE/HP program attend the event, which is held near the Neely Research Center.

**Family Weekend**

Family Weekend is a chance for friends and family members to visit campus and attend a football game. We again hosted an open house in the fall so that visitors could tour our facilities, listen to a program about undergraduate education in the Woodruff School given by Professor Ray Vito, Associate Chair for Undergraduate Studies, meet and ask questions of Ms. Kimberly Blue, Undergraduate Academic Advisor, see displays by some of our student competition groups, and meet other student leaders from the student chapters of professional societies and other organizations.

**Seniors Honors Dinner**

Each fall the Woodruff School sponsors a dinner for outstanding seniors in mechanical engineering and nuclear and radiological engineering who are eligible to attend graduate school based on their academic record (a grade point average of 3.5 and above). The dinner is the annual kick-off to the graduate student recruiting season. About 75 people attended the event and listened to faculty members explain the reasons to attend graduate school.
Information was also available about fellowship opportunities, financial aid, and study-abroad programs.

**ABET Visit and Evaluation**

The Nuclear and Radiological Engineering Program had its ABET (Accreditation Board for Engineering and Technology) visit at the end of October 2002. This visit went well and the exit interview revealed these program strengths: the program has dramatically increased the number of undergraduate students through a rigorous recruiting program; faculty members are supportive of the students; students can participate in co-op and undergraduate internship programs; and the major design experience is excellent. A number of program concerns were addressed. At the end of August 2003, Dean of Engineering Don Giddens reported that the official ABET report had arrived and all of the reviewed programs at the Institute were accredited. The new ABET reports appear on our web site in PDF form (see Undergraduate Programs).
The Undergraduate Program

The undergraduate program in nuclear and radiological engineering leads to the B.S.N.R.E. degree and is structured to meet the needs of the student who contemplates employment immediately after graduation and the student planning to pursue graduate study. The strength of the undergraduate curriculum is its breadth in many of the fundamental disciplines of NRE (radiation detection, radiation transport and interaction with matter, reactor physics, reactor heat removal, plasma physics and fusion technology).

The Five-Year BS/MS Degree Program

In fall 2001, outstanding freshmen and sophomore students in the Woodruff School were invited to apply to the new Five-Year BS/MS Degree Program. Students can earn two degrees in a five-year period, which will provide a tremendous advantage when entering the job market. The program is individualized with numerous opportunities for faculty and students to interact, including mentoring and undergraduate research. Graduate course work begins in the senior year. In the fifth year students are encouraged to continue for the Ph.D. In many cases, students might be working on an interesting topic of study as part of the master’s degree research that could provide the basis for doctoral research. Degrees can be obtained in various combinations in mechanical engineering and nuclear and radiological engineering.

The Graduate Program

The Woodruff School has a challenging graduate program that encompasses advanced study and research. The objective of the master’s degree program in nuclear engineering is to
prepare graduates for advanced-level jobs in industry or for advanced study leading to the doctoral degree. Thirty semester hours of course work are required for the master’s degree; there is a thesis or nonthesis option.

The objective of the Ph.D. program is to prepare students for research and leadership positions in industry, universities, and research laboratories. In addition to a dissertation, written and oral qualifying examinations, the doctoral degree requires forty-two semester hours beyond the bachelor’s degree or its equivalent. Students should aim to complete the Ph.D. degree some three to four years after obtaining the master’s degree or after entering the Ph.D. program.

Women and Minorities in the Graduate Program

The Woodruff School continues to be a leading producer of graduate degrees to women and minorities. In the 2002-2003 academic year, seven women earned their doctoral degrees (6 ME, 1 NE/HP). Twenty-four women earned the master’s degree (22 ME, 2 NE/HP). The first Ph.D. awarded to a woman in the Woodruff School was given to Denise Noonan in Health Physics in 1984. To date, 71 women have earned the Ph.D. from the Woodruff School; 18 of these have been in nuclear engineering. One hundred and eleven women have earned their master’s degree in NE/HP; the first was awarded to Catherine Card in 1980.

The Woodruff School granted its first doctoral degree to a minority student in 1978. Since then, 62 minority students have received the Ph.D. Five minority students earned a Ph.D. in the past academic year (3 ME, 2 NE/HP).

The Academic Common Market

The ACM provides an exciting opportunity for students from the southeast whose state universities do not offer a BSNRE degree. Students accepted to Georgia Tech in the bachelor’s degree program in nuclear and radiological engineering pay (Georgia) in-state tuition and must maintain ACM status through academic achievement.
The Office of Student Services

The Woodruff School's Academic Office was refurbished and reorganized and is now called the Office of Student Services. The majority of student needs are addressed by the Academic Office Staff (Trudy Allen, Norma Frank, Glenda Johnson, and Cosetta Williams).

Dr. David Sanborn is the Associate Chair for Undergraduate Studies. He also serves as an undergraduate advisor and handles the more technical issues in regard to the program, including transfer credit issues and career advisement. Ms. Kimberly Blue continues to serve as the primary undergraduate advisor.

Dr. Yogendra Joshi assumed the position of Associate Chair for Graduate Studies in May. He advises and oversees current graduate student issues, including programs of study, degree petitions, and graduate committee issues.

Dr. Wayne Whiteman began in April 2003 as the Director of the Office of Student Services. He manages the Academic Office and staff, and assists the associate chairs. Dr. Whiteman assists Dr. Joshi with the recruitment and admission of graduate students, and he oversees and serves as the advisor of the Woodruff School's distance-learning program.
Our most important asset is our students. Enrollment in the discipline in the past two years has been increasing, particularly in the undergraduate program. In fall 2003, the enrollment in the nuclear and radiological engineering program by ethnicity and degree is:

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<thead>
<tr>
<th></th>
<th>Bachelor's Degree</th>
<th>Master's Degree</th>
<th>Doctoral Degree</th>
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<tr>
<td>Asians</td>
<td>12</td>
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<td>Blacks</td>
<td>3</td>
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<td>3</td>
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<td>0</td>
</tr>
<tr>
<td>Americans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whites</td>
<td>78</td>
<td>16</td>
<td>9</td>
</tr>
<tr>
<td>Multiracials</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Internationals</td>
<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Totals</td>
<td>95</td>
<td>18</td>
<td>20</td>
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Of the 95 undergraduate students, there are 31 freshmen, 37 sophomores, 16 juniors, and 11 seniors; 77 males and 18 females. Of the 38 graduate students, 27 are male and 11 are female.

**Freshman Class Profile**

There are 28 entering freshmen in fall 2003 to the nuclear and radiological engineering program.

**Average SAT Score (out of 1600)**

- Nuclear Engineering: 1344
- Georgia Tech: 1337

**High School Grade Point Average**

- Nuclear Engineering: 3.71
- Georgia Tech: 3.79

**Demographics**

- Females: 2
- Males: 26
The 28 entering freshmen come from: Alabama 5, Arkansas 1, California 1, Colorado 1, Georgia 9, Louisiana 1, Kentucky 1, Maryland 1, New Mexico 1, South Carolina 5, Texas 1, and Virginia 1.

**Graduate Class Profile**

Ten nuclear engineering graduate students started in 2003. The entering students had a grade point average of 3.74 and GRE scores of 1975 (verbal 524, quantitative 765, analytical 686 -- the analytical average does not include three students who took the new exam based on the six-point scale).
Unique scholarship opportunities exist for Georgia Tech undergraduate students in nuclear and radiological engineering. In addition to national nuclear engineering scholarships sponsored by the National Academy for Nuclear Training, the U. S. Department of Energy, and the professional societies, Georgia Tech offers scholarships sponsored by local industry, as well as the prestigious George W. Woodruff NRE Scholarship. An awards recognition reception was held in February 2003 for the sponsors to meet the scholarship holders. Sponsors talked about the importance of nuclear engineering education and the positive changes in employment opportunities.

**American Nuclear Society Scholarships**  
Representative: Dominic Napolitano

**Undergraduate Scholarship**  
Matthew Robert Terry

**Joseph R. Dietrich Memorial Scholarship**  
Larissa Ann Cottrill

**CH2M-Hill Scholarships**  
Representative: Robert Eby

**CH2M-Hill Scholarships**  
Eric Branch

**Department of Energy/Industry Matching Grant**  
Representative: John Gutteridge

- Brantley Beaird (MGPI)
- Sarah Brashear (Duke Energy)
- Kevin Brenner (Duke Energy)
- Amanda Bryson (Framatome)
- Kimberly Burns (Duke Energy)
- Sherard Chiu (CH2M-Hill)
- Hillary Davis (CH2M-Hill)
- Norman Facas (Framatome)
- John Floyd (MGPI)
- James Ganong (Duke Energy)
- Nicholas Giglio (Duke Energy)
- Perry Johnson (McCallum-Turner)
Brittany Meriwether (Duke Energy)
Tyler Sumner (McCallum-Turner)
Matthew Terry (McCallum-Turner)
Pamela Thompson (McCallum-Turner)

Duke Energy Corporation Scholarships
Representative: Dale Smith

Maslin Chen
Steven Collins
Jeremiah Couvillion
Brian Kern
Ryan Lorio
Justin Pounders
Brian Rotolo
Christopher Sommer
Sara Jane Wagner
James Weathers
Framatome-ANP Scholarships
Representative: Harry Boukas
- Ashby Bridges
- Frederick Willis

National Academy for Nuclear Training Scholarships
Representative: Ann Winters
- Larissa Ann Cottrill
- Christopher Fong
- Ryan Lorio
- Joshua Parker
- Ian Spivack
- Matthew Terry
- Darren Wooten

McCallum-Turner Scholarships
Representative: Kyle Turner
- Donald Gibbs
- Jimmy Jiang
- Brandon Ylvisaker

MGP Instruments Scholarships
Representative: Sergio Lopez
- Troy Bethune
- Lindsey Ewing

Woodruff School NRE Scholarship
Representative: David Sanborn
- Kevin Riggs

Awards
Larissa Cottrill (B.S.N.R.E. 2003) won a National Science Foundation Graduate Research Fellowship and the Department of Energy Fusion
Energy Sciences Fellowship as an undergraduate. She is now a graduate student at MIT.

Christopher Fong won the Westinghouse Savannah River Company Robert Maher Memorial Scholarship from the Citizens for Nuclear Technology Awareness, Inc. He is in the Five-Year BS/MS Program.
A total of 25 degrees were awarded in the NRE/HP Program in the past academic year.

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<thead>
<tr>
<th></th>
<th>Bachelor's Degrees</th>
<th>Master's Degree</th>
<th>Doctoral Degree</th>
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<tr>
<td></td>
<td>Females</td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>NRE</td>
<td>2</td>
<td>5</td>
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<tr>
<td>HP</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>TOTALS</td>
<td>2</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

The ethnicity of those awarded degrees in the NRE/HP Program in the last academic year is as follows. Of the seven bachelor's degrees awarded, one was given to a black student and six went to white students. On the master's level, ten degrees were awarded to white students and one to an international student. Of the seven doctoral degrees awarded, one went to an Asian student, one to a black student, two to international students, and three to white students.

**Undergraduate Degrees**

During the past academic year, seven undergraduate degrees were awarded: one degree in summer 2002, none in fall 2002, and six in spring 2003.

**Summer 2002**
John Barne Williams

**Fall 2002**
None

**Spring 2003**
Anthony D. Achudume Joshua Lloyd Parker
Larissa Ann Cottrill Sarah L. Rogers
Greg Cadigan Donald Christian Sirmans
Hahn

**Graduate Degrees**

In the past academic year, eighteen graduate degrees were awarded: ten master's degrees in health physics, one master's degree in nuclear engineering, and seven Ph.D.'s.

**Summer 2002 Graduates**
Lisa G. Chiang (Ph.D. NE)
Advisor Chris Wang
Passive Coincidence Technique to Determine the Shape of Plutonium Assemblies Using Second and Higher Order Statistics

Kathleen Roessler Foster (MSHP)
Advisor Nolan Hertel
Design of an Inlet Line Monitor System for the State of Illinois' Gaseous Effluent Monitoring System

Edward Albert Hoffman (Ph.D. NE)
Advisor Weston Stacey
Title Neutron Transmutation of Nuclear Waste

Scott Allen Hudson (MSHP*)
Advisor Chris Wang (Nonthesis)

Raymond Charles Karol (MSHP*)
Advisor Nolan Hertel (Nonthesis)

Wondwosen Mengesha (Ph.D. NE)
Advisor John Valentine
Title NaI(Tl) Electron Energy Resolution

Fall 2002 Graduates

Mural Khamzin (Ph.D. NE)
Advisor John Valentine
Title Data Acquisition and Analysis for the Energy-Subtraction Compton Scatter Camera for Medical Imaging

Casey Moore (MSHP)
Advisor Chris Wang
Title Cell Cycle Affects Accumulation of B-5-0 Carboranyl-2 Deoxyuridine in Human Glioma Cell Line

Richard Oberer (Ph.D. NE)
Advisor Nolan Hertel
Title Neutron Discrimination for Higher-Order Time Correlation Statistics

Robert Wayne Simpkins (Ph.D. NE)
Advisor Nolan Hertel
Title Neutron Organ Dose and the Influence of Adipose Tissue

Tory James Swanson (MSHP*)
Advisor William Wepfer (Nonthesis)

Spring 2003 Graduates

John S. Contardi (MSHP)
Advisor Nolan Hertel (Nonthesis)

Clinton Mabe Kirby (MSHP)
Advisor Nolan Hertel (Nonthesis)

Marat Radikovich Seidaliev (MSHP)
Advisor Chris Wang (Nonthesis)

Joerge Hermann Stromberger (Ph.D. NE)
Advisor Said Abdel-Khalik

Dale Danzel Thomas (MSHP)
Advisor Chris Wang (Nonthesis)

* This denotes a degree received by participating in Georgia Tech's Distance-Learning Program.
Said I. Abdel-Khalik, Southern Nuclear Distinguished Professor and Professor Ph.D., University of Wisconsin, 1973

Research (Fission)
Dr. Abdel-Khalik conducts experimental and numerical research in both mechanical and nuclear engineering. Current experimental research projects include investigation of the root-cause mechanism for axial offset anomaly in pressurized water reactors, single and two-phase flow and heat transfer in microchannels with emphasis on accelerator targets and resistive magnet systems, first wall protection schemes for inertial fusion reactors, EHD enhancement of convection and boiling heat transfer for microgravity applications, and fuel cells' performance enhancement. Current numerical research efforts include multifluid modeling of transient nonequilibrium two-phase flow, Rayleigh-Taylor instability of bounded layers with surface injection, thermal analysis of dry cask spent nuclear fuel storage systems, and density wave instabilities in boiling water reactors.

Cassiano de Oliveira, Professor Ph.D., University of London, England, 1987

Research (Fission)
Dr. de Oliveira's main research interest is in the development of advanced computational methods for the practical solution of complex problems which arise in nuclear engineering and other fields of engineering and physical science. Current research focuses on deterministic radiation transport methods on unstructured computational grids, solution selfadaptivity for optimizing computational effort and accuracy, high-performance computing, inverse photon scattering problems, nonlinear coupling of different physical phenomena, and mathematical optimization. Applications provide the main drivers for the research and they span the areas of nuclear engineering (reactor physics, shielding and criticality safety), atmospheric and cloud physics, medical physics (optical tomography), nuclear geophysics, and oceanography.

Nolan E. Hertel, Professor Ph.D., University of Illinois, 1979

Research (Health Physics and Fission)
Dr. Hertel's research interests include neutron benchmark experiments and the integral testing of neutron data, radiation dosimetry and shielding, air-scattered radiation, high-energy particle transport, and radiological assessment. Dr. Hertel has several ongoing research projects in neutron dosimetry, internal dosimetry, high-energy particle transport, and neutron therapy facility design. He recently initiated a program to calculate inhalation and ingestion dose conversion coefficients for radioactive spallation products. Another research activity addresses the redesign of a fast neutron cancer radiotherapy target at Fermilab to extend its applicability to include boron capture therapy enhancement of the fast-neutron tumor dose. Dr. Hertel also has ongoing research projects in computational dosimetry, specifically addressing the need for dose conversion coefficients for protons, neutrons, and photons above 20 MeV. He also has been involved in the improvement of radiation skyshine analysis tools for determining radiation doses near arrays of spent-fuel dry storage casks.
Farzad Rahnema, Professor and Associate Chair of the Woodruff School, Chair of the Nuclear and Radiological Engineering and Health Physics Program Ph.D., University of California, Los Angeles, 1981

Research (Fission)
Dr. Rahnema's research activities are in computational reactor physics, transport theory and criticality safety as well as variational and perturbation theory. The main thrust of his work is the development of highly efficient and accurate coarse-mesh methods for criticality analysis in reactor cores and spent fuel configurations. He is developing coarse-mesh transport theory methods for advanced light water reactors and next generation nuclear plants. Another area of research is a coupled Monte Carlo and deterministic diffusion theory method for criticality analysis of spent fuel configurations. The main purpose of this investigation has been to develop coarse-mesh methods for estimating homogenized diffusion coefficients that lead to diffusion results with Monte Carlo accuracy. Ongoing collaboration with INEEL also involves the development and improvement of cell-homogenized cross sections in three-dimensional geometries typical of Pebble Bed Reactors (PBR). Variational and perturbation methods are under development for correcting cross sections for spectral effects due to fuel burnup in the PBR fuel cycle depletion code.

Weston M. Stacey, Jr., Fuller E. Callaway Professor in Nuclear Engineering and Regents' Professor Ph.D., MIT, 1966

Research (Fusion)
Dr. Stacey's research has two principal thrusts. Experimental Plasma Physics Analysis and Supporting Theory: Dr. Stacey's group in the Fusion Research Center (FRC) formally collaborated with the DIII-D National Fusion Facility in the planning, data analysis, and interpretation of plasma physics experiments in the DIII-D tokamak, informally collaborated with the German TEXTOR tokamak group in the analysis of a series of experiments, and independently carried out supporting plasma theory and code development. During the past year, this work concentrated on understanding density limits, calculating plasma rotation and transport, and understanding phenomena in the edge plasma which play a major role in plasma confinement. Next-Step Fusion Device Design: Dr. Stacey's group in the FRC performed plasma physics analysis in support of the national design effort for the FIRE burning plasma experiment and developed the concept of the Fusion Transmutation of Waste Reactor, a subcritical nuclear reactor driven by a fusion neutron source which would transmute the long-lived actinides in spent nuclear fuel.

C.-K. Chris Wang, Associate Professor Ph.D., The Ohio State University, 1989

Research (Health Physics/Fission)
Dr. Wang's research includes both experimental and computational studies on the radiation
detection and dosimetry problems that involve neutrons, photons, and charged particles. He has had a long-term research interest in the development of various neutron-based cancer treatment modalities including fast neutron neutron therapy and neutron capture therapy. Dr. Wang’s recent collaboration with the Oak Ridge National Lab (ORNL) and the Isotron Inc. has resulted in the successful development of a new generation of high-intensity miniature 252Cf source seeds, making the interstitial 252Cf brachytherapy a practical modality for cancer treatment. His research projects include the biophysical modeling of radiation effects on cells and the in-phantom neutron dose measurement using radiochomic films.

Affiliated Faculty

**S. Mostafa Ghiaasiaan**, *Professor*
Ph.D., University of California, Los Angeles, 1983
Multiphase flow, aerosol and particle transport, microscale heat transfer, and nuclear reactor thermohydraulics.

**Sheldon Jeter**, *Associate Professor*
Ph.D., Georgia Institute of Technology, 1979
Thermodynamics, energy systems, and heat transfer.

**Jack Lackey**, *Professor*
Ph.D., North Carolina State University, 1970
Nuclear fuel and waste processing, ceramic and metallic coatings, composites, and rapid prototyping.

Research Faculty

**John Mandrekas**, *Senior*
Research Scientist  
Ph.D., University of Illinois, 1987  
Plasma physics, transport  
theory, fusion reactor design,  
numerical methods, and  
computational physics.  

Dennis Sadowski, Research  
Engineer II  
M.S., University of Illinois at Chicago, 1986  
Thermal sciences, fluid dynamics, and design and construction of experimental equipment.  

Emeritus Faculty  

Melvin W. Carter, started in 1972, retired in 1988  
Joseph D. Clement, started in 1965, retired in 1991  
Monte V. Davis, started in 1973, retired in 1987  
Geoffrey G. Eichholz, started in 1963, retired in 1988  
Bernd Kahn, started in 1974, retired in 1996  
Ratib Karam, started in 1972, retired in 1997  
Alfred Schneider, started in 1975, retired in 1990  

Retirements  

Rodney Ice, Principal Research Scientist and Adjunct Professor of Nuclear Engineering, retired from Georgia Tech in his position as Radiation Safety Officer in summer 2003.  

Awards  

Said Abdel-Khalik won Georgia Tech's 2003 Outstanding Service Award.  
Farzad Rahnema was elected to the grade of Fellow in the American Nuclear Society.  
Weston Stacey won Georgia Tech's Outstanding Faculty Research Author Award and the 2003 Eugene P. Wigner Reactor Physicist Award from the American Nuclear Society for outstanding contributions to the advancement of the field of reactor physics. The award was given in recognition of his significant and original contributions to nuclear reactor physics through his research in several areas including variational methods, space-time kinetics and neutron slowing down theory, and through his teaching and books.  

Patents  

In fall 2001, the Woodruff School dedicated a display titled, *Patents of the Woodruff School Faculty*, which is supported by the Harold W. Gegenheimer (class of 1933) Endowment for Innovation. When the wall was dedicated it contained 140 U.S. patent plaques of current
Woodruff School faculty members. Recently, thirty-seven new plaques were added, reflecting the patents of new faculty members and joint appointments to the School. This display is meant to impress students and visitors with the importance of innovation and invention. Selected patents held by NRE faculty or affiliated faculty members are given below:


Promotions

**Shauna Bennett-Boyd** was promoted to Administrative Assistant II. She provides administrative support to the Fusion Research Center and Nuclear and Radiological Engineering research and academic faculty.
There are two major research centers associated with the Nuclear and Radiological Engineering Program.

Fusion Research Center
Director, Weston Stacey
Work is performed on plasma and neutral particle transport, fusion neutron source applications, next-step tokamak design analysis, and the transmutation of spent nuclear fuel.

Neely Nuclear Research Center
Director, Nolan Hertel
High dose rate irradiation, instrumentation testing, Co-60 sterilization, MCNP computer modeling, radiation transport and neutron measurements.
Seminars that discuss new developments in nuclear and radiological engineering are presented by well-known speakers. Speakers come from academia, industry, and governmental and professional organizations and represent various areas in the discipline. Graduate students are encouraged to attend these seminars to fulfill the requirements for NRE/HP 8997. What follows is a list of speakers from the 2002-2003 academic year.

**Bob Boyd**, Radiation Safety Officer, Georgia State University (Retired), *Aircraft Nuclear Power Program: My Experiences at the Lockheed Nuclear Laboratory*;

**Jeffrey Favorite**, Diagnostics Applications (X-5) Group Applied Physics Division, Los Alamos National Laboratory, *Using the Schwinger Variational Functional for the Solution of Inverse Transport Problems*;

**Ken Folk**, Southern Nuclear Company, *Extending the Experience Base*;

**Fun Fong**, Staff Physician, Emory Adventist Hospital, *Emergency Response for Nuclear and Radiological Events*;


**Walter M. Justice**, Acting Chief Engineer, Tennessee Valley Authority Nuclear Power Organization, *Status of Nuclear Power: The Future is Bright*;

**Kenneth R. Kase**, Staff Scientist, Stanford Linear Accelerator Center, President Elect, Health Physics Society and Vice President, National Council on Radiation Protection and Measurements, *Neutron Spectra Outside the Lateral Shield of a 30 GeV Electron Beam Dump*;

**John Lobdell**, Novoste Corporation, *Dosimetry and Activity Comparisons of Sr-90 Sources*;

**Richard E. Malenfant**, Los Alamos National Laboratory Advanced Nuclear Technology Group, *The Physics of Arms Control at Pajarito Site of the Los Alamos National Laboratory and Lessons Learned From Early Criticality Accident*;

**Dominic Napolitano**, Senior Technical Consultant, NISYS Corporation, *ISFISI Shielding Evaluations with MCNP Monte Carlo*;


**David Poston**, Space Fission Power Team Leader, Los Alamos National Laboratory, Los Alamos, New Mexico, *Fission Reactors for Near-Term Space Exploration*;

**Brad Roscoe**, Principal Research Scientist, Schlumberger-Doll Research, *Nuclear Measurements for Oil Well Logging*;

**Richard Sanchez**, Research Director, CEA - France, *Krylov Acceleration for the Method of Characteristics in Unstructured Meshes*;

**Howard Lewis Sumner, Jr.**, Vice President, Southern Nuclear Operating Company, *Current Issues and Initiatives in the Nuclear Industry*;

**Andy Tompkins**, Field Engineer, Offsite Source Recovery Program, *Control of the Nation’s Orphaned Nuclear Stockpile*; and

**Larry Townsend**, Nuclear Engineering Department, University of Tennessee, *Hazards of Solar Energetic Particle Events During Human Exploration Missions in Deep Space*. 

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**SEMINARS**

Seminars that discuss new developments in nuclear and radiological engineering are presented by well-known speakers. Speakers come from academia, industry, and governmental and professional organizations and represent various areas in the discipline. Graduate students are encouraged to attend these seminars to fulfill the requirements for NRE/HP 8997. What follows is a list of speakers from the 2002-2003 academic year.

**Bob Boyd**, Radiation Safety Officer, Georgia State University (Retired), *Aircraft Nuclear Power Program: My Experiences at the Lockheed Nuclear Laboratory*;

**Jeffrey Favorite**, Diagnostics Applications (X-5) Group Applied Physics Division, Los Alamos National Laboratory, *Using the Schwinger Variational Functional for the Solution of Inverse Transport Problems*;

**Ken Folk**, Southern Nuclear Company, *Extending the Experience Base*;

**Fun Fong**, Staff Physician, Emory Adventist Hospital, *Emergency Response for Nuclear and Radiological Events*;


**Walter M. Justice**, Acting Chief Engineer, Tennessee Valley Authority Nuclear Power Organization, *Status of Nuclear Power: The Future is Bright*;

**Kenneth R. Kase**, Staff Scientist, Stanford Linear Accelerator Center, President Elect, Health Physics Society and Vice President, National Council on Radiation Protection and Measurements, *Neutron Spectra Outside the Lateral Shield of a 30 GeV Electron Beam Dump*;

**John Lobdell**, Novoste Corporation, *Dosimetry and Activity Comparisons of Sr-90 Sources*;

**Richard E. Malenfant**, Los Alamos National Laboratory Advanced Nuclear Technology Group, *The Physics of Arms Control at Pajarito Site of the Los Alamos National Laboratory and Lessons Learned From Early Criticality Accident*;

**Dominic Napolitano**, Senior Technical Consultant, NISYS Corporation, *ISFISI Shielding Evaluations with MCNP Monte Carlo*;


**David Poston**, Space Fission Power Team Leader, Los Alamos National Laboratory, Los Alamos, New Mexico, *Fission Reactors for Near-Term Space Exploration*;

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The Nuclear Engineering Advisory Board of the Woodruff School has representatives from academia and industry. These board members also belong to the Woodruff School Advisory Board. They meet once a year, in the fall, to discuss new ideas for the NRE program and areas of research that are important to industry. Dr. Lawrence Ybarrondo is the chair of the Woodruff School advisory board.

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