

The Newsletter of the Nuclear Engineering Program

Gamma Gazette[®]

University of Missouri-Rolla • Missouri's Technological University

Vol. 10

September 2005

No. 1

NANT Scholarships

The National Academy for Nuclear Training (NANT) Scholarship Program awards scholarships to college students who are interested in pursuing careers in the nuclear power industry. The scholarships are funded by all U.S. utilities that operate nuclear power plants and by companies that offer services to the nuclear industry.

For the 2005-06 academic year, 62 new NANT undergraduate scholarships of \$2,500 have been awarded nationwide to nuclear engineering students. Six (6) undergraduate students (10% of the total awards) in the Nuclear Engineering department at UMR are recipients of new NANT scholarships. These students are sophomores Courtney Guinn, Zachary Kulage, and Samantha Price; juniors Jeffery Joggerst and Justin Talley; and senior Michael Flagg. Congratulations to all of our outstanding students!

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Competitive Scholarships and Fellowships

2005 BS nuclear engineering graduate Matt Dennis has received a fellowship from the U.S. Department of Energy's Advanced Fuel Cycle Initiative (AFCI) University Fellowship Program. He is one of the eight AFCI fellows nationwide who will receive up to \$42,500 in benefits as they work toward master's degrees and conduct advanced fuel cycle research.

Ronald Morton and Michael Lampe have been awarded the UMR Chancellor's Fellowships this Fall 2005 semester. This fellowship gives students a waiver of resident and applicable non-resident fees for as many as six semesters and intervening summer sessions as long as they maintain a minimum 3.50 cumulative grade point average.

The department recommended MS student, Michael Lampe, for the National Academy for Nuclear Training (NANT) Fellowship for the academic year 2005-2006. The NANT fellowship program provides support to deserving graduate students, particularly those demonstrating a potential for accepting employment in the nuclear utility industry following graduation. The department normally selects a student with a high GPA with concurrence of the National Academy for the fellowship.

The American Nuclear Society (ANS) has awarded scholarships to two nuclear engineering undergraduates. Reanea Hunter is a recipient of the ANS John and Muriel Landis Scholarship, and Michelle Marincel is a recipient of ANS Undergraduate Scholarship Award. Each received an award certificate and a check in the amount of \$4,000 and \$2,000 respectively, which were presented to them by Dr. Arvind Kumar on behalf of the ANS Scholarship Policy and Coordination Committee during the ANS-UMR chapter meeting.



Annual Phonathon November 6 - 9, 2005

This year's Phonathon is scheduled for November 6 - 9, 2005. Nuclear Engineering students will be contacting you during this four day period. Your generous contributions allow us to help our students with the costs of attending UMR and greatly aid our recruitment efforts. In addition, we can upgrade our labs by providing matching funds for equipment purchases. We look forward to talking to you again!

MORE TO COME 

Letter from the Program Chair

Greetings from the Nuclear Engineering Department! I am writing to share with you some of the accomplishments and challenges of our Program for the past year.

I am pleased to note that the Nuclear Engineering Summer Camp 2005 was a continuing success, with 48 attendees from 16 states. Fifteen campers were from Missouri. Some of the campers have already applied to UMR and have been accepted in our B.S. program. The summer camps have been instrumental in increasing enrollment in nuclear engineering. As you know, low enrollments have been a cause of concern in the past since the viability of our program could be questioned. I am pleased to tell you that Fall 2005 enrollment stands at 133, including 36 freshman students. This is the highest enrollment we have seen during the twenty-six years I have been at UMR.

Our students are as good as ever. Six of our undergraduates (C. Guinn, Z. Kulage, S. Price, J. Joggerst, J. Talley and M. Flagg) received new National Academy for Nuclear Training (NANT) scholarships for the 2005-2006 academic year. It is quite impressive given the fact that only 62 new NANT scholarships were awarded nationally. In addition, Reanea Hunter is a recipient of ANS John and Muriel Landis Scholarship, and Michelle Marincel is a recipient of ANS Undergraduate Scholarship Award. Our graduate students have also done well in obtaining competitive fellowship awards. Two graduate students (Ron Morton and Michael Lampe) received Chancellor's Fellowships. It is worth noting that only six Chancellor's Fellowships were awarded this year to graduate students in the seven degree programs in our School. In addition, Matt Dennis received a very prestigious Advanced Fuel Cycle Initiative (AFCI) fellowship from the Department of Energy (DOE) in a national competition.

In addition to the above, I would like to tell you about another success story pertaining to our undergraduate students associated with a newly established "Radioactive Waste Management Laboratory," funded by an Innovation in Nuclear Infrastructure and Education (INIE) grant from DOE. Three NE students (S. Fesenmeyer, J. Haden, and L. Ponder) working on the development of nuclear waste glasses received three different prizes for their research papers, including a first prize at the ANS student conference, Columbus, Ohio in April 2005.

With large increases in enrollment, we are facing several issues that we did not have to face in the past. For example, even with multiple sections to accommodate 32 students in the radiation measurements laboratory class next semester, we will need to purchase additional radiation detectors, counters, multichannel analyzers, etc. and hire student assistants to help with the lab. We also need to upgrade existing equipment and software. Furthermore, the amount of money needed for providing scholarships to our students is also increasing with enrollment.

Regrettably, UMR's budgetary situation is not good. Therefore, little, if any, state funds are available for laboratory upgrades or student support. As a result, we need your help more than ever. Your support is gratefully appreciated.

In closing, I would like to mention that I will be stepping down on July 1, 2006 after serving as Chair of Nuclear Engineering for thirteen years. Release from administrative duties will give me additional time to work on my research in the area of nuclear plant life extension. Search for a new Chair is underway.

Please keep in touch and visit us when you can. Best wishes,

Arvind Kumar

Dr. Usman's First Year at UMR

The Gamma Gazette provides me this opportunity to share with all of you the progress that I have made during my first year at the University of Missouri-Rolla. As you may know, I joined UMR last year. During my first year at UMR, I have been busy recruiting good quality students and improving our Radiation Measurement Lab. I have also been busy establishing my research program and getting acquainted with the university system. I taught two sections of NE 205 and NE 204. This teaching experience is simply wonderful. I found UMR students to be intelligent and very motivated to learn. I am sure together we will build a collegial partnership.

In addition to my research carried over from University of Cincinnati, I initiated and completed one project on simulation of natural convection. This effort produced a very interesting analogy between integrator circuits and the phenomenon of natural convection. These results were presented at the summer ANS meeting and a manuscript is in the editorial process.

A much improved radiation measurement facility is now established in 214 Fulton Hall. The lab is equipped with all modern amenities including ten web-enabled computers loaded with radiation data acquisition hardware. We are still in the process of procuring new state-of-the-art radiation detectors and other associated hardware to further our research and teaching capabilities.

My recruiting efforts have also been very successful and I am pleased to have Bassam Abd El-Nabi, Matthew Dennis, and Amol Patil as my new graduate students. In addition, I am also advising Terry Yu and Krista Kaiser for their undergraduate research.

Perhaps the most rewarding experience during my first year at UMR was the Nuclear Engineering Summer Camp. This camp provided me with the opportunity to work with prospective nuclear engineering students who are now in high school. Students from many different states attended the camp. It was a true pleasure to participate in this successful effort which was a huge success. Two of these students are so eager to start nuclear engineering that they are trying to make arrangements to get started on a nuclear engineering project even before finishing high school.

THERE'S MORE 

Dr. S. Kim's Yearly Summary

We have recently completed building the air-water two-phase flow experimental loop in the Two-phase Flow and Thermal-Hydraulics Laboratory (TFTL) to perform advanced two-phase flow experiments. TFTL is located in G-2 Fulton Hall. It is a rectangular adiabatic air-water two-phase flow loop approximately 20 feet in height (L/D ratio is over 100), where liquid and gas flow rates can reach easily up to 10 m/s and 50 m/s, respectively. It is capable of simulating all the conceivable two-phase flow regimes encountered in light water nuclear reactors and is ideal for flow visualization. The facility has been employed for demonstrations in my nuclear engineering courses and served as a great educational tool. In addition, the high-speed digital movie camera that can record moving images up to 10,000 frames per second played an important role in motivating students' curiosity on nuclear thermal-hydraulics.



Students Building TFTL

Furthermore, two of my undergraduate assistant students, Justin Talley and Tisha Johnson, have performed flow regime identification studies and presented their work at the UMR undergraduate conference. They showed that the existing flow regime transition models developed for round pipe flows cannot be applied to predict the regime transition in rectangular channels. They will work further to develop models to predict flow regime transition in a rectangular channel, which is often encountered in a high-efficiency nuclear reactor. We are planning to perform various two-phase flow studies important in view of reactor safety. These include: interfacial area transport in vertical rectangular channels, turbulent diffusion in two-phase planar jets, and studies on effects of void profile at the inlet. In parallel to these studies, continuous efforts in developing advanced two-phase flow instrumentation will be made to acquire detailed and accurate local two-phase flow parameters.

I am also working on a research project supported by the US NRC, entitled as "Interfacial Area Transport in Horizontal Two-Phase Flow Through Various Flow Restrictions." We are trying to establish models to dynamically predict the two-phase flow transport and to develop correlations for two-phase minor loss pressure drops. This project started in October 2004 and will be continued in 2006. So far, we have developed correlations for two-phase minor losses in 45-degree and 90-degree elbow junctions and published two internal data reports (UMR/NE-TFTL-05-01 and UMR/NE-TFTL-05-02) submitted to the US NRC.

Summer Camp 2005

This summer the Nuclear Engineering department hosted its sixth annual summer camp, with a total of 48 students from 16 different states including: Arkansas, Arizona, Florida, Illinois, Kansas, Michigan, Minnesota, Missouri, North Dakota, Nebraska, New Mexico, Oklahoma, South Dakota, Tennessee, Texas, and Virginia. The two sessions for this year's camp were held on July 10-15 and July 17-22. The camp was again a great success, and the recruiting efforts of the students, alumni and faculty were greatly appreciated.

During the camp, the students were exposed to a variety of activities. The activities included a presentation by AmerenUE on the Callaway nuclear power plant steam generator replacement project; radionuclide identification; half-life experiments; and with many others. These experiments were headed by six student mentors: Ron Morton, Mike Lampe, Mike Varner, Brandon Distler, Billy Peach, and Stewart Henderson. The campers were also expected to make a presentation based on information they gathered during the week in their respective focus groups. This year's focus groups included: *Reactor Operations*; *Space Nuclear Power*; *Next Generation Reactors*; and *Nuclear Fuels*. The students prepared their presentations with the help of faculty and UMR student mentors.



This year, the primary camp counselors were sophomores Michael Hoffman, Tisha Johnson, Justin Talley, and Terry Yu. The counselors led activities such as evening reviews that incorporated nuclear engineering information that the students had learned during the week. Overall, the summer camp was a great success. Many high school students who attended the camp indicated that they would like to be contacted in the future about entering UMR's Nuclear Engineering program. Many thanks for those who were involved with the many different aspects of the camp. We look forward to next year and hope, with your help, to make next year's camp the best yet.

ONE MORE 

Dr. Cheol-Woon Kim's Summary

I have recently joined the department as an adjunct assistant professor. Before I joined the department, I worked at the Materials Research Center, UMR as a research assistant professor for several years and did research on the development of novel glasses and ceramic materials for encapsulating radioactive and hazardous wastes.

During the last year (04-05), I was partially affiliated with the department and successfully established the "Radioactive Waste Management Laboratory" in the remodeled room 218, where our new and novel research on "Removal of Radioactive and Toxic Elements from Nuclear Waste Streams using Hydroxyapatite Filter" has been initiated. The students who helped establish the lab include Stephanie Fesenmeyer, Jeffrey Haden, and Leia Ponder. This lab and research project is being co-directed by Dr. Delbert E. Day (Curators' Professor of Ceramic Engineering and Adjunct Professor of Nuclear Engineering). Stephanie, Jeff, and Leia have won three prizes for their excellent research activities in national and local student research contests. They won the first prize at the ANS Student Conference, Columbus, Ohio, April 14-16, 2005; second prize at the first Undergraduate Research Conference, Havener Center, UMR, April 13, 2005; and third prize from the Sigma Xi Undergraduate Research Contest, UMR, December 17, 2004. In addition, our student research was presented at a national professional conference, the American Ceramic Society 107th Annual Meeting, Baltimore, Maryland, April 10-13, 2005.

This year, I joined the department full time and started teaching NE307, Nuclear Fuel Cycle. The students mentioned above are still on board, and Alicia Canelos and Michelle Minard have recently joined our research group. Michelle is currently working with Dr. Day and me on technetium removal from aqueous solution using hydroxyapatite for her M.S. Most recently, I was fortunate to receive research funding from the University of Missouri Research Board to study "Disposing of Nuclear Wastes in Lunar and Martian Glass." In this project, Dr. Chandra Ray in NASA is working with me as a co-investigator. I will do my best to help the department to keep growing and advance its reputation.

Gamma Gazette News

I have been the editor and creator for the *Gamma Gazette* for the last ten years. I have thoroughly enjoyed bringing our alumni and friends news about our department. However, this will be the last issue of the *Gamma Gazette*. Next year there will be a new editor and a new design for the department's newsletter. Hope you all have enjoyed the *Gamma Gazette*! Gary Mueller

The Nuclear Engineering department would like to thank and acknowledge the following alumni, friends and companies for their generous contributions between July 1, 2004 and June 30, 2005.

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Baker, Edwin R '73
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The gifts received by the department from individuals total \$11,655.

The following corporations made gifts to Nuclear Engineering during the same time period.

American Nuclear Society
Bio Met Access Company LLC
Black & Veatch
INPO
Nuclear Advisory Group, Inc.

The matching gifts received by the department from corporations total \$25,260.

THANKS AGAIN!