



THE  
UNIVERSITY OF  
BRITISH  
COLUMBIA

# ingenuity

Faculty of Applied Science  
Engineering News

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## Living alongside the Fraser River

### A balance between human safety and environmental stewardship

The gravel reach of the Fraser River, which runs approximately from Hope to Mission in the Fraser Valley, is a vibrant ecosystem where up to two million pink and chum salmon spawn in a good year, and where 20 or more other species of fish co-habitate, including the endangered white sturgeon. It has formed where the Fraser River emerges out of the Fraser Canyon and reduces its gradient. This causes the river to deposit the gravel and coarse sediment that it has transported through the Canyon. It is this gravel deposition that produces the rich and diverse riverine habitat, but also results in channel migration, bank erosion and potentially increased flood risks. These represent major concerns to communities such as Chilliwack and Kent that have developed on the floodplain of the Fraser River.

UBC Civil Engineering Associate Professor Rob Millar is currently focusing his research efforts on this gravel reach. With generous financial support from an Engineering and Science Research Canada Strategic Project Grant, he is developing, along with colleagues Michael Church from UBC's Department of Geography and Ted Hickin from Simon Fraser University, tools for sustainable, long-term management of the gravel reach—tools that address flooding and bank erosion concerns, while preserving the natural behaviour and rich ecosystem.

As part of its natural behaviour, the river moves laterally from side to side over a period of time. As the gravel deposits in one area of the river, the river tends



Associate Professor of Civil Engineering Rob Millar researches the ebb and flood of our rivers.

to flow around the gravel deposit, producing the lateral shifting of the channel. This lateral movement is a significant factor in what makes that section of the river so rich in habitat, and from an ecological perspective it is important that the natural processes, including channel shifting, be allowed to continue. However, this causes some problems for landowners and infrastructure adjacent to the banks of the river, particularly the flood protection dykes.

Over the longer term, ongoing gravel deposition causes the riverbed to increase in elevation, or aggrade. The aggraded riverbed in turn results in higher flood levels. Communities in the Fraser Valley are dependent upon a series of dykes that provide flood protection. If flood levels were to increase as a consequence of gravel deposition, and this does appear to be happening in some sections of the Fraser River, then the existing dykes become less and less adequate for providing flood protection.

# Message

## from the Dean



Welcome to the spring 2005 issue of *Ingenuity*. We are seeing another eventful year for the Faculty, with two major projects that I've mentioned before nearing completion, and a new one—one that will greatly expand engineering programs across B.C.—getting underway. I am pleased to bring you news on all three important developments.

Both of the new engineering buildings that we've been working on over the past few years are now nearing completion, and formal opening ceremonies are anticipated for both facilities in the near future. The Fred Kaiser Building will house an expansion of the Department of Electrical and Computer Engineering, as well as the new Dean's Office; and the much-needed, new facility for the Department of Chemical and Biological Engineering will house the department and the Clean Energy Research Centre.

Unfortunately, a funding shortfall on the latter building persists, and we now have a final opportunity to attempt to address this, with your help. Two of our distinguished alumni, Dick Auchinleck and Pat Daniel, have kindly taken it upon themselves to assist us with this by making a direct and personal appeal to all our alumni and friends—I direct you to their open letter on page 8, and hope you will take a moment to reflect on their words.

As I indicated in the last issue of *Ingenuity*, UBC is establishing a campus—UBC Okanagan—in Kelowna. The new campus will open its doors in September 2005, with the aim of expanding to 7,500 students by 2009. UBC Okanagan will include full engineering programs and our Faculty has been given the responsibility of developing these—you can view the associated press release on page 4. Planning is underway to develop distinctive, linked engineering programs at UBC Okanagan, with close ties to UBC Vancouver, including complementary programs and student transfers, but with a unique small-campus environment. We hope to introduce the new first-year program, *Engineering One*, in September 2005.

In future issues of *Ingenuity*, we will share with you further news on the development of engineering at UBC Okanagan. In the meantime, we are confident that this initiative will be a major step forward for our Faculty, for the University and for British Columbia.

Beyond these three projects, I wanted to take a moment to reflect with you on the devastating events associated with the tsunamis that occurred in Southeast Asia last December 26. From the Faculty's perspective, this reminds us of the importance of engineering in ensuring our quality of life and our future well-being. Among other things, engineers are charged with the responsibility to develop our safety codes, to build our cities, to ensure safe drinking water, to monitor our environment for potential ill effects, to initiate preventative measures when danger looms, and to act when crises arise. It is important that these technical engineering contributions be combined with concern, care and compassion for our citizenry. As an illustration of the caring nature of engineers, page 6 has an article that tells how two members of our Faculty reacted with compassion for the victims of the disaster. One of our Chemical Engineering students, Monty Raisinghani, helped to raise \$16,000 for the Red Cross through a student-driven fundraising campaign. As well, Professor Ward Wilson, Chair of Mining and the Environment and a renowned expert in clean water treatment, went at short notice to Indonesia with *Canadian Food for the Hungry International* to lend his expertise in the establishment of water treatment facilities. As engineers with a strong tradition of service to the community, we are very proud of both of these individuals and their contributions, which demonstrate the caring, human side to our profession.

As always, please contact me—by letter, telephone (604) 822-6412, fax (604) 822-7006, or e-mail dean@apsc.ubc.ca—if you are able to assist in the development of the Faculty, if you have any suggestions to provide, or if you would like further information on the Faculty's activities.

A handwritten signature in black ink that reads "Michael Isaacson". The signature is written in a cursive style and is positioned above a horizontal line.

**Michael Isaacson**

Dean

To view past issues of *Ingenuity* and learn more about the Faculty, visit our website at <http://www.apsc.ubc.ca/publications/engineering.html>.

# Students are in good hands

## Associate Dean Bruce Dunwoody

### is making sure of it

An Associate Professor of Mechanical Engineering at UBC, Bruce Dunwoody received his B.A.Sc. in mechanical engineering from UBC in 1974 and his Ph.D. in ocean engineering from the Massachusetts Institute of Technology in 1980.

He joined the faculty in 1985 after several years in industry: first with Defense Research Establishment Pacific in Esquimalt, studying submarine acoustics in the Pacific Ocean; and then with Dome Petroleum, designing artificial islands in the Beaufort Sea.

Despite numerous patents, he insists that he has always been just a dabbler in research. It is as an administrator and an educator that he finds the most fulfillment.

This is because Bruce Dunwoody has but one passion and that is undergraduate engineering students!

Dunwoody sums up his Associate Dean duties as falling under three basic categories—he teaches, he goes to committee meetings and he counsels students. The relative weighting of these three things, he says, depends on the particular day in question.

This year he has led APSC 150—Engineering Cases Studies and APSC 151—Engineering Graphics. He is also responsible for the three student-focused units

in the Dean's Office: the Engineering Student Services Office (ESS), the Engineering Co-op Office, and the Technical Communication Centre.

How does he handle all this responsibility? "I have very capable people in charge of each one," says Dunwoody. "I am single-minded. There is only one thing that I HAVE to do in my job and that is to take care of the students."

ESS is where you will find Dunwoody on most days; it is where his office is and it is where he counsels students on a daily basis. "I have to go into those interviews with an open mind. Some of the students' problems are fairly predictable, but others are quite unique and really do require unique solutions," he explains. "I try to understand the root of their problem, and then approach it with empathy for their situation. At the same time, I have to maintain a consistency in that whatever I do for one student I must be willing to do for all students. It can mean difficult choices sometimes."

Dunwoody has a role with all undergraduate engineering students, but it is the first-year students in particular that are his biggest concern because they come in without a home department. "The biggest challenge in the job is taking students with a high school mentality and



Dr. Bruce Dunwoody with high school students during one of the recruitment information sessions he participates in annually.

starting them on the road to becoming engineers," he says. He feels it is his responsibility to prepare them for the rest of their engineering studies.

Dunwoody has an ambitious plan underway to address just this challenge. It involves introducing more metaskills into the curriculum, which includes things like how to deal with people and how to express yourself clearly.

"Introducing more metaskills needs to involve a balance between not giving up the technical skills, but also motivating students on the metaskills side and giving them effective teaching on that side," explains Dunwoody. "It is a challenge to do well because the key is motivation. It is hard to take a student who thinks that engineering is, as I did, the place to go if you don't like dealing with people and you don't like writing, and to convince them that these are things that they need to have and that they are capable of having."

To accomplish this, he is working to expand the Technical Communication Centre to become the home of metaskills development within the Faculty. The Centre currently teaches written and oral presentation skills within technical courses, which is proving highly successful. The plan is for Centre faculty to broaden the metaskills they introduce into the classroom.

He is also currently working with several colleagues to write an Introduction to Engineering textbook that incorporates metaskills into the curriculum.

"Metaskills are going to separate UBC engineers from engineers at other universities. I expect that other universities are also seeing that this is a direction they have to go. We at UBC certainly have to go in that direction to benefit our students," concluded Dunwoody.

# Engineering One program at UBC Okanagan

The Faculty brings engineering studies  
to the Kelowna campus by fall 2005

On Friday, February 18, 2005, UBC held a press conference to announce plans to develop engineering programs for UBC's newest campus—UBC Okanagan—in Kelowna. The press release follows:

## UBC Okanagan Set to Offer Full Engineering Degree Programs in Kelowna

KELOWNA – Engineering starts at UBC Okanagan in September 2005, when the first 60 students enter the innovative new *Engineering One* first-year program that will eventually lead to four-year degrees graduating up to 180 students per year, Deputy Vice Chancellor Barry McBride announced today.

“Industry needs this infusion of engineers and engineering activity in B.C.’s southern interior,” said Association of Professional Engineers and Geoscientists of B.C. Past President Dick Fletcher. “An Okanagan Industrial Survey conducted in early 2004 clearly showed very strong support for engineering programs at UBC Okanagan.”

UBC’s Faculty of Applied Science will offer the program, with degrees likely available in Mechanical, Electrical, Computer and Civil Engineering, as well as graduate programs and research opportunities.

“Linkages between the engineering programs at UBC Okanagan and UBC Vancouver will be strong,” said McBride. “Having the Faculty of Applied Science as a bridge across UBC’s Vancouver and Okanagan campuses will also help to meet requirements of the Canadian Engineering Accreditation Board.”

McBride said students at both Kelowna and Vancouver will be able to transfer at the end of the first-year program to specific discipline programs offered at either campus. A co-operative education program, with students alternating between academic terms and work terms in industry, will also be available.

In addition, a proposal under discussion would allow graduates of the new Okanagan College’s Engineering Technology Diploma to take a six-month Bridging Program for transfer to third year at either UBC campus.

Michael Isaacson, Dean of Applied Science, said *Engineering One* will offer full-time studies equivalent to that of UBC Vancouver, but will have a distinctive pedagogy and delivery mode, with a close integration between curriculum components and between fundamentals and applications.

“B.C. has been graduating less than 50 per cent of engineers per capita relative to the rest of Canada,” said Isaacson. “We are grateful to the B.C. government for its commitment to expand student spaces in the province by 25,000, and for establishing UBC Okanagan. Together we can begin to address the significant shortfall in engineering graduates.”



BACKGROUND:

## Engineering at UBC Okanagan

In August 2004, UBC Dean of Applied Science Michael Isaacson established the UBCO Engineering Task Force, with faculty members from both UBC and Okanagan University College. Associate Dean Perry Adebar, Professor of Civil Engineering, chaired the Task Force.

In December, the Task Force issued a draft report with a number of recommendations to develop Engineering at UBC Okanagan. The Task Force consulted existing reports and key interest groups such as the Okanagan Science and Technology Council and UBC's Engineering Advisory Council and worked closely with local industry representatives and business leaders.

The Task Force Report recommended that programs offered in second year and beyond at UBC Okanagan should include civil engineering, electrical and computer engineering, and mechanical engineering, with the use of common second-year courses wherever possible. Distinctive options within each discipline will be offered at the campus in third and fourth years. Students at both Kelowna and Vancouver will be able to transfer to specific discipline programs offered at either campus.

The Task Force recommended an emphasis on providing students with the development of “metaskills” —including leadership abilities, professional ethics, conflict resolution, business economics, strategic planning, environmental and sustainability considerations, teamwork skills, written and oral communication and multi-criteria project assessment—through regular courses and extra-curricular activities.

Linkages with industry will also be a significant factor in the success of engineering programs developed for the Okanagan. The Faculty plans to develop partnerships with local industry, and is consulting closely with the Okanagan Partnership's Engineering Advisory Committee.

Coupled with the establishment of strong baccalaureate programs will be the development of graduate programs in specific areas and a vibrant research presence. Areas of existing Okanagan regional strength such as aeronautical engineering, water resource management, and radio engineering, will benefit from UBC Okanagan's research and technology transfer capacity.



Mary Murphy



Mary Murphy

From left: UBC Okanagan Deputy Vice Chancellor Barry McBride, Minister of Intergovernmental Relations and Kelowna-Mission MLA Sindi Hawkins, APEGBC Past President Dick Fletcher, and UBC Dean of Applied Science Michael Isaacson each spoke during the press conference on February 18, 2005.

Dean Isaacson (left) shares a celebratory moment with Dick Fletcher following the press conference.

# Tsunami relief efforts out of the Faculty

Two humanitarians within the Faculty were among the many around the world who lent their expertise and support to relief efforts following the devastating tsunami that struck Southeast Asia on December 26, 2004.

## Mining Engineering Professor Ward Wilson travels to Indonesia

UBC Professor of Mining Engineering and Chair of Mining and the Environment G. Ward Wilson received the call for help from *Canadian Food for the Hungry International* (CFHI) on January 7. Ironically, he was travelling back to B.C. from vacationing in Hanoi when the quake struck.

Based in the lower mainland, CFHI had been aware of Wilson's expertise since his visit to one of their camps in Kenya ten years earlier. They needed his expertise to establish two water treatment plants in Banda Aceh, Indonesia, and to train the locals to maintain the facilities after his departure.

Although Wilson knew immediately that he desired to help, he also realized that the spring semester was about to begin and he had a busy schedule of teaching and research ahead of him.

"Department Heads Malcolm Scoble and Eric Hall understood immediately how important it was for UBC as part of the global community to lend its expertise during such a crisis," said Wilson.

"Everyone rallied around to help with my teaching load and I was on a plane by January 10. I am extremely

grateful to UBC and my colleagues for their encouragement and support."

Although Wilson found a good groundwater supply almost immediately, the water treatment plants from Canada were delayed due to an unexpected \$2,000 customs levy. In the meantime, he kept busy assessing water needs, potential water supply and purification systems for several refugee camps. "At each camp, more than 200 refugees lived under tents made with plastic sheets held up with sticks. There was no running water and no toilets. Debris and garbage were everywhere. People were cooking on the ground. It was a really tough place to be," said Wilson.

Wilson is home now and back in the classroom, but he says work is not finished in Indonesia. The first phase of emergency response, addressing emergency medical and food issues, has been addressed to a large extent, but the next phase of providing water and adequate housing will continue to be emergent issues in Banda Aceh for the next several months. Reconstruction of the built landscape is estimated to take several years.

## Chemical Engineering student Monty Raisinghani helps raise \$16,000

Not everyone had the ability to drop everything and fly to Southeast Asia. Third-year Chemical Engineering student Monty Raisinghani was in the midst of a co-op work term in Alberta when the tsunami hit. "I was pretty devastated to see so many lives struck at once," said Raisinghani. "I knew I had to do something."

No stranger to charity work, when he was in Grade 10, he founded the annual Community Christmas Dinner for less fortunate people in Surrey in 2000, for which he won the Governor General's Caring Canadian Award in 2003.

It was after being interviewed about this year's dinner on the Indian community radio station, Sabrang Radio, in Calgary on December 17 that Raisinghani got the idea for a radiothon. He had also



taken part in the B.C. Children's Hospital telethon in the past so was familiar with the format.

"I called my contacts at the radio station with the idea and they were all for it," explained Raisinghani. During the radiothon, he also pledged, as a challenge to other post-secondary students, to add \$10 to his own personal donation for every student that called in.

In the end, Raisinghani and Sabrang Radio raised \$16,000 towards relief efforts. The cheque was presented to the Canadian Red Cross on January 16.



Professor Wilson boarding a military flight home at the end of his three weeks at Banda Aceh.

# Faculty Development

# Looking forward

For the past several years, the Faculty of Applied Science has worked hard on two major infrastructure developments. Both the new Fred Kaiser Building and the new building for the Department of Chemical and Biological Engineering, the latter incorporating the Clean Energy Research Centre, represent a significant investment not just in the future of engineering at UBC, but also in the future of engineering in Canada. With these new facilities, we will continue to produce some of the best engineers in Canada who will bring their own unique,

innovative developments to their field. We are proud to have the opportunity to help build the future of the profession.

On the next page, there is an open letter from two of our successful Chem Eng graduates, Mr. Dick Auchinleck and Mr. Pat Daniel. They have both been active supporters of and advocates for the Faculty, and have written an open appeal to you, their classmates and colleagues, for the Chemical and Biological Engineering Building. This is about the value of education: what we can offer those students

who will be tomorrow's engineers, and will guide the future of your chosen profession. I hope you take the time to read their request and respond to it. Our students depend on your support.

There are many naming opportunities still available in the Chemical and Biological Engineering Building, ranging from \$150,000 for the Project Rooms to \$8 million for the building itself. All donor contributions over \$25,000 will be recognized on a special donor wall in the atrium of the new building— and, to specially recognize the support of our alumni, we will total each class' contribution to the building and add the name of each class whose gifts total more than \$25,000 as well. We've also begun a campaign to name the Reading Room for Professor Emeritus Dr. Norman Epstein: Norman has spent more than fifty years within the department, conducting leading research and teaching hundreds of students, and we are pleased to have the opportunity to honour his contributions in this way.

Official opening ceremonies will be held in fall 2005 for the Fred Kaiser Building and in spring 2006 for the Chem/Bio Building. We are looking forward to celebrating these milestone



events with all our alumni, friends, and our donors whose support has made our vision for the future possible. We look forward to seeing you there!

The Development Office is continuing to pursue other opportunities for the Faculty, including a BC Leadership Chair in Information and Communications Security Technology, a Professorship in Biomedical Engineering, an Industrial Professor for the Department of Mining Engineering, and a new initiative in Transportation Engineering for the Department of Civil Engineering. If you would like more information on any of these exciting new projects, or about the Chem/Bio Building, please contact me. I can be reached at 604-822-1329 or [hillary.gosselin@ubc.ca](mailto:hillary.gosselin@ubc.ca). I look forward to hearing from you.

A handwritten signature in cursive script that reads "Hillary Gosselin".

**Hillary Gosselin**  
Manager of Development



# Investing in engineering's future

## Dear classmates, fellow alumni, and friends:

Last February's groundbreaking for the new Chemical and Biological Engineering Building was a great cause for celebration. The old CHBE building no longer adequately houses the faculty or the students associated with the department, and the need for a new facility has been pressing and urgent. We are very pleased to have a new building under construction. Classes will commence in the new building in fall 2005.

However, even though the university, the government, industry and especially the alumni have all generously contributed to the building, it is still facing a funding shortfall. As alumni, we know how crucial good facilities are, and we are appealing to you, our classmates, to come forward to support this important development just one more time.

The new building for CHBE isn't just a structure to house the department—this building and others like it are an investment in the future of engineering education and research. The value of a new building goes well beyond the cost of its construction. The new Chemical and Biological Engineering Building will provide state-of-the-art classrooms and laboratories for students that will enhance their educational experience. It will provide new laboratory spaces and equipment to encourage cutting-edge research. The Department of Chemical and Biological Engineering is B.C.'s only Chem/Bio engineering education and research facility, and is world-renowned for its educational and research programs. The value of a good education and excellent research facilities simply cannot be overestimated: this new infrastructure development is crucial if we are to maintain excellence in engineering education and to prepare for the future of our profession.


The benefits of new facilities aren't just limited to the department. Chem/Bio researchers collaborate with colleagues across campus and in industry as part of a growing, thriving synergy of engineering innovation. This synergy of engineering makes an important contribution to the economies of both B.C. and Canada through education, training, research, and technology transfer. As part of a conglomerate of engineering education and research, the new facility will allow the department to expand its educational and research programs in order to better serve its students, its faculty, its partners, and many associated industries.

As graduates of the Chem Eng program at UBC, we understand the importance of providing outstanding facilities to both students and faculty, and the impact this has on education, research, and the engineering profession. We know you, our classmates and fellow engineering alumni, realize the value of the contributions engineering has made to your lives, and we hope you will make an investment in your career of choice through a contribution to the new Chemical and Biological Engineering Building.

Please join us in this last appeal for the future of Chemical and Biological Engineering in B.C., and fill out the giving form with your donation. Your investment will pay out in the future successes of UBC engineers, future progresses of engineering research—and the economic success of industries across Canada.

Thank you very much for your consideration.

Sincerely,



**Richard Auchinleck**  
BASC 1976 (Chemical Engineering)  
Member, UBC Engineering Advisory Council  
Former President and CEO, Gulf Canada



**Patrick Daniel**  
MASC 1970 (Chemical Engineering)  
Member, UBC Engineering Advisory Council  
President and CEO, Enbridge Inc.



# Alumni update

Our fall/winter 2004 issue of *Ingenuity* highlighted some of the ways the Faculty has been working to build on and improve our strong relationship with our alumni. I am now pleased to inform you about developments that we believe will further help ensure you obtain optimum benefit from alumni services offered on campus by the Faculty, the University and the Alumni Association.

Effective January 2005, UBC hired Marie Earl into a newly created position with the dual roles of Associate Vice President Alumni and Executive Director of the UBC Alumni Association. Over the next 18 months, Marie will conduct an analysis of alumni affairs on campus and present recommendations to the Vice President Students for increasing both the quantity and quality of services to UBC's graduates.

UBC and the Alumni Association have worked together for the past two years to reach an agreement on how alumni services will be shared between them. Marie Earl's appointment reflects the determination of both bodies to build alumni affinity and bring more alumni back into the life of the university. For more information, visit [www.alumni.ubc.ca](http://www.alumni.ubc.ca).

I would also like to remind you about the On-line Community website introduced by the UBC Alumni Association. Among many interesting features, this site offers you the opportunity to update your address on-line, to connect with and/or find missing classmates, and to acquire a "for-life" e-mail address. For further information on how to register, please visit their website at [www.olcnetwork.net/ubc](http://www.olcnetwork.net/ubc).

I am pleased to bring you highlights of some of the alumni events held over the past few months.



May Cordeiro  
Alumni Relations Officer

## Recent event highlights



### CIVL '49—55th Reunion—September 15, 2004

Troopers from the Civil Engineering Class of 1949 (left) meet every year for a class reunion. This year they celebrated their 55th reunion with a lunch at the Beach Grove Golf Course in South Delta, B.C.

Left (front row, from left): Stu Hamilton, Ray Cunliffe (Class President), Gerry McCombie, Bob Bagnall, and Knute Soros; second row, from left: Jim Rowledge, Les Edgeworth, Bob Smith, Brian Talbot, Stan Oakes, Frank Mehling, and Al Knappett; back row, from left: Art Beaumont and Tony Pollard.

### EECE '69—35th Reunion—October 1 and 2, 2004

Electrical and Computer Engineering classmates from 1969 and their guests celebrated their 35th reunion with a two-day celebration that included a tour of the Electrical and Computer Engineering Building led by Department Head Vijay Bhargava, a pub night at the Wolf and Hound Pub in Vancouver, and a dinner at a local Chinese restaurant (right).



## Other Reunions

The Mechanical Engineering Class of 1959 celebrated its 45th reunion on September 11, 2004, with a tour of the Mechanical Engineering laboratories led by Instructor Jon Mikkelsen, followed by dinner at a local restaurant. (No photo available.)

The Geological, Mining and Materials Engineering Classes of 1954 celebrated their 50th reunion with a reception and dinner on October 1, 2004, at the Brockhouse restaurant in Vancouver. (No photo available.)



Left: Head of the Department of Electrical and Computer Engineering Vijay Bhargava met with alumni at a reception on November 18, 2004, at the Hyatt Sainte Clare in San Jose, California.

Right: Dean Michael Isaacson visited with engineering alumni at a reception on November 25, 2004, at the Fairmont Royal York in Toronto.



## Old Red New Red Event—February 10, 2005

The Faculty and the Engineering Undergraduate Society held their annual “Old Red New Red” networking event on February 10 in the Civil and Mechanical Engineering Building. As usual, the event provided a great opportunity for students to meet alumni, to learn about careers, and to show off their project models (left).

# 2005 Reunions

The following reunions are being planned for 2005: BASC'55, BASC'65, BASC'75, CHML'55, CHML'65, CHML'80, CIVL'51, CIVL'58, CIVL'79, MECH'55, MECH'85, and MINE'85. Complete details of these events will be sent to the respective classes in the coming months. If you would like to get involved or have any questions, please contact me by phone at 604-822-9454 or by e-mail at [mcordeiro@apsc.ubc.ca](mailto:mcordeiro@apsc.ubc.ca).

# Students named Energy Ambassadors

## Prize-winning invention wins two national competitions

Ever wondered if it really helps your electricity bill to turn the lights off every time you leave a room? Well, now a group of undergraduate UBC students can help you discover the answers to your electricity consumption questions.

Mechanical Engineering students Cyrus Irani, Tariq Amlani and Lauren Kulokas teamed up with Sauder School of Business students Janice Cheam, Salim Hassan and Derek Sawkins to invent the PowerTab, a small device that plugs into any household electrical outlet and displays in real-time the amount of energy that is being consumed.

The invention came out of the course APSC/COMM 486—New Venture Design, which teams students from Applied Science and the Sauder School of Business to create a business plan and a prototype or engineering solution of a novel product, process or process component.

We can, in large part, thank Electrical and Computer Engineering Professor Peter Lawrence and Civil Engineering Associate Professor Helmut Prion for this innovative, interdisciplinary course. Together, they were awarded an NSERC Chair in Design Engineering a few years ago with a mandate to develop such curriculum

redesigns. As one of their initiatives, they collaborated with Associate Professor of Marketing Darren Dahl in the Sauder School of Business on this new course. The success of these students is a wonderful testament to the fine work they are doing.

The creators of the PowerTab say that there is no other such device on the market in Canada.

Although the year-long course does not end until April, these students are already receiving recognition for this novel invention. During the same weekend, they were notified that they had won not one but two national competitions: the Sauder School of Business Enterprize Conference and Business Plan Competition, which garnered them \$6,000 in prize money; and Natural Resources Canada's Energy Ambassadors competition, which garnered them \$1,000 in prize money.

What are their plans for the money? These high achieving students are looking into filing their patent claim and have formed their company, Energy Aware Technologies Inc. They are setting aside their prize money for start-up costs.

"This is a very marketable device," said Kulokas. "We anticipate that it could retail for as low as \$190."

They believe that there is a demand for such a device. "Consumers who have ever gasped at the amount of their electricity bill will want the PowerTab. No longer will they have to wait two months to find out how much they owe. With the PowerTab, they will be able to monitor their energy consumption and the cost. They can set target goals and adjust their usage to meet those goals long before the next bill ever arrives in the mail," said Amlani.

This is going to become more and more an issue in the years to come, say the students. "At the rate we use energy today, within 10 years, British Columbia would exceed its electrical carrying capacity and would have to import electricity at a significant cost to meet consumer demands. Already there are peak user times throughout the



The PowerTab will allow homeowners to monitor their energy consumption and costs on a daily basis.

day when B.C. exceeds its consumption and has to import energy," said Irani.

With the PowerTab, Canadians can become more aware of their individual energy consumption. It will provide a visual incentive to cut back on their personal usage to save themselves money and to help Canada meet its commitment to conserve its energy resources and protect the environment.



The young inventors, from left: Salim Hassan, Janice Cheam, Tariq Amlani, Derek Sawkins, Lauren Kulokas and Cyrus Irani.

# Cutting-edge curriculum innovations

Currently the highest demand discipline with both industry and students alike, the Department of Mechanical Engineering has made some daring advances in its curriculum offerings.

## The New Mechatronics Option

Mechanical engineers with training in real-time software, electronics and instrumentation are currently in very high demand with industry. Mechanical Engineering Associate Professor Elizabeth Croft says that she is continually contacted by industry asking for graduates with this type of specialized training. As well, the Mechanical Engineering Advisory Council has strongly recommended that the department focus more on graduating these types of mechanical engineers.

Demand comes not only from industry. Many students, who have shown a strong aptitude for mechanical instrumentation before even entering university, were unable to pursue this career path at UBC. "These individuals typi-

cally have very high GPAs, and have already done some instrumentation in their own projects. Some have designed circuit boards for adjusting the timing of their car engines, or they have been building robots as a hobby, for instance," said Croft.

To address this high demand, the Department of Mechanical Engineering has developed the Mechatronics Option, available to students beginning in their second year of mechanical engineering. It is a four-year program culminating in a B.A.Sc. in Mechanical Engineering, Mechatronics Option. Graduates have the option to continue on to receive their master's degree, through a one-year industry project and graduate course work.

"We've designed new courses and laboratories

that focus specifically on the needs of Mechatronics students—such as real-time programming, digital and analog circuit design, mechatronics systems modeling, instrumentation, control of mechatronic systems, sensors and actuators, microelectro-mechanical systems, and so on. As well, we have various electives and the Co-op Program available to Mechatronics students," explained Croft, who is Co-coordinator of the Mechatronics Option, along with Electrical and Computer Engineering Assistant Professor Robert Rohling and Mechanical Engineering Professor Yusuf Altintas.

The program is currently training students in second and third years and will begin the fourth-year curriculum in September.

What do the students think? "I find the program extremely rewarding," said third-year student Karen Ho. "One of the most valuable aspects is the small class size. It allows for good interaction between students and professors. As the

courses become more in-depth and challenging, I've become even more motivated to learn. I'm very grateful to be a part of the program."

Matthew Paone, another third-year student, said, "the projects and laboratories really help drive home the theory that we learn in lectures. Our professors challenge us to think, but are also helpful when it comes to problem solving. I know that my time in the program has already opened many doors for me; and when I finish my degree, I anticipate many more exciting opportunities ahead."

The program has been very successful in attracting the highest quality students. It receives approximately 70 applications annually and admits 30 to 40 students each year. Some of these students opt for the Engineering Co-op Program, extending their education by an additional year, and some will continue on for their master's degree. The department anticipates graduating its first cohort in spring 2006.

This is excellent news for engineering companies in B.C. and throughout Canada who are in need of these specially trained mechanical engineers!

To learn more about the Mechatronics Option, visit [www.mech.ubc.ca/~mecha](http://www.mech.ubc.ca/~mecha).

To hire a third-year Mechatronics co-op student, call (604) 822-3022.



Mechatronics students outside the new Mechatronics Laboratory opening in May 2005.

## **MECH** completes its first year

If developing a new option were not enough, the Department of Mechanical Engineering has also just completed a major redesign of its second-year curriculum called Mech 2. Mandatory for all second-year mechanical engineering students, the aim of Mech 2 is to develop students' analytical, practical and design skills.

According to Mech 2 Program Coordinator Peter Ostafichuk, the traditional curriculum was not an optimal way to educate engineering students. He believes that students greatly benefit from the unified approach of Mech 2.

"In the traditional program, students juggled five or six diverse courses and had difficulty seeing connections in the material," explained Ostafichuk. "In Mech 2, students take only one carefully designed course at a time and the material is presented in a logical, integrated fashion."

In order to do this, the department had to completely change the way courses are organized, taught and scheduled over each day and over the two terms in second year. Students take only four courses over the entire second year. Instructors in mathematics, materials, electronics, technical communication and mechanical engineering used to organize and teach their own courses autonomously. Now they have become

a team teaching the same course in collaboration with each other. This required a significant amount of communication and consensus among the instructors.

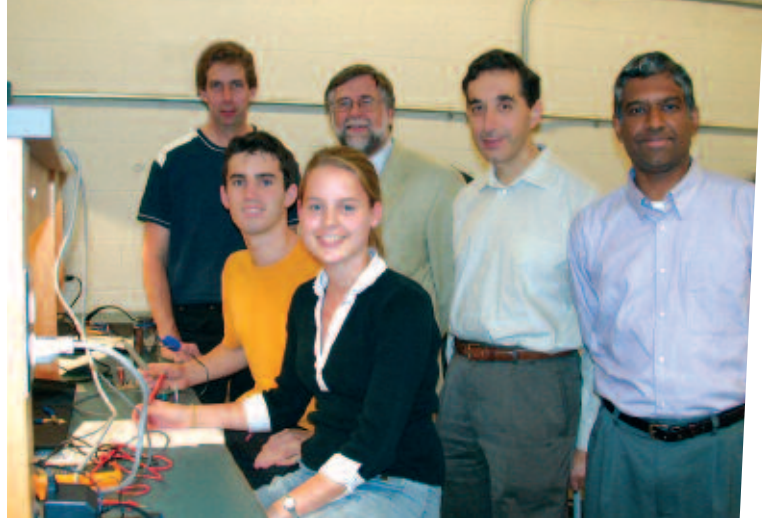
How did they achieve this consensus? "Lots and lots of meetings," said Ostafichuk.

The program has been designed so that students have time to focus their thinking on key aspects of theory, and then apply the ideas in an experimental or design setting.

In MECH 220, students learn all of the practical skills required to take them through the development and construction of a small project. They complete training in machine shop practice, engineering drawing, computer-aided design, and instrumentation. At the end of the four-week course, they have modeled, fabricated and tested their own electronically controlled magnetic levitation device.

MECH 221 and 222 include more formal training in engineering science, covering material in solid mechanics, rigid body dynamics, mathematics, electrical engineering, materials engineering, fluid mechanics, and thermodynamics.

Finally, in MECH 223, students complete two design projects related directly to the material from their earlier courses, focussing also on engineering design and professional



Students demonstrate their levitation device for the Dean during his tour of MECH 220. Standing, from left: MECH Research Engineer Gordon Wright, Dean Michael Isaacson, MECH 220 Professor Gary Schajer and MECH Department Head Nimal Rajapakse; seated, from left: students Curtis Mullen and Solveig Brandvold.

practice. At the completion of the projects, students demonstrate their devices in competitions with the rest of the class and prepare professional quality engineering reports and presentations.

"This first year has gone amazingly well," said Ostafichuk. "We are seeing a positive shift in the way students are learning and there has been a great deal of excitement and enthusiasm from students and instructors alike."

Mech 2 student Solveig Brandvold agrees. "Mech 2 has been a completely new educational experience for me. The team-based parts are a challenge; we've had to learn new skills in order to get the work done successfully in teams. It's much more like real life. It's very fast paced, and the hands-on design projects are super fun—totally unlike anything we've done before. I particularly liked the practicum of drafting, instrumentation, machining and software. It was interesting and rewarding to gain some hands-on fabrication skills.



MECH 221 students on a field trip to an indoor climbing gym where they studied phenomena such as friction, tension, and elasticity. Students collected data that they later analyzed and used to prepare a report.

I think that Mech 2 has the potential to be much more successful than a conventional program in preparing engineers for the work ahead," said Brandvold.

For more information on Mech2, visit [www.mech.ubc.ca/~mech2](http://www.mech.ubc.ca/~mech2).

# Retirements

The Faculty would like to acknowledge with deep appreciation for their many years of service the following faculty members, who retired on June 30, 2004:

## Michael Davies, Electrical and Computer Engineering



Michael Davies received his M.A. in mechanical sciences from Cambridge University in 1961, and his M.S. and Ph.D. in electrical engineering from the University of Illinois in 1966 and 1967, respectively. He was first appointed at UBC in 1966. Since that time he has become a highly regarded expert in the applications of control, particularly in the pulp and paper industry. He has always enjoyed a tremendous rapport with both his undergraduate and graduate students, and has won teaching awards for this effort.

Alongside his exemplary teaching and research, Davies has served the Faculty in a number of administrative positions: as Assistant Dean from 1983-85; Associate Dean from 1985-97; and Head of the Department of Electrical and Computer Engineering from 1997-2002. His administrative contributions in these positions have had a significant, positive and long-lasting impact on engineering education in Canada.

Although he stills teaches two undergraduate courses and supervises graduate students, since retirement he has found more time for his research on the dynamic response of particles to random impulsive forces—on the golf course!

## Colin Oloman, Chemical and Biological Engineering



Colin Oloman began his career with Australian Iron and Steel Pty. Ltd. (A.I.S.) while studying chemical engineering at the University of Sydney. He received his B.E. in 1961 and continued as an engineer with A.I.S. until 1963. In 1964 he moved to Canada and spent six years as an engineer with B.C. Research. After a break for worldwide travel, he returned to Vancouver in 1972 for an M.A.Sc. at UBC, then in 1974 joined UBC as a faculty member in the Department of Chemical Engineering.

In the areas of chemical and electrochemical technology, Oloman has made many contributions

over the past 40 years through engineering reports, scientific papers, consulting, two books and numerous patents—including some that are the basis of ATS Electro-Lube International Inc., a local company of which he is part owner. However, looking back on his professional career, it is his teaching accomplishments that give him the greatest pride.

Oloman continues to supervise graduate students, gives guest lectures and is involved with the start-up of the Clean Energy Research Centre at UBC. Beyond this, he looks forward to renewing some of the outdoor adventures that first brought him to Canada.

## Paul Watkinson, Chemical and Biological Engineering



Paul Watkinson received his B.Eng. in chemical engineering at McMaster University in 1962. Following graduation, he worked as a research engineer at International Cellulose Research Ltd. and at Columbia Cellulose Co., before completing his M.A.Sc. and Ph.D. degrees in chemical engineering at UBC in 1966 and 1968, respectively. He then spent three years with Noranda Research Centre in Quebec, before joining the Faculty in 1971.

For the past 32 years, Watkinson and his research team have made advances in the areas of high-temperature reactors, heat exchanger

fouling and electrochemical processes, for which he has earned several major awards. In addition, he was Head of the Department of Chemical Engineering from 1992 to 2001, providing outstanding leadership to the department during that time.

Watkinson can still be found in his office working on his research and planning an engineering conference that he will co-chair this summer in Germany. He has also lectured in the U.S., Scandinavia, the Netherlands and Japan. Nevertheless, he happily reports that he is finding more time to spend at his cabin on Savary Island, and expanding his musical talents by taking up the Irish flute.

# Appointments

## Electrical and Computer Engineering

**Lukas Chrostowski** was appointed Assistant Professor on January 1. His research interests are in the areas of nanophotonics, high-speed modulation of semiconductor lasers, optical communications, and fabrication of vertical cavity lasers.

## We've Moved!

With the recent completion of the Fred Kaiser Building, the Dean's Office has moved to the fifth floor of the building. Our new address is:

5000–2332 Main Mall  
Vancouver, BC V6T 1Z4

All our contact numbers are unchanged.

## Living alongside the Fraser River... Continued from page 1

To maintain adequate flood protection, one approach would be to progressively raise the elevation of the dykes as the riverbed aggrades, an exceedingly costly exercise. An alternate strategy is to remove the gravel as it accumulates. Because the gravel is valued as a construction material, periodic gravel removal is seen by many as a cost-effective solution. However, in order to ensure natural river processes and to preserve the environmental quality of the habitat of the Fraser, it is necessary that gravel deposition and lateral movement of the channel be allowed to continue.

"If you go back in history and look at examples of large European rivers like the Danube or the Rhine—rivers that have similar characteristics to the lower reach of the Fraser—you see that over time, it was a

case of 'death by a thousand cuts,'" explained Millar. "No one set out to destroy those rivers, but over time they hardened up the bank here, they removed a bit of gravel there—they trained it for flood mitigation, for gravel supply, and for navigation. To stabilize the river, for whatever reason, people got in and modified the rivers so that, one or two hundred years later, instead of this rich diverse river ecosystem, we've ended up with straight, uniform channels that support very little in terms of fisheries. That's been the sad history of most of the major world rivers within urban areas."

"We are quite fortunate here that we have this near-wild river in relatively good shape, flowing right through a major urban corridor," said Millar. "Of course, we are dealing with the same issues that people in Europe dealt with hundreds of years ago. So if we want to maintain

its more natural attributes, we've got to implement long-term, sustainable management approaches."

Millar and his colleagues are working to understand better the principle physical processes of the river—the movement, the erosion, the transport and the deposition of gravel sediment. The primary monitoring of the river is through multiple surveys at five-year intervals of the bottom of the river—the bathymetry of the river—and the position of the river channels. By comparing the surveys taken at different times, they are able to track the movement and changes in the channel.

With this data they have developed computational models to simulate the flow depth and velocity and the rate of gravel deposition for the Fraser. This model is then run into the future to predict areas of gravel

accumulation or depletion. They then can simulate different gravel management options and predict the effect on the flow depth and velocity and downstream impacts on the ecosystem.

Ultimately, Millar's hope is to develop a better understanding of the physical processes of the Fraser River, and to develop new approaches to river management that will provide adequate flood protection within the urban corridor, as well as permit natural processes to function so that that river can maintain a rich and diverse ecosystem.

"By modifying traditional approaches to river management, we can ensure that in one or two hundred years much of the life within our river will be sustained," concluded Millar.

# Achievements

Chemical and Biological Engineering Professor **Richard Kerekes** has received the 2004 Research and Development Technical Award from the Technical Association of the Pulp and Paper Industry (TAPPI).

Civil Engineering Professor **Nemkumar Banthia** has received the 2004 Distinguished Researcher Award from the Korean Concrete Institute and Seoul National University.

Civil Engineering Professor and Dean of Applied Science **Michael Isaacson** has been honoured with the Julian C. Smith Medal from the Engineering Institute of Canada for his achievements in the development of Canada.

Civil Engineering Assistant Professor **Jacqueline Jenkins** won Ibeo Automobile Sensor GmbH's world-wide competition for new applications of automobile laser sensor systems.

Civil Engineering Professor **Donald Mavinic** was elected a Fellow of the Engineering Institute of Canada.

Electrical and Computer Engineering Professor **Vikram Krishnamurthy** was elected a Fellow of the Institute of Electrical and Electronic Engineers (IEEE).

Electrical and Computer Engineering Professor Emeritus **Mabo Ito** was elected Vice President of the Association of Professional Engineers and Geoscientists of B.C.

Electrical and Computer Engineering Assistant Professor **Guy Lemieux** has received (along with co-authors E. Lee, M. Tom and A. Yu) the Best Paper Award from the IEEE International Conference on Field-Programmable Technology in Brisbane, Australia, for his paper "Directional and Single-Driver Wires in FPGA Interconnection."

Electrical and Computer Engineering Professor **Tim Salcudean** was elected a Fellow of the IEEE.

Electrical and Computer Engineering Associate Professor **Steven Wilton** has received (along with co-authors S.-S. Ang and W. Luk) the Best Paper Award at the International Conference on Field-Programmable Logic and Applications held in Antwerp, Belgium, for the paper "The Impact of Pipelining on Energy per Operation in Field-programmable Gate Arrays."

Materials Engineering Professor **David Dreisinger** has received the 2005 Extractive and Processing Science Award from The Minerals, Metals, and Materials Society.

Mining Engineering Professor **John Meech** has received (along with co-authors M. Ghomshei, S. Sanyal, K. MacLeod, R. Henneberger, A. Ryder, and B. Fairbanks) the Best Paper Award at the Annual Meeting of the Geothermal Resources Council held in Indian Wells, CA, for the paper "Status of the South Meager Geothermal Project, British Columbia, Canada: Resource Evaluation and Plans for Development."



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#### Departments and Programs

- Chemical and Biological Engineering
- Civil Engineering
- Electrical and Computer Engineering
- Engineering Physics
- Environmental Engineering
- Geological Engineering
- Integrated Engineering
- Materials Engineering
- Mechanical Engineering
- Mining Engineering

#### Office of the Dean

- Business & Development Office
- Centre for Instructional Support
- Engineering Co-op Office
- Engineering Student Services
- Technical Communication Centre

#### The Faculty participates in several research centres and laboratories including:

- Advanced Materials and Process Engineering Laboratory (AMPEL)
- Clean Energy Research Centre (CERC)
- Institute for Computing, Information and Cognitive Systems (ICICS)
- Michael Smith Laboratories
- Pulp and Paper Centre

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