

INTERFACES

CHEMICAL ENGINEERING AND APPLIED CHEMISTRY, UNIVERSITY OF TORONTO



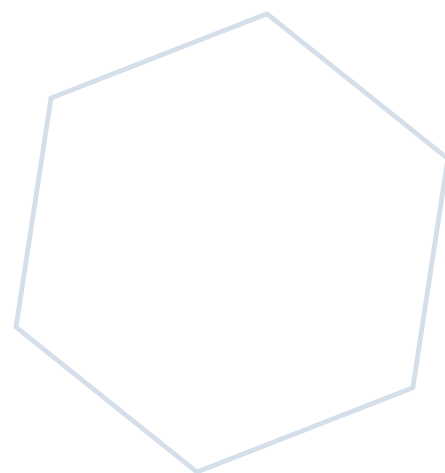
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www.chem-eng.utoronto.ca

Chemical Engineering and Applied Chemistry
University of Toronto
200 College Street
Toronto, ON Canada M5S 3E5
Telephone: 416-978-3063
Facsimile: 416-978-8605
Email: chair@chem-eng.utoronto.ca
Website: www.chem-eng.utoronto.ca



Welcome to the ninth issue of INTERFACES. Over the past six months, I have had the privilege of serving as Acting Chair. Stepping outside the role of a regular professor for this brief time, I enjoyed the opportunity to learn how the Department works from a different perspective: it is a well-oiled machine, with many things and many people to be proud of.

In this issue, the spotlight is on our graduate program: our graduate students and alumni/ae, and the people who make the program run. Graduate students have historically provided the framework of the social life in the Department, creating a family atmosphere. Through the years, CEGSA's sumptuous barbecues, holiday feasts, and Halloween parties have brought us together in merriment. Our many graduate alumni/ae were the focus of the newly launched Graduate Alumni/ae Dinner, held on October 27, a highly successful event that reconnected them to the Department, their former supervisors, and others who made their graduate experience memorable, especially **Jacquie Briscoe**. Dr. **Michael May**, who received his Ph.D. under the supervision of Professor **Michael Sefton**, gave the keynote address.

The Graduate Alumni/ae Dinner coincided with the Department's first Graduate Recruitment Weekend. Professor **Grant Allen** and his team worked tirelessly to put together an enriching weekend experience for twenty-seven outstanding potential graduate students from

across the country. Chemical Engineering will continue to focus on the graduate program and the graduate student experience in the coming years as the Province, the University, the Faculty, and the Department expand graduate enrolment. We are well positioned to bring more graduate students into our Departmental family.

The Department welcomed Assistant Professor **Tim Bender**, who took up his position in September. He joins **Edgar Acosta**, **Emma Master**, **Milica Radica**, and **Krishna Mahadevan**, making a total of five Assistant Professors in the Department. I had a chance to get to know them at the retreat for junior faculty held in November, and I think that the future of the Department is in great hands.

Thanks to those of you who contributed news and photos, attended the Graduate Alumni/ae Dinner, or stayed in touch in some other way. We hope to hear from the rest of you soon. We value your friendship and support of the Department.

YU-LING CHENG

*Professor and Acting Chair,
Department of Chemical
Engineering and Applied
Chemistry*



Class of 0T7: A Broad Spectrum of Interests

The wide range of research undertaken by the Department's faculty is reflected in the diverse interests of its undergraduate students. As they near graduation, the members of the class of 0T7 carefully consider their options. Even those who do not intend to pursue an academic career recognize that graduate studies offer a unique opportunity to develop effective research skills and scientific and technological expertise.

A Random Sample:

Among her many interests, **Jessica Currie** (Chem 0T6+PEY) has a passion for environmental remediation. Her fourth-year thesis with Professor **Ramin Farnood** involved degrading contaminants using photocatalysts. She experimented on a dye, using halogen lights rather than UV. Jessica completed her PEY at a small company called Waterloo Biofilter, which designs wastewater treatment systems. She worked on both residential and large-scale systems such as those created for golf courses (after cleaning, wastewater is used to water the lawn). These experiences made Jessica appreciate the value of research skills. Although she thinks she will eventually go into industry, she would



Jessica Currie

like to acquire as much scientific knowledge as possible, so she plans to apply to graduate school.

Jessica believes that more women are attracted to Chemical Engineering than to the other engineering disciplines because they like the biological side. She found Professor **Kim Woodhouse's** course stimulating but was a bit intimidated by the high expectations. She also enjoyed Reaction Kinetics taught by Professor **Charles Mims** and Process Control taught by Professor **Will Cluett**.

Having grown up outside Woodstock, Ontario, Jessica loves the countryside, both for its open spaces and forests; she also loves the excitement of the city. A young woman who embraces contrasts, she is on the Department's volleyball team, but she derives pleasure from reading highly intellectual fare, notably *The Walrus* magazine and *L'Etranger* by Camus. She applauds the Department for having created an environment in which inquiring minds are free to explore.

Daniel Pohl (Chem 0T6+PEY), who enjoys investigating different aspects of the discipline, considers himself a general Chemical Engineering student. His favourite courses were Thermodynamics taught by Professor **Frank Foulkes** and Inorganic Chemistry taught by



Daniel Pohl

Professor **Charles Jia**. Daniel's fourth-year thesis, supervised by Professor Jia, concerns the pore size distribution of activated carbon and its effect on capacitance, which is relevant to the use of activated carbon as an electrode material for supercapacitors.

Daniel spent his PEY at Celestica, Inc., an electronics manufacturing systems company. His supervisors were so impressed by his background that they allowed him to undertake program management. The first student ever given this responsibility, he was supervising eight programs with new products after only four months. Daniel was surprised to learn that he has a talent for managing relationships. He discovered that he likes dealing with people and valued the opportunity to see all the different aspects of the company, which enabled him to develop a holistic view. Facing the choice between graduate school and industry, Daniel finds himself in a quandary: he likes industry because it is fast-paced, but he knows that only in graduate school can he acquire more effective research skills. Ultimately, he would like to own his own business.

A member of the Chem Club and a participant in the PEY panel, Daniel also enjoys volleyball and played in the Chemical Engineering 3 on 3 basketball tournament. He

loves movies about mathematical topics, such as *Pi*, *Good Will Hunting*, and *A Beautiful Mind* because they allow him to "feel free to be a nerd".

Fahkira Samsudeen (Chem 0T7) is completing a fourth-year thesis project with Professor **Ramin Farnood** on the roughening and gloss reduction of paper due to rewetting. The courses she found especially interesting were Process Design with Professor **Graeme Norval** and Plant Design, for which her faculty advisor was Professor **Edgar Acosta**. In the short run, Fahkira would like to go into industry, but her long-range plan is to return to graduate school. Although her main interest is in process design, maybe in the oil industry, she recognizes that the key to being able to innovate is enhanced research skills.

Born in Sri Lanka, Fahkira came to Canada in 1999 and was shocked by the bad behaviour of Canadian children. At the same time, she was heartened by the politeness and understanding of the older generation, so many of whom, especially her teachers, extended a helping hand. She loves reading *Harry Potter* and *Artemis Fowl*.

Varun Malhotra (Chem 0T7) wants to enrich his Chemical Engineering education by learning economics. He is completing a fourth-year thesis



Fahkira Samsudeen



Varun Malhotra

on service level agreements in outsourcing under the direction of Professor **Joseph Paradi** at the Centre for Management, Technology, and Entrepreneurship. He plans either to pursue an M.A.Sc. with Professor Paradi or an M.Econ., combining his science degree with a strong financial background.

Although he did not choose the PEY option, Varun acquired considerable industry experience. He worked for ThermoElectron in Boston, Icynene, a polymer company in Mississauga, and Maple Lodge Farms Food Science and Technology Centre, also in Mississauga. He quickly learned that an in-depth knowledge of the technology is necessary for making good business decisions.

Varun plays badminton and is on the Chemical Engineering basketball team, who were the division champs but lost the finals. In the long run, he wants to own his own business, related either to instrumentation or analytical research. Varun is convinced that his combined engineering and financial expertise can be a powerful tool in the fight to eradicate illiteracy and poverty.

Student Awards at the CSChE Conference

The Department practically swept the student awards at the Canadian Society for Chemical Engineers Conference held in October, 2006.

The Uranium Innovations Plant Design Team won first place in the SNC-Lavalin Plant Design Competition. Team members included **Meky Fong** (Chem 0T6), **Karina Lorenzo** (Chem 0T6), **Jessica Park** (Chem 0T6), **Mark Pingal** (Chem 0T6), and **Arash Shafiei** (Chem 0T6).

Karina, Jessica, and Mark presented the winning design at the conference.

Tea Tancez (Chem 0T8) won the Robert G. Auld Memorial Award Second Place, and **Alex Lee** (Chem 0T7) won the Robert G. Auld Memorial Award Third Place.

Rano Matta (Chem 0T7) was awarded the CSChE Local Section Chemical Engineering Scholarship.

The **UofT CSChE Chapter** was given the Student Chapters Merit Award.

Graduate student **Sonam Mahajan**, a Ph.D. student working under the supervision of Professor **Emma Master**, won the Reg Friesen Student Oral Paper Competition Award.



Sonam Mahajan

Congratulations to all the winners for a job well done!

“Selahbrating” Graduate Secretary Jacquie Briscoe

Jacquie Briscoe made a dramatic entrance into the Department. She was hired in January, 1973 as Secretary to the Chair. A year later, when the Graduate Secretary, **Ella Butcher**, passed away suddenly, Office Manager **Phyllis Conquergood** asked Jacquie to jump into the breach.

Jacquie has seen significant changes in the program, most recently because of the decentralization of the School of Graduate Studies. The nature of her work has changed over the years: not only is she responsible for a much broader range of tasks, but also she must comply with the University’s increasing demand for verification and documentation. She oversees applications, scholarships, student enrolment, oral exams, and distribution of the graduate handbook, which has grown over the years from two to sixty-six pages.

Jacquie observes the effect of bureaucratic information overload on the students, remarking that they need some downtime. In the old days, Professor **Diran Basmadjian** began teaching at eight a.m., but today, such an early start time would issue a “death sentence” to a course. Jacquie misses the eccentricities of previous generations but sympathizes with the current generation, for she knows firsthand the demands



Jacquie Briscoe

that are placed on them. She is quick to assert that they are just as bright as their predecessors.

Today, there are more international students in the Department, but they come from a narrower range of countries. Jacquie used to feel that no matter where she travelled in the world, she would find a Chemical Engineering alumnus/a to welcome her. She fondly remembers the lunches the students organized; the table groaned with food from around the globe. When Jacquie first came to the Department, Professor **Ray Woodhams** predicted that robots would take over the housework. Says Jacquie: “I’m still waiting.” As she continues to push the vacuum cleaner, she thinks of the incredible student hijinks on the night of the Iron Ring Ceremony: filling Professor **Will Cluett’s** office with popcorn and Professor **Grant Allen’s** office with glasses of water, and turning Chair **Jim Smith’s** office into a putting green.

Students past and present love Jacquie. In response to the standing ovation she received at the Graduate Alumni/ae Dinner, she said: “It felt like Thanksgiving, when all your children have come home.” She wields her magic by trying her best to help the students because she understands the expectations they must fulfill. Her goal is to see them graduate. Perhaps her empathy comes from her faith, which gives her confidence that she is not alone. A member of St. Bride’s Anglican Church, Jacquie belongs to both the church choir and a triple trio called Selahbration (Selah is a term from the Psalms). The joy she derives from singing is surpassed only by the joy she experiences in seeing the students succeed.

Graduate Education for the Multidisciplinary World

Graduate Coordinator **Grant Allen** grapples every day with the evolution of Chemical Engineering from a small community into a multidisciplinary enterprise with huge outreach, not only to the other engineering departments,



Grant Allen

but also to the biological sciences (medicine, botany, and molecular biology), chemistry, and mathematics. Today, to operate at the cutting edge, students must be conversant with a wide range of disciplines, mastering an expanding toolkit of techniques and theories.

The challenge of multidisciplinary research is the impossibility of learning everything: there will always be gaps. It used to be that a scientist who was an expert in, say, fluid mechanics migrated into biomedical engineering. This traditional approach is no longer feasible, so it would be preferable if students could develop a multidisciplinary perspective as undergraduates while still acquiring depth in a particular field. However, universities have not yet caught up with the need, so graduate students and their supervisors must make up the deficit. The Department's response to the problem includes the shift toward the cluster model, in which research is grouped into eight categories: Biomolecular and Biomedical Engineering, Bioprocess Engineering, Informatics, Environmental Science and Engineering, Advanced Inorganic Molecular Systems, Pulp and Paper, Surface and Interface Engineering, and Sustainable Energy.

The Department has developed a strategy for improving the quality of training in the graduate program and increasing research intensity. A key change is the expansion of graduate enrollment

(currently 66 Ph.D., 67 M.A.Sc., and 9 M.Eng.), with a focus on attracting the best students. The immediate challenge is to rebalance the undergraduate/graduate ratio, which has gone too far toward undergraduates (from about 2 in 1999-2000 to just over 2.75 in 2004-5). Also on the table is the renewal of the postgraduate curriculum to provide more advanced courses in core and strategic areas. In addition, efforts will be made to reduce the time to completion for graduate degrees. Other fundamental goals include increasing the emphasis on professional skills development and exploiting the opportunity to play a major role in research and graduate education in Biosystems Engineering.

The key to success is recruiting the strongest graduate students, but this is possible only if professors work on projects that intrigue both the student and the supervisor. Currently, the hot topics are biomedical engineering, bioengineering, environmental engineering, and sustainable energy. Professor Allen maintains that biology is booming because of its links with well publicized advances in biotechnology. More important, it has a "feel-good" side, offering an opportunity to help people directly: many students want to cure cancer or contribute to sustainable development; comparatively few want to conduct research in more traditional areas involving mature industries, unless they can see a connection to pressing social concerns. He thinks that, ten years from now, many of the "go-to" fields will still involve biology and sustainable systems, and he wants to help make Chemical Engineering the "go-to place" for this kind of research.

As a first step toward increasing enrollment, the Graduate Research Weekend was held in late October. The goal was to begin enlarging the catchment area by bringing in twenty-seven excellent students from across the country, allowing them to meet faculty and learn firsthand about the broad range of research opportunities in the Department. The multidisciplinary age will be built upon the collaboration of the best minds.

Graduate Studies Research Weekend: Recruiting the Best Minds

On October 26–29, 2006, Chemical Engineering launched an initiative which is expected to become an annual event. Twenty-seven outstanding undergraduate students from across Canada were invited to immerse themselves in the Department's culture so that they could learn what it would be like to pursue graduate studies at the University of Toronto. Their home universities span the country, from Vancouver to Regina to Charlottetown.

Each participant was met at the airport or train station by a graduate student chaperone who acted as a guide throughout a weekend of intensive exposure to life in the Department. Graduate Chair **Grant Allen**, Vice-Dean (Research and Graduate Studies) **Javad Mostaghimi**, and Acting Chair **Yu-Ling Cheng** delivered welcoming speeches, and Cochairs **Angela Tran** and **Victor Castellino** presented an overview of CEGSA. Professor **Susan Pfeiffer**, Dean and Vice-Provost, Graduate Studies, joined the group for lunch. Later in the weekend, Professor **Molly Shoichet** gave a seminar entitled "The Promise of Regenerative Medicine," and Professor **Joseph Paradi** asked the question "What is Chemical Engineering and CHEM-ENG@UofT?"

Activities included tours of laboratory facilities, notably biomedical and tissue engineering labs in the Centre for Cellular and Biomolecular Research (CCBR), the Surface Science Ontario lab, and the Southern Ontario Centre for Atmospheric Aerosol Research (SOCAAR). There was also a poster session: faculty members and students made twenty-three presentations on topics representative of the research clusters, followed by lively discussions in which Dean Pfeiffer participated.

A special feature of the weekend was the afternoon set aside for interviews with the faculty: each visitor had the opportunity to

discuss research interests with three different professors. Many of the participants came away from this enriching experience with an expanded appreciation of the possibilities within Chemical Engineering. **Stephen Wong**, from Simon Fraser University, is interested in electronics, especially its biomedical applications. He was impressed by the extent of collaboration between Chemical Engineering and other departments and the way the Institute of Biomaterials and Biomedical Engineering (IBBME) provides an umbrella for its professors. **Daniel McLean**, a student at McMaster University, discussed tissue engineering and drug delivery with Professors **Yu-Ling Cheng**, **Molly Shoichet**, and **Kim Woodhouse** and was inspired by the range of their expertise. **Debashree Dasgupta**, who studies at McGill University, came to the weekend intent on pursuing her interest in biomaterials, but she was intrigued by Professor **Vlad Papangelakis**' explanation of electrochemical mining and Professor **Paradi**'s introduction to financial engineering.

Participants also got to see the fun side of life in the Department, sharing meals with faculty and current graduate students and enjoying a pub dinner at the Duke of York. The highlight of the weekend was the Graduate Alumni/ae Dinner, at which they were the guests of honour.

Celebrating the Graduate Alumni/ae Family

At last year's Annual Chemical Engineering Dinner, Professors **Grant Allen** and **Honghi Tran** observed that the event was mostly devoted to undergraduate activities. **Sonia De Buglio**, the Department's Manager of External Affairs at the time, came up with the idea of hosting a dinner to celebrate the achievements of graduate alumni/ae.

The Graduate Alumni/ae Dinner was launched on October 27, 2006 at the Faculty Club. It was attended by thirty-six graduate alumni/ae, one of whom had travelled from

Switzerland, thirty-one faculty, six staff, twenty-seven graduate students, and the twenty-seven visiting undergraduate participants in the Graduate Studies Weekend.

Acting Chair **Yu-Ling Cheng** welcomed the crowd and described recent major initiatives, such as the Graduate Studies Weekend, which many in the Department had worked hard to bring to fruition. Professor **Grant Allen** spoke briefly about the graduate program, emphasizing the broad spectrum of research activities within Chemical Engineering and the need to recruit excellent graduate students. Professor **Jane Phillips** presented a history of the Department's accomplishments over the past sixty years, and **Zoë Coull** of the CEGSA Executive outlined the Leaders of Tomorrow: Graduate (LoTG) program. Members of the staff were introduced to thunderous applause, Graduate Secretary **Jacquie Briscoe** receiving a standing ovation. She beamed as she acknowledged the thanks of her "graduate student family".

The keynote address was delivered by Dr. **Michael May** (Chem 9T1; Ph.D., 1998), Chief Operating Officer of Rimon Therapeutics. His theme was the importance of networking, which he first encountered as an undergraduate in the Department. For May, Chemical Engineering has always been like a family, teaching him and supporting his endeavours. He paid special tribute to Professor **Michael Sefton**, his former graduate supervisor and cofounder of Rimon. Judging by the smiles on the faces of this year's participants, the Graduate Alumni/ae Dinner seems destined to become a tradition, helping to extend the network to the entire Chemical Engineering family.

Graduate Student Organizations: The Backbone of the Department

CEGSA

The Chemical Engineering Graduate Student Association (CEGSA) has existed for over

forty years. A non-profit organization representing Chemical Engineering graduate students, it receives funding from the Graduate Student Union and the Department. However, most of its revenue comes from its business operations. The goal of last year's Executive was to make CEGSA financially stable. Under the leadership of **Zoë Coull** (Chair), **Nick Coulthard** and **Doug Baumann** (Vice-Chairs), and **Flor Garcia** (Business Development Manager), the CEGSA account grew from \$59 to \$2000. Led by Cochairs **Victor Castellino** and **Angela Tran**, this year's Executive has already doubled the funds to \$4000 thanks to the dedication of the new Business Operations Team (**Flor Garcia**, **Aditya Ganti**, **Jaganathan Ulaganathan**, **Neda Felorzabihi**, and **Chris Healey**). This was accomplished by replacing the old pop machines and rationalizing their operation.

Recently, **Doug Baumann** and **Sonam Mahajan** played an active role in organizing the Graduate Studies Weekend. They were on the Departmental committee which evolved the strategy of assigning a graduate student chaperone to each visitor. CEGSA members introduced the participants to the campus and the Department, led lab tours, and shared their expertise in the poster session. They also facilitated the social aspects of the weekend, assuming a leadership role in the Graduate Alumni/ae Dinner.

CEGSA hosts free events throughout the year, but when admission fees are requested, the proceeds are donated to charity. In early December, the current Executive arranged a



CEGSA Cochairs
Victor Castellino
and Angela Tran

spectacular turkey feast replete with all the trimmings. Volunteer chefs **Chris Goode, Peter Versteeg, Allie Simmonds, Arkti Bhakta, Flor Garcia,** and **Jana Dengler** cooked the birds at home. Over a hundred merrymakers savoured their creations, and the leftovers were donated to the Salvation Army. Gifts were presented to the staff, who expressed their gratitude with a rousing chorus of *Rudolph the Red-Nosed Reindeer* led by **Arlene Fillatre.**

Last year, CEGSA created the Leaders of Tomorrow: Graduate (LoTG) program, an initiative designed to equip graduate students with professional skills and leadership training. It is actively involved with Departmental events and projects. An important CEGSA/LoTG project is the Technology Tour: the 2007 destination is Boston. The group hopes to visit MIT, the University of Massachusetts, and Harvard, along with various corporations. The purpose is to acquaint U of T students with the research conducted in other institutions and, at the same time, to publicize the work carried out here.

However, it is the renovation of the Graduate Common Room which generates the most passion among CEGSA members. Currently, it serves as a lunchroom and a venue for events, but it is run-down and underused. CEGSA's goal is to transform it into a nexus for graduate student activity by creating a functional space that incorporates a large conference area for meetings and LoTG seminars. Based on a projected budget of \$30,000, plans were drawn up, and CEGSA has now moved into the fundraising stage. More information is available on the web: <http://cegsa.chem-eng.utoronto.ca/>

TISCUT

The Technical Association of the Pulp and Paper Industry (TAPPI) is the leading association for the worldwide pulp, paper, packaging, and converting industries. The TAPPI International Chapter at the University

of Toronto (TISCUT) is affiliated with the Pulp & Paper Centre. Founded in April 1995 with the help of then PPC Director Professor **Doug Reeve** and Student Advisor Professor **David Kuhn,** TISCUT was the first international student chapter. It currently boasts nearly thirty members, graduate students from Chemical Engineering, Forestry, and Mechanical and Industrial Engineering. The President, **Steven Nunnari,** is ably supported by Vice Presidents **Peter Versteeg** and **Pooya Azadi,** Social Chair **Laleh Kobari,** Treasurer **Malahat Fardadi,** Secretary **Fariba Azgomi,** Communications Director **Daniel Saturnino,** and Webmaster **Ailee Ho.**

TISCUT's objective is to assist PPC graduate students with their academic and professional development as well as provide the opportunity to participate with their peers in social events. The range of TISCUT sponsored activities is comprehensive: technology tours (Michigan last year, China this year); a seminar series which provides alumni talks, the most recent of which was given by **Teresa D'Souza,** and writing workshops delivered by various professors in the Department; and the annual Graduate Student Conference, which facilitates interaction with industry representatives through a poster session, presentations, and an awards dinner. In January 2006, to promote the Centre to undergraduates, TISCUT initiated what it hopes will become an annual tradition: the PPC Open House.

Steven Nunnari is proud to lead TISCUT at a time when the industry has embraced the shift toward environmentally responsible strategies. Today, the objective is to "get as much product as possible out of as few resources as possible", which means conserving energy and developing innovative technologies. Steven explains that industry works closely with students at the PPC on projects that will ultimately save the consumer money while greening the environment.

For more information, visit: <http://www.chem-eng.utoronto.ca/~tiscut/>

The Pulp & Paper Centre Comes of Age

The Pulp & Paper Centre (PPC) at the University of Toronto, which exists within the umbrella of the Department, was founded in 1987 by Professor **Doug Reeve**, who was the Director for fifteen years. Although the PPC has grown and changed with the challenges that face the industry, its mission has remained the same: it continues to facilitate partnerships between the University and the pulp and paper industry in order to provide excellence in education, research, and information transfer. The PPC is currently supported by three core companies: Bowater Canadian Forest Products Inc., ERCO Worldwide, and Tembec Inc. Since 2004, it has been directed by Professor **Honghi Tran**, together with Professors **Ramin Farnood** and **Ning Yan** (Forestry). Embracing the new biological and hi-tech tools in a multidisciplinary approach, the PPC has broadened its activities to include biorefinery research projects which seek to convert forest biomass and mill effluents into alternative sources of energy, including methane and bio-ethanol.

Research within the PPC is organized around five groups: Environment, led by Professor **Grant Allen**; Energy and Chemical Recovery, led by Professor **Honghi Tran**; Lignocellulosic Fibres, led by Professor **Mohini Sain**; Surface Science of Paper, led by Professors **Ramin Farnood** and **Doug Reeve**; and Biotechnology, led by Professor **Emma Master**. Cutting-edge projects are carried out with the support of three industrial consortia and various grants. In the past year alone, a total of \$3.2 million in research funding was provided by NSERC and over thirty pulp and paper related companies in Canada, the United States, Finland, Sweden, Japan, Brazil, and New Zealand.

In addition to working with industry partners, the PPC has collaborated with numerous universities and research institutions,



Ning Yan, Honghi Tran, and Ramin Farnood

both domestic and international. It also actively participates in the Canadian Forest Biorefinery Network established by Pulp and Paper Innovation in Education and Research (PAPIER), an organization consisting of industry sponsored PAPERICAN and the seven pulp and paper centres in Canadian universities. PAPIER allows its members to combine industry experience and research on a national scale to “get the best out of the forest”.

The PPC encourages extensive student involvement at both the graduate and the undergraduate level, drawing upon an impressive pool of talent: 51 graduate students, 28 undergraduate students, 25 associated staff, and 46 faculty from several departments within the University of Toronto. The graduate student training and professional development programs are a core activity. Students have enthusiastically participated in the Industrial Internship program, which allows selected candidates to work in a pulp and paper mill for two months in their research areas. They have also organized many technology tours, both within Canada and to the United States, Scandinavia, Japan, and Brazil, and they are planning a tour to China this summer. The vibrant program mounted by TISCUT enables students to develop outstanding research and leadership skills so that they

become active members of the pulp and paper community.

In recent years, the PPC and its faculty have received broad recognition, winning a 2003 NSERC Synergy Award for Innovation with ERCO Worldwide. In addition, Professor **David Goring** was inducted into the Pulp and Paper Industry Hall of Fame in 2006, Professor **Honghi Tran**, recently appointed to the Frank Dottori Chair in Pulp & Paper Engineering, was the recipient of the prestigious TAPPI Beloit Engineering Award (2006), and Professor **Doug Reeve** will be awarded the 2007 John S. Bates Memorial Award, the highest honour bestowed on an individual by the Pulp and Paper Technical Association of Canada.

On July 1, 2007, the PPC will celebrate a milestone: twenty years of self-supporting operation. The Centre will continue to make flexibility its major operating principle in order to keep up with the challenges of a post-Kyoto world and help transform the pulp and paper industry into a sustainable industry of the future.

Where Is the Next Hill?

Assistant Professor **Tim Bender** joined the Department on September 1, 2006, and his reaction so far has been: “It’s all good.” He completed his B.A.Sc. and then his Ph.D. (1999) at Carleton University, investigating macromolecular materials that can take an electron and give it back. After winning the 1999 award for the top graduate thesis in macromolecular science in Canada, Tim began an NSERC postdoctoral fellowship in Chemistry at the University of Toronto, but he converted it into an industrial postdoctoral fellowship at Xerox in Mississauga when he realized that he wanted to gain experience in the application of chemistry to real-world problems.

Xerox was the first company to commercialize an organic electronic device, commonly known as a photoreceptive device, the heart of a laser

printer. Tim spent two years at Xerox learning about the burgeoning area of organic electronics and then an additional five years developing a photoreceptive device through to commercial realization. When it was at the pilot scale, he made the decision to reenter academia, his first love.

Tim applauds the fact that the Department delivers its own chemistry courses and is enthusiastic about teaching Physical Chemistry in the winter term and taking over the Organic Chemistry course for chemical engineers in September, 2008. He is currently looking for undergraduate thesis students and graduate students who are interested in building organic solar cells to “generate electric energy from plastic.” He anticipates that it will take five years of effort to complete the project, which comprises three main aspects: the chemistry fundamentals, the chemical engineering, and the development of the product. Concerned about the environmental effects of conventional technologies, Tim “would like to make it possible for every consumer to generate his/her own energy to supplement the publicly distributed grid.” He feels strongly that “Canada’s future sustainability should not depend on Alberta’s oil fields.”

Tim is an avid cyclist. With reference to mountain biking, he says: “I suppose much as



Tim Bender

in life, if you can stay upright over the bumpy terrain of a rocky trail, you will come out the other end stronger and wiser for the experience.” With reference to road biking, Tim quotes Chris Carmichael, Lance Armstrong’s coach: “There are two types of people, those who get to the top of a climb and say thank goodness I made it, and others who ask where is the next hill?” Tim is among the latter, and not only when he is biking.

Awards

At an awards gala held on November 18, 2006 at The Carlu, Toronto, the Ontario Society of Professional Engineers (OSPE) and Professional Engineers Ontario (PEO) honoured Professor **Masahiro Kawaji**, who won the Engineering Medal in the Research and Development Category. Professor Kawaji is internationally recognized for his work on two-phase flow and heat transfer, in particular flow visualization, high pressure/high temperature



Masahiro Kawaji

steam/water flow, microgravity fluid physics, and, most recently, adiabatic two-phase flow in microchannels. His work has provided new insights into complex macroscale and microscale phenomena encountered in various energy systems. Through such fundamental and applied research, Dr. Kawaji has contributed to the development of advanced heat exchanger systems, safety improvements in nuclear reactors, and identification of the causes of thermal problems in kraft recovery boilers.

Professor **Honghi Tran** has been appointed to succeed Professor **Doug Reeve** as holder of the Frank Dottori Chair in Pulp and Paper Engineering. The Chair was endowed by Tembec Inc. in honour of **Frank Dottori**, who saved the mill town of Temiscaming from certain demise, turning a fledgling company into an international forest products giant. Professor Tran will uphold the tradition of fostering collaborative research with industry partners and finding innovative strategies for enhancing the viability of Canada’s pulp and paper industry.

Professor Emerita **Mary Jane Phillips** (Chem 5T3) will be inducted into the Skule™ Alumni Hall of Distinction on June 2, 2007. She earned her M.A. from Bryn Mawr College and, after working for Du Pont in Wilmington, DE for two years, her Ph.D. in physical chemistry from Johns Hopkins in 1960. Hired in 1962 as the first female professor in the Department, she began her distinguished career in research, teaching, counselling, and administration at the University. Professor Phillips was the first, and to date the only, female academic to be president of Professional Engineers Ontario (1993-1994). She currently serves as Chair of PEO’s Committee on Complaints. Since 1997, she has been a Professor Emerita but continues to teach her course in professional ethics and her graduate course in industrial catalysis. She remains a respected mentor and role model for female students.

Promotions

Assistant Professor **Ramin Farnood** was promoted to Associate Professor with tenure effective July 1, 2006. Professor Farnood is also Associate Director of the Pulp & Paper Centre and the principal investigator of the Surface Science Research Consortium, an international university-industry collaborative program. Professor Farnood received his B.A.Sc. and M.A.Sc. in chemical engineering from Sharif University of Technology in Tehran, Iran, and his Ph.D. (1995) from the Department. His research interests include surface science and environmental engineering.

Associate Professor **Elizabeth Edwards** was promoted to Full Professor effective July 1, 2006. Her research involves the characterization of microbial communities that degrade pollutants and the development of molecular tools such as nucleic acid probes and DNA microarray technology for detecting gene expression in groundwater or soil samples. Dr. Edwards collaborates extensively with GeoSyntec Consultants in Guelph, Ontario, developing bioremediation and bioaugmentation strategies for chlorinated solvent remediation.

The Huntsville Retreat: Brat Pack II

Two years after Professor **Yu-Ling Cheng** joined the Department in 1989, Chair **Jim Smith** held a retreat for new faculty in an attempt to integrate them into the community. He dubbed his young colleagues the “brat pack.” Professor Cheng found the experience invaluable and wanted to recreate it for the Department’s five new junior faculty members: **Edgar Acosta**, **Tim Bender**, **Krishna Mahadevan**, **Emma Master**, and **Milica Radisic**. In collaboration with Leadership Development Professor **David Colcleugh** and Professor **Kim Woodhouse**, she organized a retreat in the Huntsville area, which took place in early November.

The goals were to foster team building, help new professors develop their careers, and involve them in the Department’s long-range plans. The retreat was structured around formal seminars and informal discussions covering topics that included how to teach, how to be a good professor, career progression, and the Department’s strategic vision. **Lisa Romkey**, Lecturer in Engineering Science, led a session on addressing the different learning styles. Also present to share their experience were Professors **Grant Allen**, **Elizabeth Edwards**, **Ramin Farnood**, and **Charles Jia**. Professor Cheng refers to Farnood and Jia as “the most junior senior profs” or “the most senior junior profs”.

The consensus among the young faculty was that everybody involved in the retreat was genuinely nice and sincere, and eager to help them build their careers. Emma Master was impressed by the depth of collegiality. Edgar Acosta felt a sense of belonging because the values of the new professors seemed to match those of the Department. Milica Radisic expressed confidence that the support of colleagues will have a significant impact on the quality of her work experience. For Krishna Mahadevan, the value of the retreat was that it clarified the Department’s strategic plan and mission and demystified a number of issues surrounding research, teaching, and service. Tim Bender left with a strong sense that the future of the Department is bright because “we are the correct bunch of people at a correct point in time.”



The Brat Pack: Edgar Acosta, Emma Master, Milica Radisic, Krishna Mahadevan, and Tim Bender

Analytical Thinking Spawns Innovation

Lianne Ing: Bubble Technology Industries

Lianne Ing (Chem 9T8) had bypassed the M.A.Sc. and was pursuing her Ph.D. with Professor **Stephen Balke** on the topic of inline monitoring of plastics processes when 9/11 turned her world upside down. Her father, **Harry Ing** (Engineering Physics, 6T5; Ph.D., 1969) founded Bubble Technology Industries (BTI) in 1988. After the attack on the World Trade Center, there was a pressing need for BTI technology in a number of counterterrorism programs. The company underwent rapid growth, and the Board of Directors recruited Lianne to assist in its expansion. She left graduate school to lend a hand.

BTI builds systems that detect radioactive or explosive threats such as nuclear weapons, dirty bombs, and land mines. As Vice President of Business Development, Lianne's role is to identify opportunities where BTI's products can be applied. Canadian customers include the Department of National Defence, CSIS, and the RCMP; global customers include the U.S.



Lianne Ing

Department of Homeland Security and NATO countries. The company continues to expand, producing an impressive array of innovations, such as developing equipment for NASA to use in space flights.

As Lianne perceives it, the greatest benefit she derived from graduate school was developing the ability to solve a complex problem by defining and characterizing it and then breaking it down into components. She also learned to communicate complicated technical concepts in a straightforward manner, which she believes is a key skill for every engineer. Lianne is a frequent speaker at defence and security conferences and travels extensively to meet with customers and business partners. Although the pace is hectic, she enjoys the challenges and finds counterterrorism and defence work highly rewarding.

Constantine Karayannopoulos: Neo Material Technologies, Inc.

Constantine Karayannopoulos (Chem 8T3; M.A.Sc., 1985) came to Canada from Athens when he was seventeen. Ironically, he loved math and hated chemistry, but **Marty Oslinger**, his superb chemistry teacher at Marc Garneau Collegiate, changed his mind. As a graduate student, he worked with Professor **Diran Basmadjian**, producing a mathematical and theoretical thesis called *Process Modelling of Adsorption and Ion Exchange Systems*. Constantine was a process design engineer for Esso Petroleum Canada from 1985 to 1986, and, from 1986 to 1994, he worked in market development at Praxair Canada. In 1994, he joined forces with lawyer and investment banker **Peter Gundy**, founder of Advanced Material Resources (AMR), contributing technical expertise and knowledge of market development.

In 2006, AMR was renamed Neo Material Technologies, Inc. The company comprises two divisions. The original AMR specializes in



Constantine Karayannopoulos

rare earth and zirconium products, which are used in catalytic converters, display and lighting phosphors that generate colour and light in plasma TVs, LCDs, and CRTs, and electronic chips. The second division, Magnequench, was an American company acquired by AMR in 2005. It is the world's largest producer of Neo Magnetic powders, which are used in the manufacture of magnets for sensors and motors and specifically magnets for high precision micromotors. All the iPods and hard disk drives in every device in the world have magnets made with Neo Material Technologies' products.

The company is "handsomely profitable," with third quarter total sales of \$41.2 million and a net income of \$7 million. It employs 1300 people, mostly in China. In the early 1990's, China, which has the world's best rare earth deposits, was emerging as a major producer, with 25% of the market. Today, this figure has jumped to 95%. Neo Material Technologies hit upon the innovative strategy of setting up production in China, employing local labour and managers, for only local people can understand local problems.

Constantine, who has just accepted an invitation to join the Board of Advisors, has built his success upon the strong foundation provided by his Chemical Engineering education, joking that he has learned how to decode the periodic table. On a more serious note, he emphasizes that he has acquired the fundamental knowledge needed to address the challenges faced by his engineers, who conduct technically and chemically complex projects. Most important, he has developed the ability to think analytically, perceiving and understanding all the alternatives and, he hopes, making rational choices. Constantine firmly believes that engineering, especially chemical engineering, is a highly creative discipline that "helps you to put into practice things that others can only imagine".

In September, 2006, **Sonia De Buglio** (Chem 9T4; M.A.Sc., 1998) departed Chemical Engineering, ending a seventeen-year association to become Associate Director of Alumni Relations for the Faculty of Applied Science and Engineering. Sonia began working in the Department in 1989, while still a high school student. In 1995, just after she started graduate studies with Professor **Levente Diosady**, she was hired as Liaison Coordinator, responsible for undergraduate recruitment and admissions initiatives. As the Department grew, Sonia's title was changed to Manager of External Relations, and her role was extended to include alumni and industry relations, advancement, and co-editing INTERFACES. She is now responsible for outreach to the alumni/ae of the Faculty. Sonia's warmth, enthusiasm, and magical ability to engage undergraduates will be missed. If you would like to maintain contact, she can be reached at sonia@ecf.utoronto.ca, or by phone at (416) 946-8143.

Bert Orland Wasmund (Ph.D., 1966) will be inducted into the Skule™ Alumni Hall of Distinction on June 2, 2007. After completing his doctorate on heat transfer under the supervision of Professor **James W. Smith**, he

joined Hatch Associates, providing leadership in the development and marketing of new technologies for the smelting and refining of non-ferrous metals. One early example was the use of copper elements to cool the walls of smelting furnaces. He is perhaps best known for the design of an electric smelting process that revolutionized platinum smelting. This and many other successes brought him to his present position as Executive Director of Hatch Ltd., where he has developed a world-class hydrometallurgical group.

Phillip J. (Rocky) Simmons (Chem 6T4; M.A.Sc., 1965; Ph.D., 1968), President and Chief Executive Officer of Eco-Tec Limited, has received the 2006 Ontario Professional Engineers Award. Dr. Simmons transformed a small niche company into an internationally prosperous water treatment business using technology he developed during his graduate studies in the Department. Under his leadership, Eco-Tec, named one of the Best Privately Owned Companies in Canada, has become a major player in purifying, recovering, and recycling industrial wastewater and is rapidly becoming a force in water treatment for power plants. Today, a number of Eco-Tec's processes have become de facto standards in industries such as



"Rocky" Simmons

stainless steel finishing, aluminum finishing, and electroplating. A vigorous champion of research and technology development in university and industry, Dr. Simmons has served on the Dean's Advisory Board of the Faculty of Applied Science and Engineering and on the Advisory Board of Chemical Engineering. He is currently Vice Chair of the Board of Governors of the University of Ontario Institute of Technology.

Bonding

Amy Peers

(Chem 0T7) will tie the knot on July 7, 2007. Her intended, **Kevin Senn** (CS 0T6+PEY), was her high school sweetheart.



Baby Chemistry

Nalina Nadarajah (Ph.D. Candidate) and husband **Vijai** are the proud parents of a baby boy. **Parithi**, whose name means “the sun” in Hindi, was born on November 2, 2006, weighing 8 lb, 10 oz.



Arrivals and Departures

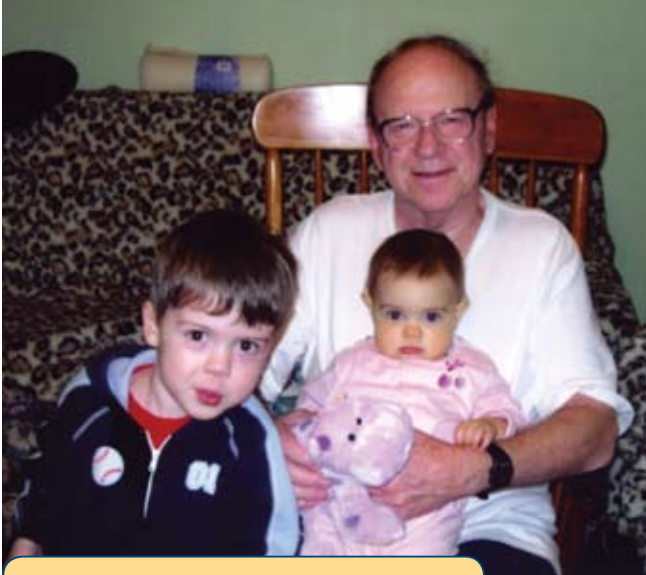
The Department welcomes **Liam Mitchell**, who succeeded **Sonia De Buglio** as Manager of External Relations on December 1, 2006. For the past three years, Liam has worked in the Office of Student Recruitment at the University of Toronto, where he coordinated national recruitment activities. He has also served on a number of inter-university committees, including the Ontario Universities' Fair Organizing Committee, which he chaired for the past two years. Prior to joining the University, Liam worked for CBC News in a variety of capacities. He holds an Honours Bachelor of Arts degree from U of T and a Master of Journalism degree from the University of British Columbia.

Liam copes with a broad range of tasks, remarking that he has always been a multitasker and compulsive organizer. What he enjoys most about his new position is the chance

to participate in virtually every aspect of the Department. He works with students, faculty, staff, alumni/ae, and industrial partners. His short-term goal is to consult broadly with members of the Chemical Engineering community. Based on their feedback, in collaboration with the Chair's Office and the Board of Advisors, he hopes to develop a strategic plan for the External Relations Office over the next few months.

Alex Dvornyak was the Department's Information Technologist for four and a half years, providing a wide range of services including web site, desktop, user, and media support. In January, 2007, he left to become Web/Application Developer for the Department of Ecology and Evolutionary Biology and the Department of Cell and Systems Biology. His new position involves developing and supporting various Intranet and web applications. The Department is grateful to Alex, whose expertise has helped move us into the Information Age.

Fred Leslie, the Glass Blower for Chemical Engineering for thirty-five years, retired in 2002, but he maintains close ties with the Department. Hired in 1967 by then Chair Professor **Breckenridge**, Fred learned his craft by apprenticing with **Art Hunt**, who held the position before him. A member of The American Scientific Glassblowing Society, Fred organized and chaired their 30th symposium and exhibition in 1985. He was heavily involved in the Departmental Occupational Health and Safety Committee throughout his time here and still gives annual lectures at the safety courses offered to new students and staff. Over the years, from his workshop in WB227, Fred produced a vast array of apparatus for undergraduate labs, fourth-year thesis projects, and faculty research. Asked if he ever tried “artistic” glass blowing, he replied that making a condenser which was symmetrical satisfied his aesthetic sensibilities.



Fred Leslie with two of his grandchildren

Fred and his wife **Meryl** celebrated their fiftieth wedding anniversary on July 29, 2006 in a special communion service during which they renewed their vows. The minister who had married them officiated, and their two bridesmaids and one usher were in attendance. These days, Fred and Meryl spend much of their

time taking three of their seven grandchildren on excursions to the ROM, the AGO, and the Science Centre. Fred also pursues his interests in photography and classical music.

Ross Dance (Chem 3T3), an artist, engineer, gardener, and longtime Brockvillean, died on September 6, 2006, two weeks short of his ninety-fourth birthday. Predeceased by his wife **Margaret**, he leaves four children and eight grandchildren. Ross's engineering career took him to Proctor and Gamble in Hamilton, Polymer in Sarnia, and DuPont in Kingston, Maitland, and Montreal. After his 1974 retirement, Ross and Margaret toured the world, making numerous trips to France and England. Ross served for many years on the board of the Brockville Public Library and also on the local Health Council.



Mark your calendar. These events are the perfect venue for expanding your mind or reuniting with classmates and professors.

The LECTURES AT THE LEADING EDGE series continues into the new year with speakers representing a broad spectrum of international cutting-edge research. Everyone is welcome to attend the seminars, which are held at 12:30 pm in room 116 of the Wallberg Building, 200 College Street

LECTURES AT THE LEADING EDGE
CHEMICAL ENGINEERING AND APPLIED CHEMISTRY, UNIVERSITY OF TORONTO

Year	Date	Speaker	Topic
1998	September 13	Cristina Armon, Faculty of Applied Science and Engineering, University of Toronto	Nanoscale Thermal Transport: Modeling Challenges and Opportunities
	October 4	Jens Nerstok, Technical University of Denmark	Heterogeneous Catalysis from First Principles
	October 25	Lester Law, Carnegie Mellon University	Lessons from U.S. Electricity Restructuring: What Doesn't Work and What is Possible
	November 1	Ike Treurnicht, MaRS Discovery District	MaRS - A Cluster for the Knowledge Economy
	November 3	Anthony Atala, Wake Forest University School of Medicine	Regenerative Medicine: New Approaches in Health Care for the 21st Century (1:30 pm, G8201, Gilbreath Building, 35 St. George Street)
	November 15	Dan Rossin, The Fields Institute for Research in Mathematical Sciences, University of Toronto	Financial Engineering and Applied Algebra: An Engineer's View on Quantitative Finance and Risk Management
	November 22	Ravi Bellamkonda, Georgia Institute of Technology/Emory University	Spatio-temporally Controlled Cues Enhance Peripheral and Spinal Nerve Regeneration
	December 6	Derek Lovley, University of Massachusetts	The Microbe Electric: Microbial Nanowires, Fuel Cells, and Extracellular Electron Transfer onto Minerals with Geobacter and Other Electrogen
2007	January 17	Edward DeLong, Massachusetts Institute of Technology (MIT)	Exploring the Marine Microbial World, from Genomes to Biomes
	January 24	Andre Anderko, OLI Systems, Inc., Morris Plains, New Jersey	Electrolyte Systems: From Thermodynamics and Transport Property Models to the Simulation of Industrial Processes
	February 7	Dick Peltier, Department of Physics, University of Toronto	Global Sea Level Rise and Global Warming: Tide Gauges, Satellites, and Computer Models
	February 14	Eddy Isaacs, Alberta Energy Research Institute	The Canadian Oil Sands in the Global Context: The Challenge and the Opportunity
	February 28	Kim Woodhouse, Department of Chemical Engineering and Applied Chemistry, University of Toronto	Elastomeric Biomaterials for Tissue Engineering and Regenerative Medicine: Synthetic and Naturally-based Polymer Systems
	March 7	Nils Petersen, National Institute for Nanotechnology, Edmonton, Alberta	Intermolecular Interactions in Cell Membranes
	March 21	Tommy Iversen, STFI-Packforsk AB, Sweden	Nanotechnology, Biomaterials, and the Forest Products Industry
	March 28	Gary Wu, University of Michigan	Radiation Materials Science - Behavior of Materials in Extreme Environments
	April 11	Valerie Davidson, University of Guelph	Microbial Risk Assessment and Management in Food Systems

LECTURES AT THE LEADING EDGE are supported by alumni and friends of the Department. www.chem-eng.utoronto.ca

All seminars will be held at 12:30 pm in Room 116 of the Wallberg Building, 200 College Street, Toronto, Ontario, except on November 3.

January 17 LECTURES AT THE LEADING EDGE
Edward DeLong, Massachusetts Institute of Technology (MIT), *Exploring the Marine Microbial World, from Genomes to Biomes*

January 24 LECTURES AT THE LEADING EDGE
Andre Anderko, OLI Systems, Inc., Morris Plains, New Jersey, *Electrolyte Systems: From Thermodynamics and Transport Property Models to the Simulation of Industrial Processes*

February 7 LECTURES AT THE LEADING EDGE
Dick Peltier, Department of Physics, University of Toronto, *Global Sea Level Rise and Global Warming: Tide Gauges, Satellites, and Computer Models*

February 14 LECTURES AT THE LEADING EDGE
Eddy Isaacs, Alberta Energy Research Institute, *The Canadian Oil Sands in the Global Context: The Challenge and the Opportunity*

February 28 LECTURES AT THE LEADING EDGE
Kim Woodhouse, Department of Chemical Engineering and Applied Chemistry, University of Toronto, *Elastomeric Biomaterials for Tissue Engineering and Regenerative Medicine: Synthetic and Naturally-based Polymer Systems*

March 7 LECTURES AT THE LEADING EDGE
Nils Petersen, National Institute for Nanotechnology, Edmonton, Alberta, *Intermolecular Interactions in Cell Membranes*

March 14 The annual student production **Skule™ Night** returns to the Hart House Theatre. For tickets, please contact Mary Butera: (416) 978-4941; butera@ecf.utoronto.ca

March 21 LECTURES AT THE LEADING EDGE
Tommy Iversen, STFI-Packforsk AB, Sweden, *Nanotechnology, Biomaterials, and the Forest Products Industry*

March 23 The Department will host the **22nd Annual Chemical Engineering Dinner**, this year honouring the classes of 5T7 and 8T2 as they prepare to celebrate their 50th and 25th reunions, respectively. The dinner will be held at 89 Chestnut Street Resident (89 Chestnut Street, Toronto). For more information, please contact Liam Mitchell: (416) 978-8770; liam.mitchell@chem-eng.utoronto.ca

Upcoming Events

March 28 LECTURES AT THE LEADING EDGE
Gary Was, University of Michigan Radiation,
*Materials Science—Behavior of Materials in
Extreme Environments*

April 1 LECTURES AT THE LEADING EDGE
Valerie Davidson, University of Guelph,
*Microbial Risk Assessment and Management in
Food Systems*

May 31 The **5th Annual Skule™ Alumni
Golf Classic** will be held at the Sleepy Hollow
Golf & Country Club in Stouffville, Ontario.
Early registration deadline: May 1. For more
information, please contact Jim Webster: (416)
978-3177; webster@ecf.utoronto.ca

June 1 A dinner dance will be held to mark
Spring Reunion 2007. For more information,
please contact Mary Butera: (416) 978-4941;
butera@ecf.utoronto.ca

June 2 Professor Emerita **Mary Jane Phillips**
(Chem 5T3), **Bert Wasmund** (Ph.D. 1966),
Anton Davies (Chem 7T2), **David Harquail**
(Chem 7T9), and **George Myhal** (Chem
7T8) will be honoured at the annual **Hall of
Distinction Unveiling**. Members are selected by
their peers based on lifelong accomplishments.
For more information, please contact Mary
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Editor: Yu-Ling Cheng

Managing Editor: Debby Repka

Contributing Editors: Liam Mitchell,
Luke Y. H. Ng, Kathy Weishar

Design and Layout: Dennis Boyes

Photographers: Maegan Guerette,
Steve Frost, Alex Dvornyak, Camelia
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Please contact:

Douglas Reeve
Professor and Chair
Department of Chemical Engineering
and Applied Chemistry

200 College Street
Toronto, ON Canada M5S 3E5
Telephone: 416-978-3069
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Email: chair@chem-eng.utoronto.ca

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