Dear AMEP Alumni, Students and Friends,

I am pleased to present you with the second edition of the AMEP newsletter. There is a lot of news to pass on to you this year. Last year’s newsletter drew a considerable number of alumni emails, and I have included news from many of you in the “Alumni news” section. It is a tremendous pleasure for me to hear from alumni, so please drop me a line! The web page has been redesigned so as to better help students in learning about AMEP and choosing their courses. Please take a look at www.math.wisc.edu/~amep. From there you can also download the newsletters and donate to the program! An exciting piece of news is that Dr. Stephen Turner (’91) has received a “Distinguished Alumni Award” for his pioneering work in new methods for DNA sequencing (see inside).

I have been thinking for a few years on ways to expand AMEP. One idea, for example, is a degree program based on the AMEP framework that focuses also on Biology. This would give students the option of entering the exciting and emerging interdisciplinary fields that combine aspects of Biology, Physics, Mathematics and Engineering.

I will be on a research sabbatical next year, but I will keep AMEP on the front burner, so please send me your ideas, suggestions or opinions. Thank you to Li Jiang who served as the “reporter” for this newsletter, for all his work. Until next year!

Paul Milewski, AMEP Coordinator
**Faculty Profile**

**Professor Fabian Waleffe** is currently a mathematics advisor in the program. He is originally from Belgium and was an undergraduate Engineering Physics major in a five-year program. Afterwards, Professor Waleffe went to MIT and received his Ph.D. in Applied Mathematics in 1989. He then worked as a postdoctorate fellow at Stanford and at the NASA Ames Research Center until 1992. He was then a faculty member at MIT before coming to Madison in 1998.

Concerning his career direction, Professor Waleffe says that he never aspired to become a professor, though he has been interested in mathematics and physics since high school. He was also very interested in coming to the United States, saying “everything exciting was from the US.” Professor Waleffe explains, “One thing led to another, I applied and MIT took me… and it just happened.” Professor Waleffe’s research involves turbulence and fluid dynamics, which goes all the way back to his undergraduate years.

He says “I was amazed that we could walk on the moon but we didn’t understand the flow of water down a pipe.” Though Professor Waleffe has done research in other areas, fluid dynamics has always been his main passion.

Ever since he came to Madison, Professor Waleffe has been involved with AMEP and was also coordinator for a few years. He thinks that it is a very attractive program and that it fills up a gap in today’s education system. Professor Waleffe explains:

“When I was an undergraduate, we learned a lot of math, much more than the typical engineer today… In some sense, Math is more important now than before because we have cheap, powerful computers to help us solve math problems… Paradoxically, the math education of engineers has been reduced. People think we don’t need math since computers can do the math for us, but computers only help us with number-crunching. More than ever, we need people to do mathematical
modeling and analysis. That’s one of the places where a program like AMEP comes in.”

The advice that Professor Waleffe would give AMEP students is to talk to their advisors and make sure that they don’t take the easiest path in terms of classes. Because AMEP is very flexible in terms of the classes required and because it essentially covers three fields, AMEP students naturally take more basic courses. However, he thinks they should not end their studies without having had many higher level classes also.

Those who have taken classes with Professor Waleffe (including the writer of this article), would agree that his classes are very challenging. Professor Waleffe explains that, because his background is applied math and engineering, he knows how engineers and scientists use the math that he teaches. Students might not get that from another professor who is a pure mathematician. Many students, in hindsight, appreciate Professor Waleffe’s unique approach to math and the challenge that he provides in his course. As one student puts it: “after 321 with Waleffe, all my courses in electromagnetics and waves were a breeze!”

Recent Graduate

Lyubov (“Lyuba”) Chumakova graduated from the AMEP program in 2004 and was also a recipient of the AMEP leadership prize that year. She began her college career at Novosibirsk State University in Russia studying Mathematics. After two years, Lyuba transferred to Madison. She found AMEP to be the only program that satisfied all of her interests, including math, fluid dynamics, and working in Formula 1. As such, she specialized in mechanical engineering for her AMEP degree.

Lyuba enjoyed the program, saying “The program is flexible and there are many advisers who can suggest the courses that suit the best scientific interest of a particular student.” Lyuba also believes that the “AMEP experience is unique, one of its greatest virtues is the student’s early exposure to a variety of scientific fields and their
interactions…They see how specialists in these field interact and how interdisciplinary research is often the result of such interactions.”

For two summers during her stay at Madison, Lyuba worked with Professor Waleffe on the visualization of instabilities of flows and with Professor Milewski on image processing for immunocolloid labeling. During her last summer she participated in the Research Experience for Undergraduates (REU) in Brazil, where she worked with students from Brazil and other US universities.

Lyuba has changed her mind about working in Formula 1, and is now pursuing her Ph.D. in Mathematics at the Courant Institute of Mathematical Sciences in the Center for Atmosphere and Ocean Sciences (CAOS). Currently, she is working in the field of ocean modeling, treating the ocean as a stack of fluid layers with different densities. Lyuba explains that this is important work because understanding the dynamics of ocean behavior will contribute greatly to the understanding of climate change.

To the current students, Lyuba would suggest that they try doing a research project or applying for a REU. Lyuba explains that “there is nothing more exciting than figuring something out that nobody has ever done before. And you’re in AMEP, so you’re well prepared for the challenge.”

Alumni News

We have news from one of the very first graduates of AMEP! Dr. Hirsh Cohen entered the University of Wisconsin–Madison in 1942 as a Mining and Metallurgical Engineering student. By the end his first semester, however, he had realized that he did not want to do drafting, and was in search of a different major. As luck would have it, his math advisor revealed to him a new curriculum that was starting in the spring semester called Applied Mathematics and Mechanics.

Hirsh Cohen was introduced to Professors Elizabeth Sokolnikoff and Bob Specht. They had recently returned from Brown University, where a special wartime Applied Mathematics graduate program had been formed, and wanted to start a similar version at Madison for undergraduate students. He explains that he switched to this new major “mostly to get away from more mechanical drawing, and with virtually no idea of what applied math meant.” From the beginning, the major was “an amalgam of math, engineering and physics.” Engineering classes included basic subjects such as statics, dynamics, and strength of materials along with an assortment of electrical, aeronautical, and mechanical courses.
His most memorable and useful course was one on Fourier series and harmonic analysis, taught by Professor Erickson with a textbook written by Ruel Churchill. Of course, electronic computers were not yet on the scene and, as Dr. Cohen explains, most attention was on approximate analytical methods and hand calculations by electro-mechanical desk machines.

Dr. Cohen also shared with us humorous and interesting memories of another professor that he had:

“[He] was a newly arrived Polish gentleman named Stanislaus Ulam, very continentally dressed and mannered, who always had a cigarette in one hand and the chalk in the other as he lectured. The chalk in those days was really chalk and must have tasted quite strange to him when he switched hands and wrote with the cigarette and inhaled the chalk. About mid-term, he left and the department head, Rudolph Langer, announced that Mr. Ulam had gone to join the war effort and he, himself, would lead the course. Later, I realized that Stan Ulam had, indeed, gone to Los Alamos and there, figured out how to build the hydrogen bomb.”

Due to the war, the university had put itself on an accelerated, three term yearly schedule. By the time Dr. Cohen’s draft number came up, he had finished more than the first three years’ courses. He entered the Navy to be trained as a radar technician and spent some time in the Pacific. He then returned to Madison in June of 1946 and graduated the following year. Dr. Cohen describes the graduation ceremony:

“At the graduation ceremony in the football stadium, degrees were announced and the graduates stood up. Hundreds were rising for English and many for economics and political science but only two for the new degree of Applied Math. I believe the other person was a fellow named Harold Black and I think we were the first to finish with that degree although memory does not serve so well and June 1947 is a few decades of memory passed.”

After graduation, Dr. Cohen’s friends Burt Colvin, Bob Specht, and Betty Sokolnikoff arranged for him to go on to Brown University, where he finished the work for the Ph.D. in 1950. Since then, Dr. Cohen has been involved with teaching, research, managing, and was also the president of the Society for Industrial and Applied Mathematics (SIAM) in the ‘80s. Throughout the years, Dr. Cohen has “watched how [the applied math program]
developed from [Harold Black and him] at Camp Randall on that sunny June day to a full fledged and thriving body of science.”

Dr. David Nelson graduated from the AMEP program in 1964 and went on to receive a Ph.D. in theoretical physics in 1970 at the University of Maryland. Afterwards, Dr. Nelson managed several corporate research departments in Computer Science. He co-founded Apollo Computer, a major vendor of engineering workstations, in 1980. It was sold to HP in 1989. Dr. Nelson also founded Fluent, which developed digital video and was sold to Novell in 1994. Since then he has continued his involvement in startup companies.

While an undergraduate, he worked part-time for Professor Willy Haeberli designing a large scattering chamber for the Van de Graff accelerator located in the basement of Sterling Hall. Among the memorable courses he took was an astrophysics course taught by Professor Ray Herb who tried to convince the class that we would never land on the moon due to the combined failure rates of the large number of components required. There was also a nuclear physics course taught by Manhattan Project veteran Prof Henry Barschall who, upon the death of Neils Bohr, relayed his fond memories of their time together.

Dr. Nelson’s introduction to computers occurred in the early 1960s through his use of a CDC 1604 computer located on the upper levels of Sterling Hall. He has since published numerous papers in the area of computer architecture, and on the lighter side, he won the M.V.P. award for the National Computer Bowl competition in 1992, and M.V.P. for the National all-star Computer Bowl Competition in 1994 – a competition among celebrities of the industry, testing their knowledge of computer technology, history and trivia. Dr. Nelson has maintained an active interest in Physics, Cosmology and quantum computers.

C. Thomas (“Tom”) Sylke transferred to the University of Wisconsin - Madison from the United States Air Force Academy in 1979, and immediately declared AMEP as his
major, opting for Electrical Engineering as his engineering-emphasis field. Tom enrolled in AMEP because he knew he wanted to take classes in all three areas and thought the AMEP program was the best way to serve his interests while utilizing the credits he would earn in the three fields. His father was a junior high school math and science teacher in Fox Point, Wisconsin for 35 years: “My dad’s enthusiasm for and fascination with math, science and engineering had rubbed off over the years. AMEP was an ideal way to cultivate my math and science interests.” Tom thoroughly enjoyed the variety of the AMEP curriculum’s offerings, the options available for customizing his own curriculum, and the opportunity to study and learn the different fields’ interdependencies.

Tom received his degree in 1982 and stayed at UW-Madison for law school. After graduating in 1985, he immediately put his AMEP training to work at a 100-plus lawyer Milwaukee law firm, working in the patent, trademark and trade secret fields. Tom wrote patent applications for clients such as Harley-Davidson, Aqua-Chem/Cleaver-Brooks, Applied Power and others, using his electrical engineering and physics backgrounds to explain electrical and electro-mechanical control systems, brake and suspension systems and other technologies. Tom later moved to a 1,000-plus lawyer national law firm headquartered in Milwaukee, with more diverse clients in California and outside the United States.

After practicing with these two law firms for more than 13 years, Tom took the leap and embarked on opening his own law firm, Sylke Law Offices, LLC, in November of 1998. Tom had stayed in touch with AMEP and law classmates who had settled to work in the San Francisco Bay Area and he opened a patent practice in Silicon Valley. Tom’s work in Silicon Valley has included patent work for Cisco Systems, Stanford University and a number of start-up companies emerging from research at Stanford and elsewhere. The breadth of Tom’s AMEP background provided him with a unique set of skills and tools needed to work with sophisticated clients in a number of highly specialized technical fields throughout the United States, Europe, Asia and elsewhere in the world.

“My understanding of mathematics and principles governing digital signal generation and processing, electro-magnetic wave behavior and propagation, and other phenomena employed in new technologies has given me the opportunity to work with some of the most innovative commercial enterprises, academic leaders and potentially explosive new business ventures in the United States and the world. Without my broad AMEP background I would not have had the conceptual
tools to perform my duties effectively for my clients. Those clients and the other technical people with whom I work on a day-to-day basis know the difference between a person who has a working knowledge and sincere interest in these technologies and someone who is merely going through the motions for their job. AMEP was the single most important component contributing to my being able to thrive in the Silicon Valley legal, R&D and VC communities.”

Tom believes that many employers nowadays expect their employees to be multi-dimensional in their academic and professional training. Interdisciplinary development has been one of the key qualification factors in many companies’ hiring and business development plans, especially in small, emerging enterprises.

Tom’s advice for current AMEP students is twofold – (1) get the broadest working knowledge you can of those fields in which you have a sincere interest – it is unlikely that you’ll ever get a chance to study and be exposed to this broad palette of subject matter again; and (2) look to the future and try to estimate what skills and background will be needed in the fields where technologies are moving. One of Tom’s best decisions in the early 1980s was making sure he had a working knowledge of optics and solid state physics, which has proven helpful in the rapid evolution of optical and semiconductor technologies.

**Dr. David Johnson** came to Madison as a transfer student from LaCrosse in 1967. At the time, he was unsure of his career goals and was nudged toward AMEP. He recalls finding the engineering aspect of the program most gratifying. After graduation, he pursued a Masters degree in Engineering Mechanics. Few jobs were available when he finished, and Dr. Johnson continued to medical school, focusing on the mechanics of human tissue. The medical school in Milwaukee took an interest in the research and offered Dr. Johnson a position in 1972. He is now an anesthesiologist in Vermont.

When asked about his fondest memory at Madison, Dr. Johnson remembers Professor A.L. Schlack, who was in the Mechanics Department. He says “[Professor Schlack] inspired me to excellence like no one I had ever known. His style was so easy, and so committed that we couldn’t help but learn.”

Dr. Johnson continues to visit Madison a few times a year, and, like all UW-Madison alumni should, remains a devoted fan of Badgers football.
Joel Petersen graduated from Madison with his BS in AMEP in 1971 with an emphasis in Electrical Engineering. He had originally started at UW in Electrical Engineering, but switched to AMEP after his first year. During his years at Madison, he rarely met the other AMEP students. Joel’s experience at the University was filled with protests against the Vietnam War and the bombing of Sterling Hall.

After he graduated, jobs were scarce and he went on to graduate school, first studying Mathematics at UW-Madison and then Physics at the University of Texas-Dallas. He received his Ph.D. in Physics from UTD in 1978 and has since then been in Madison, working at Nicolet Instruments designing Fourier Transform Infrared Spectrometers, and for the last ten years at GE-Lunar designing Dual Energy X-ray Bone Scanners.

James Schroeder graduated from AMEP in 1973 and began working at National Electrostatics Corp., a company founded in 1969 by Dr. Raymond Herb, a physics professor at UW-Madison. He firmly believes that it was his wide and deep knowledge of a variety of topics obtained through the AMEP program that helped him obtain the job. Mr. Schroeder currently holds three patents related to electrostatic accelerator technology and his designs are used in research and industrial laboratories throughout the world. “Accelerator technology demands a command of a wide range of disciplines. AMEP totally prepared me for this.”

Despite the appreciation that the AMEP program allowed him to pursue his passions in the physical sciences without burdening his schedule with the usual liberal arts studies requirements, Mr. Schroeder does not discount these, and also has a keen passion for history and politics.

Current Students

Erick Butzlaff is a graduating senior in the AMEP program. During the summer before his freshmen year, Erick talked to Professor Paul Milewski and decided then to become an AMEP major. Even though Erick was in the AMEP program, he was still unsure of this decision and chose against taking any engineering courses. After deciding that he wanted to go into industry after graduating, Erick changed his mind near the end of his junior year and started taking several higher level engineering courses. Erick is headed off to the Patent Office next year working on patents for alternative energy, and will also begin in a Masters program at either George Washington University or the University of Maryland to continue his studies in alternative energy and aerospace vehicle design. Pursuing a Ph.D. is also in the back of Erick’s mind. However, he may not “necessarily have the
attention span for that.” Erick would like to study the financial analysis side of alternative energy.

Erick has worked on research through the biochemistry department on computational protein docking. His work involves “trying to define an energy function that characterizes the interaction between two biomolecules that need to link up to perform their biological function.” For the current students in AMEP, Erick strongly suggests taking as many design classes in engineering as possible. He says that those classes will go a long way for students applying for jobs in the engineering market or even for those who go on to graduate school. Erick also suggests to AMEP students to get in touch with their engineering advisors as soon as possible and ask to be put on their emailing list. The AMEP program is highly regarded by Erick, who said “AMEP is definitely a valuable degree that you can do whatever you want with.” When asked if there was anything else that he would like to add, Erick proclaimed, “Do well, make money, be happy, and change the world.”

**Alumni Award**

**Dr. Stephen Turner**, who graduated from AMEP in 1991, is the recipient of one of this year’s Distinguished Alumni Awards at UW-Madison. He is the founder and chief technology officer of Pacific Biosciences, located in California, which focuses on DNA sequencing and is at the forefront of the race to the “$1,000 genome.” Dr. Turner received his Ph.D. at Cornell University, where he studied the behavior of biomolecules in nano-fabricated fluidic structures. He holds 9 U.S. patents and in 2003, Stephen was awarded the MIT Technology Review TR 100 award. He is the son of UW Emeritus Professor of Mathematics Robert Turner. He came to Madison in May to receive the award and had a lunch and a chat about his experiences with a few AMEP and Physics students.
AMEP Leadership Prize

The AMEP leadership Prize, endowed by Dan Koellen (AMEP ’79) has been awarded to Erick Butzlaff and Nicholas Ballering.

Prior winners are Kyle Mandli (AMEP ’04) Lyuba Chumakova (AMEP ’04), Jeremy Hanson (AMEP ’04), Andrew Huening (AMEP ‘05), Jeffrey Noel (AMEP ’05), Christopher Yu (AMEP ’06), Doug Lipinski (AMEP ’07), Zac Labby (AMEP ’07) and Li Jiang.
Contact Information

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Gifts to this Fund support AMEP, a unique interdisciplinary program. The Fund will support activities designed to improve AMEP's ability to mentor students successfully, to foster a sense of community among students and faculty, and to enhance the visibility of AMEP on campus and to prospective students, corporate recruiters and graduate schools.

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If you wish to speak with someone about your gift or other giving options, please feel free to contact our representative at the UW Foundation:

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