



THE
UNIVERSITY OF
BRITISH
COLUMBIA

ingenuity

Faculty of Applied Science
Engineering News

A Matter of Time: Assessing BC's Earthquake Damage Potential

INSIDE:

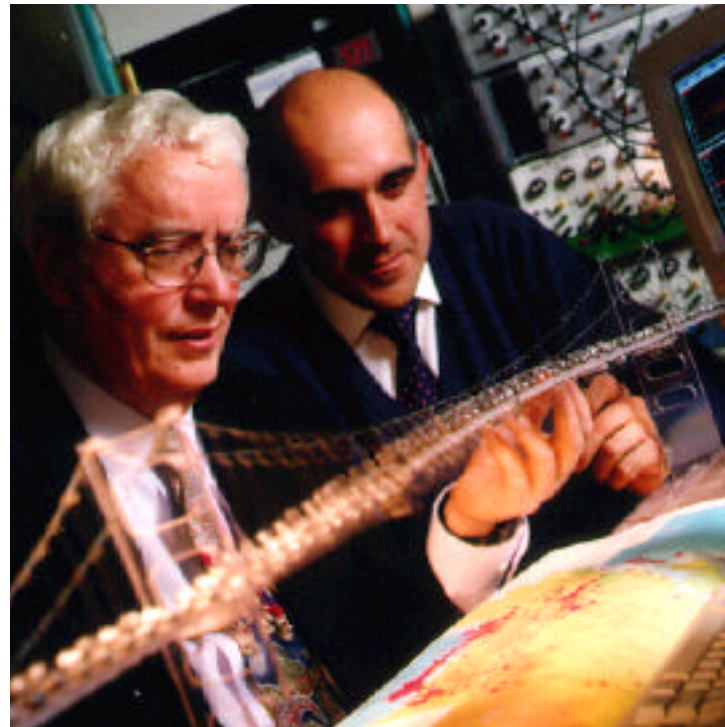
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Thoughts of earthquakes tend to evoke Hollywood disaster scenes. People stagger to find shelter, pieces of building crash down, water pipes burst and city streets twist open. How accurate is this picture for British Columbia, accustomed to the occasional shake? The recent disasters in California and Japan serve as reminders that BC is also due for a big quake. But to what extent and when?

Few British Columbians take the threat seriously enough to stockpile on non-perishable food and flashlights. They are, however, buying earthquake protection insurance; and while it might take 700 years before the Juan de Fuca plate produces its anticipated 8.5 to 9.0 megathrust quake, insurance companies are already feeling the tremors.

Insurers need to know the Probable Maximum Loss (PML), their benchmark of estimated damage if such a quake, or a local one, were to strike today. But it's a guessing game for BC, whose estimated economic losses due to earthquakes are founded on the well defined assessments of two very distinct and seismically active areas, California and Japan. Consequently, insurers base their estimates on catastrophes elsewhere and assume the worst, raising premiums, increasing deductibles and laying off more premium-income on reinsurance.

Enter Dr. Carlos Ventura and Dr. Liam Finn, civil engineers from the Faculty of Applied Science, with research and consulting interests in earthquake engineering. Together with Dr. Gail Atkinson of Carleton University they are currently mapping the seismic and architectural landscapes of the Greater Vancouver and Victoria regions, where seventy percent of the provincial population resides. *continued on pg 4*



DRS. LIAM FINN (L) AND CARLOS VENTURA inspect a model of a cable suspension bridge. Hopes are that their study will expand to include lifelines such as the Lower Mainland's bridges and tunnels.

A note from the Editor

Happy New Year and welcome to the first edition of Ingenuity, the Faculty of Applied Science's newsletter on its engineering activities. Ingenuity replaces Engineering for the Future which last came out in the Fall of 1996.

As this is a new format, we would welcome any comments or suggestions that you may have. Please contact the Office of the Dean at:

Tel.: (604) 822-6413
Fax: (604) 822-7006
e-mail: news@apsc.ubc.ca

Message from the Dean

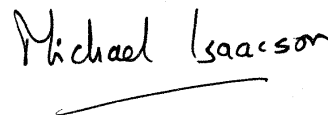
I am honoured to have been appointed Dean of the Faculty of Applied Science for a six year term. This comes at an exciting time for The University of British Columbia, coinciding with the appointment of the University's new president, Dr. Martha Piper. Over the last several years our Faculty has enhanced an already excellent reputation through a number of significant achievements. These are largely a tribute to Dr. Axel Meisen who led the Faculty superbly as Dean for 12 years. He has assured the high calibre of its faculty members; the standards and extent of its research contributions; and, the quality of its programs, student body, professional service and infrastructure support. An external review of the Faculty, which was conducted in the Spring of 1996, concluded that the Faculty has a strong record of scholarly accomplishments and a very good base of human and physical resources to build upon for the future.

The university's external environment is undergoing rapid change, associated in part with technological advances; a shifting economic, societal and cultural context; the need for increased accountability, efficiency and effectiveness; and a challenging fiscal climate. It is critical that the Faculty is sufficiently responsive to such changes, and is properly positioned so as to influence and benefit them.

We need to deal with a number of immediate challenges, consolidate recent achievements, and develop new initiatives. These include: maintaining a coherent set of strong academic programs with rigorous

academic standards; enhancing teaching effectiveness and the teaching environment, in part by making significant use of modern technology; recognizing and responding to the changing employment climate and the profession's requirements of our graduates; ensuring a high calibre and relevant research presence and associated technology transfer activities; increasing interdisciplinarity; attracting and retaining outstanding faculty and staff; securing closer linkages with our external communities, including the profession, industry, government and other post-secondary institutions; and, last but not least, developing a fiscal strategy and securing a sound resource base needed to address the issues that have been identified. We are embarking on a number of exciting initiatives, including the development of a new broadly-based engineering program which relies heavily on problem-based learning.

I hope you find this newsletter informative and enjoyable. If you would like further information on the Faculty's plans and activities, or would like to discuss them or participate in the development of the Faculty, please feel free to contact me by letter; telephone (604) 822-6412; fax (604) 822-7006; or e-mail isaacson@apsc.ubc.ca.



Michael Isaacson, DEAN



ISABELLE PARIS PHOTO

UBC PRESIDENT DR. MARTHA PIPER mingles with undergraduate engineering students during her September 23rd visit to the Faculty of Applied Science at the Advanced Materials and Process Laboratory. Piper got to know students, faculty and staff and spoke about redefining UBC's academic environment in response to increasing internationalization, inter-disciplinary collaboration and rapid expansion of information technology. Piper replaced Dr. David Strangway August 1, 1997.

Changes in the Dean's Office

The Dean's Office underwent a number of administrative changes last summer. Dr. Michael Isaacson was appointed Dean for a 6 year term, having just completed a 5 year appointment as Head of the Department of Civil Engineering. Dr. Alan Russell replaces him as Head of the Department. Dr. Axel Meisen, Professor in the Department of Chemical and Bio-Resource Engineering, previously served as Dean for twelve years and is currently on administrative leave.

Dr. Anoush Poursartip was appointed Associate Dean for Resources, Research and External Affairs. An Associate Professor in the Department of Metals and Materials Engineering, Dr. Poursartip continues in his role as

Chair of the Faculty's Research Committee. He replaces Dr. Michael Davies who has become Head of the Department of Electrical and Computer Engineering.

Dr. Bruce Dunwoody was appointed Associate Dean, Student Services, replacing Dr. Siegfried Stierner who returns to the Department of Civil Engineering. Dr. Dunwoody is Associate Professor in the Department of Mechanical Engineering.

For more information contact the Office of the Dean at:
Tel.: (604) 822-6413
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e-mail: dean@apsc.ubc.ca
Web site: www.apsc.ubc.ca

Holistic Horizons

Like most university freshmen, Trevor Mazurek is a little unsure about his career prospects. Should he be a forest engineer as planned or investigate opportunities in Metals and Materials Engineering? How about Human Kinetics? Although uncertain, his future looks promising; and, he has the benefit of a rather unique educational program.

Trevor is taking the First Nations Professional Sciences Access Program at UBC, the first program of its kind in the province designed to prepare First Nations students for university. Trevor's studies blend western science and first nations knowledge and culture, challenging him to take an in-depth look at science and its application to native communities.

For 19-year-old Trevor, a Tahltan Indian of the Crow Clan located near Telegraph Creek, it's a valuable experience. Born and raised in Prince Rupert, he developed a keen interest in science at his public school, particularly through physics teacher Alex Katramadakis. Says Trevor, "he was animated and really made the work interesting and amazing."

A visit by Access Coordinator Cliff Grant made another impression. For Trevor, Access became an alternative doorway into university; and throughout high school he forwarded letters and newspaper clippings, highlighting his scholastic progress in an effort to earn himself a place.

He says, "one of the reasons I wanted to get into this program was its holistic approach. I don't

know too much about my spirituality or my native background. I was raised in a multicultural environment and my native traditions are being lost."

It's a sentiment shared by fellow Access students and one which inspired Cliff Grant when he launched the program three years ago. He says, "I was the only native in science at the University of Alberta. I went through as a number and I needed something more than that."

His mission is to increase aboriginal enrolment in UBC's Faculties of Applied Science, Agricultural Sciences, Forestry and Science by offering a support network of teachers, elders and peers, a disciplined work ethic and an alternative curriculum. His hard work is paying off. The program has increased the first year retention rate for native students by 17 percent and expects another increase this year.

Historically, First Nations enrolment has been almost non-existent. The program has in two years prepared 14 students for an education in professional sciences, equalling the total number of First



Nations students who have ever entered these Faculties at UBC.

Accepted on the basis of academic performance and a personal essay, students attend a summer orientation in preparation for the following Access year. Once they complete the rigorous curriculum at Access they embark on the Undergraduate Degree program, taking elective courses relevant to First Nations issues.

Funding is a critical issue for Access. The Ministry of Skills, Training and Labour's three-year commitment has ended and the Ministry of Education and UBC have secured funding for another year. While the

TREVOR MAZUREK (L) AND PROGRAM COORDINATOR CLIFF GRANT take time out from their busy schedules in the First Nations Longhouse. Plans are underway for an Access Open House to be held January 22nd. For details contact 822-5854.

program has benefited from the generous support from BC Hydro, The Body Shop and the Joan C. Forrester Foundation, long-term funding solutions will be sought out during the remainder of the current fiscal year.

For more information on the First Nations Professional Sciences Access Program contact Cliff Grant at 822-5854 or cliffg@unixg.ubc.ca.

A Matter of Time...

continued from pg 1

Their task is to provide insurers and the community with a useful assessment of building damage, judging by building type and location. Their technique is not new; but, it's a first for BC.

And it's timely. Facing losses incurred by recent earthquakes abroad, reinsurance companies, backed by the provincial and Canadian governments, have pressured the insurers to improve damage estimates.

In response, a group of Vancouver and Victoria insurers implemented the Insurance Risk Assessment System (IRAS), developed by Risk Management Solutions (RMS) of California, to assess PML. Called the IRAS User Group, these insurers turned to Drs. Finn and Ventura and RMS to help them 'Canadianize' this system.

The group invested seed money to kick start what's turned out to be a three year project, funded also by the Natural Sciences and Engineering Research Council (NSERC). Currently in the second year, the UBC led team recently completed a building inventory, based on field studies, blue prints, building inspection reports and aerial photographs, to classify buildings by construction and size.

They continue to simulate ground motions, to examine the effects of soil stratigraphies and water levels on stability and the potential for liquefaction.

Detailed studies of the Californian and Japanese earthquakes have provided new insights into these areas.

Important data provided by the Geological Survey of Canada (GSC) and local consulting firms are also being incorporated into the database.

Some tentative conclusions from these data are surprising.

Richmond may not be as prone to liquefaction as once believed. Although more data is needed, results so far from trenching studies indicate that liquefaction in some areas hasn't occurred for the past 2,000 years despite intervening seismic events.

Findings will feed into a Geographical Information System (GIS) database which generates damage distribution rates. The GIS will permit the rapid generation of damage scenarios, calculating potential impacts for various epicentre locations of South Western BC.

Thus far, some findings have resulted in a PML decrease of up to 50% for commercial buildings and up to 30% for residential buildings.

Once complete, this study will inevitably affect emergency personnel, governments, and home and commercial buyers.

For more information on this project, contact Dr. Carlos Ventura at ventura@civil.ubc.ca or 822-6946 or Dr. Finn at finn@civil.ubc.ca or 822-4938.

MMAT

Field Trip

a Great Success!

Forty Metals and Materials Engineering students visited seven operations in Southern Ontario in late October to learn more about materials research and production.

Each year the third and fourth year students in Metals and Materials Engineering take a week out of the first semester to visit plants and research establishments engaged

in the manufacture, processing, design and characterization of metals and other materials.

The visit was focused on materials used in the automotive industry; although the tour began with a visit to INCO's extensive research facilities in Sheridan Park in Mississauga.

The group also visited a powder metallurgy facility at Stackpole Ltd., and two of Magna's large parts-making plants. Magna, a Canadian company, has grown over the last two

decades to become one of the largest parts suppliers to the global auto industry.

Both Dofasco and Stelco, who together produce over 75 percent of Canada's steel, were toured in great detail. The highlight of the trip was standing beside a huge Basic Oxygen Vessel while a 500 tonne capacity crane tapped 300 tonnes of liquid steel at 1650° C. into a ladle for transfer to a casting facility. The trip concluded with a visit to General Motors in Oshawa.

The students each write a report on the trip as part of the requirements for

their MMAT 398 and 498 Engineering Report courses.

The cost of accommodation and travel is shared between the students and the MMAT Department. The Department gratefully acknowledges the Cy and Emerald Keyes Foundation for their substantial contribution to overall trip expenses and student assistance.

For more information, contact Dr. Indira Samarasekera, Acting Head of the Department of Metals and Materials Engineering at indira@cmpe.ubc.ca or 822-2676.

Beautiful Fish and the New Connoisseur

They say that beauty is in the eye of the beholder. For Dr. Elizabeth Croft, the beholder could be a machine. An Assistant Professor in the Department of Mechanical Engineering since 1995, Croft is developing artificial intelligence to determine aesthetics in the unlikely area of fish processing.

It seems that mechanization is broadening its horizons. Sound fishy? Croft explains, “there are many machines that measure products accurately, but not how pretty they look. That’s what I’m after. The ability to make quality decisions.”

These decisions are critical for BC’s herring roe industry.

Herring roe egg sacks are highly valued in the Japanese Sushi market and are harvested throughout the world. The value of the translucent sacks, called skeins, depends on their aesthetics. Among other features, purchasers look for firmness, colour, smoothness and a distinguished arc. The value depreciates when the skein breaks or twists during processing.

BC Packers originally marketed good skeins with damaged ones and received a discounted rate in exchange. When the company began to sell quality skeins separately, it increased its intake. To further increase its competitive edge, the company approached UBC professors Ray Gosine and Clarence de Silva at the Industrial Automation Laboratory in the Department of Mechanical Engineering in a bid to automate this process.

Croft replaced Gosine in 1995 and her first step

was to discern from graders their standard for quality. From there, she and her students developed a prototype to evaluate quality through 2D vision. The machine calculates the shape, colour and weight associated with quality, computes this information and sorts each skein accordingly.

To combine the information, Croft uses what’s known as Fuzzy Logic, a well-defined but relatively new field of artificial intelligence, mathematics and computer science. Fuzzy Logic blurs set boundaries which define information. It assumes that many shades of grey live in a world of black and white. Having worked mainly in neural networks with artificial intelligence applications, Croft began working with Fuzzy Logic when she came to UBC and collaborated with Dr. de Silva, a leading expert in this area.

Now that the prototype awaits implementation, another challenge is to develop a system to sort quality levels, the twisted skein from the broken ones. Working in the Centre for Integrated Computer Systems Research (CICSR) at UBC, the researchers are incorporating 3D vision to distinguish these levels.

Croft conducts similar work for BC Packer’s salmon canning business. Her task is to develop a system to

sort out the poorly packed salmon from those which meet the industry’s safety and quality standards.

Beauty, however, can be fickle. What does the company do when standards change? While Croft works with industry to address its specific needs, she is also developing a sensor integration software system for product grading. Says Croft, “we need to develop an adaptable system for the users to program and upgrade themselves.”

In other words, the software, not the researcher, will interrogate the grader to define quality and, with “logical sensors,” incorporate it in the system. These logical sensors measure features

such as density, firmness, shape or colour, and will be processed by a number of physical sensors, such as a camera, proximity sensors, force sensors, and weighing devices.

Currently in its second year, this four-year project will provide users with an accessible and versatile tool to keep up with changing and competitive markets. Croft’s intention is to address the needs of as many users as possible. Beauty may be difficult to measure, but she’s working on it.

For more information, contact Dr. Elizabeth Croft at ecroft@mech.ubc.ca or 822-6614. Her Web site is: www.ubc.ca/~ecroft.



DR. ELIZABETH CROFT displays an example of a “beautiful” herring roe skein. She, with her graduate students, has developed a prototype which scans and determines quality skein to give BC Packers a competitive edge in this world-wide market.

GEERing Up^{for} Summer

Summer seems a long way off, but a team of UBC engineering students is preparing once again for the stampe of young engineers eager to find out how airplanes fly, ice cream is made and modern appliances work.

THESE YOUNG ENGINEERS are cleaning up an oil spill. It is part of an intensive one-week summer curriculum designed to get kids actively involved in engineering.



GEERING UP PHOTO

The Faculty proudly supports GEERing Up! UBC Engineering for Kids, a program organized by enthusiastic UBC students dedicated to promoting engineering and science. One of several programs, their summer day camp runs through July and August for youngsters seven to twelve. Camp sessions last a week and are designed, through interactive demonstrations and hands-on activities, to show kids that engineering is exciting, fun and useful.

GEERing Up is an active member of YES Camps Canada, a decentralized non-profit organization based in Ottawa. There are 22 YES Camps across Canada, including 4 in BC.

Established in 1995, GEERing Up at UBC has proved popular with kids. Program Director Michelle

Katerberg finds that many participants return for a second week of activities.

The GEERing Up volunteer committee is currently testing new activities for Summer '98. The program also offers workshops in elementary schools during May and June, leading exciting interactive demonstrations, projects and group activities. The volunteers travel to high schools as well, discussing their choices to be engineers, career options and university life.

Part of the Program's mandate is to ensure accessibility. Registration fees are below cost and bursaries are available to ensure that no one is deterred due to financial limitations. These fees make up a third of the operating budget. The program's operation relies

on contributions from government, corporations and individuals.

Eventually, Katerberg would like to offer programs for grade eight to ten students and increase employment opportunities for engineering undergraduates.

Right now, she's taking one step at a time and remarks on the growth she's seen in the program: "the original volunteer committee had a vision, and found the tools and support to turn it into a reality. The instructors are exceptional with the kids, providing an atmosphere where science and engineering are exciting and accessible. It's wonderful to see people, both kids and adults, sharing their enthusiasm for applied science." For more information contact GEERing Up at geerup@interchange.ubc.ca; by phone at 822-2858 or fax at 822-2021.

Generous Donors Support Faculty Initiatives

The Faculty of Applied Science's development program continues to meet with great success. Many corporations, individuals, faculty and alumni have demonstrated their confidence in the Faculty by supporting its initiatives and establishing scholarships for its students. Alumni support for the Faculty of Applied Science continues to be the highest of all facul-

ties for UBC. Sincere appreciation is extended to all of those who have helped make the development program a success—thank you!

Undergraduate Electrical and Computer Engineering students will be the beneficiaries of three new scholarships created this past year. Kevin Huscroft BASC'79, has established an endowment for the PMC-Sierra Inc. Founders' Award of \$2,000 per year for a student in Computer and Electrical Engineering. Two \$3,000 awards have also been

established: the General Motors of Canada Ltd. Scholarship and the Rockwell Automation Canada Inc. Scholarship. As tuition costs rise, these scholarships will help ensure that students have access to the financial assistance required to pursue an education in electrical and Computer Engineering.

A funding priority for the Faculty is the Engineering Equipment and Software Fund. This fund gives students access to leading edge technology and equipment. Support for this fund will help increase student access to the Internet, purchase a fileserver for the computer laboratory, and acquire addition-

al computers and equipment for teaching laboratories.

Another priority is the Earthquake Engineering Facility in the Department of Civil Engineering. Donations to the new facility support its role in enhancing Canada's capability of treating seismic-related issues through improved education and training.

If you have any fundraising questions or would like information on current fundraising projects please contact Simone Carnegie, Development Officer, Faculty of Applied Science at simone.carnegie@ubc.ca or by phone at 822-0603.

The Faculty Mourns the Passing of Acclaimed Metallurgical Researcher



The Faculty of Applied Science sadly announces that acclaimed researcher Dr. Keith Brimacombe passed away unexpectedly at the age of 54 on December 16th, 1997 in Vancouver.

Awarded the prestigious Canada Gold Medal for Science and Engineering by the Natural Sciences and Engineering Research Council of Canada in 1997, Dr. Brimacombe was noted as "one of the innovative giants of 20th century metallurgical process engi-

neering, and a role model for young Canadian scientists and engineers."

Dr. Brimacombe, a member of the Department of Metals and Materials Engineering, was a visionary committed to excellence and the primary force in developing a world-class program in materials process engineering at UBC since his appointment in 1970. He played a vital role in building partnerships between universities and industries, and his groundbreaking studies for the development and improvement of metallurgical processes have been recognized world-wide.

Dr. Brimacombe received 28 major national and international awards and 19 best paper awards; and, he was active in

institutes and professional societies across Canada and abroad. He was an Officer of the Order of Canada, a Fellow of the Royal Society of Canada, a Fellow of the Canadian Academy of Engineering; and, he received an Honorary Doctorate from the Colorado School of Mines in 1994.

He was recently appointed President and CEO of the Canada Foundation for Innovation, stepping down as Director of the Centre for Metallurgical Process Engineering at UBC, which he, with colleagues, founded in 1985.

Born in Nova Scotia and raised in Alberta, Dr. Brimacombe obtained a B.A.Sc. (Hons.) from UBC and a Ph.D. at the Imperial College of Science and Technology, University of London. He will be greatly missed by friends, colleagues and students at UBC.

Achievements

Dr. Jim McEwen, an Adjunct Professor in the Department of Electrical and Computer Engineering, is the recipient of the Manning Award for his invention of the microprocessor controlled tourniquet, now in widespread use around the world. The tourniquet enables operations to be carried out with a reduced flow of blood, but without the damaging side effects resulting from a too restrictive reduction.



Dr. Gary Birch received the Young Innovator Award at the BC Science and Technology Awards dinner held October 20th. Gary was recognized for his work in adapting robotics technology to the needs of the disabled. Gary is an Adjunct Professor in the Department of Computer and Electrical Engineering.



As well, the Science Council of BC presented **Dr. Indira Samarasekera** with the New Frontiers in Research award at the Awards dinner. A professor in Metals and Materials Engineering and recently appointed Director of the Centre for Metallurgical Process Engineering (CMPE), Indira explores factors influencing metal processing for their improvement or replacement.



Dr. Mohamed S. Gadala, Associate Professor in the Department of Mechanical Engineering, and Tristar Industries were winners at the 1997 University-Industry Partnership Awards. They were recognized for the design and development of a new pressure washer drum for pulp mills.



Dr. Richard Kerekes received the 1997 Technical Association of the Pulp and Paper Industry (TAPPI) Engineering Division Beloit Award. Director of the UBC Pulp and Paper Centre, Richard was cited for his many unique and valuable contributions to the engineering science of fibre processing and papermaking.



Did you Know?

Co-op is growing!! Since 1993 with the switch to 'year round,' the program that combines study with work experience has grown from 238 placements a year to a projected 680 in 1997/98. This represents a 190 percent increase over the last 4 years. As well, student demand for the program is steady with 300 new students accepted into the program this year.

International placements are increasing in the United States, Chile, Peru, Norway, Denmark, Hong Kong, Malaysia, Singapore, Taiwan and, especially, Japan. Approximately 24 engineering students will experience 7 to 11 month placements in some of Japan's largest corporations in 1997/98.

For more information on the Co-op Engineering program contact its Web site at: www.coop.apsc.ubc.ca. Or you can e-mail Co-op at eng-coop@unixg.ubc.ca, phone 822-3022, or fax 822-3449.



Spring-Time Events

• UBC—CEBC Dinner

January 21

A dinner for engineering faculty and members of the Consulting Engineers of British Columbia will be held at the University Golf Club. For more information, contact The Dean's Office at 822-1486.

• Open House at the First Nations Access Program, January 22

6298 Biological Sciences Road, UBC

For more information contact Ms. Shirley Cornell at scornell@unixg.ubc.ca or 822-5854.

• WECC

January 28—February 1

The UBC Engineering Undergraduate Society is hosting the 1998 Western Engineering Conference and Competition.

For more information contact the WECC Web site at www.ultranet.ca/wecc/comprn.htm.

• Seminar Series

January—April

Spring-time graduate-level seminars series are open to all who are interested. For more information on specific departmental seminars, please contact the following:

Chemical and Bio-Resource Engineering, Dr. Joel Bert;
bert@chml.ubc.ca;
822-4888 (phone)

Civil Engineering, Ms. Kelly Lamb;
klamb@civil.ubc.ca;
822-2035 (phone)

Mechanical Engineering, Dr. Ian Gartshore;
gshore@unixg.ubc.ca;
822-3770 (phone)

Metals and Materials Engineering, Dr. Mary Wells;
mary@cmpe.ubc.ca;
822-1918 (phone)

Mining and Mineral Process Engineering;
mmpe@mining.ubc.ca;
822-2540 (phone)

The Centre for Integrated Computer Systems Research (CICSR);
cicsrinfo@cicr.ubc.ca;
822-6894 (phone)

The Office of Continuing Education offers courses and workshops for practising professionals at a post-baccalaureate level.
www.apsc.ubc.ca/conted/general.htm
e-mail: conted@unixg.ubc.ca;
822-3347 (phone)

New Faces

CIVIL ENGINEERING

• **Dr. John Howie**, Associate Professor; appointed August, 1997. John is a geotechnical engineer with interests in In-situ testing for soil characterization and the development of ground improvement methods.

• **Dr. Barbara Lence**, Associate Professor; appointed December, 1996. Barbara comes from the Civil Engineering Department at the University of Manitoba. Her interests are in Water Resource Systems.

CHEMICAL AND BIO-RESOURCE ENGINEERING

• **Dr. Xiaotao Bi**, grant-tenure-track Assistant Professor; appointed September, 1997. Xiaotao's position was created in collaboration with The Mitsubishi Chemical Corporation (MCC) of Japan as a key component of the recently established Fluidization Research Centre (FRC). Xiaotao has worked on fundamental areas of two-phase flow and on the design and testing of pilot-scale hot fluidized bed reactors.

• **Mr. John Ivison**, Acting Director of the Fire Protection Engineering M.Eng. Program; appointed December, 1997. John has specialized in fire protection engineering and building code consulting and security for the past twenty years.

ELECTRICAL AND COMPUTER ENGINEERING

• **Dr. Ed Casas**, Assistant Professor; appointed January, 1998. Ed's teaching and research interests include mobile radio propagation, wireless system architecture, modulation techniques, and DSP algorithms for communications.

• **Dr. Sidney Fels**, Assistant Professor; appointed January, 1998. He was recently a visiting researcher at ATR M.I. & C. research laboratories in Japan. His interests include neural networks, adaptive interfaces, speech, virtual musical instruments, and computer artwork.

• **Dr. Babak Hamidzadeh**, Assistant Professor; appointed July, 1997. Babak was formally an Assistant Professor at The Hong Kong University of Science and Technology. Interests include on-line scheduling and optimization in real-time and distributed systems.

• **Dr. Steven Wilton**, Assistant Professor; January, 1997. Steven joins the Department after completing his Ph.D. at the University of Toronto. His interests are in the area of VLSI and Computer Architecture.

MECHANICAL ENGINEERING

• **Mr. Pat Crammond**, Instructor; appointed September, 1997. Joint appointment with the Faculty of Forestry. Pat has extensive industrial experience in machine design, most recently with CAE Machinery Ltd.

• **Dr. Thomas R. Oxland**, Associate Professor; appointed October, 1997. Joint appointment with the Department of Orthopaedics in the Faculty of Medicine. Tom was head of a research group at the Maurice E. Müller Institute for Biomechanics at the University of Bern. His interests involve the application of engineering principles to problems of the musculoskeletal system.

MINING AND MINERAL PROCESSING ENGINEERING

• **Dr. Malcolm Scoble**, Professor; appointed July, 1997. Malcolm was formerly the Director of the Mining Program at McGill University. His interests include mining methods, feasibility studies, automation and clean mining technology.



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The Faculty's engineering activities include the following:

Departments

- Chemical and Bio-Resource Engineering
- Civil Engineering
- Electrical and Computer Engineering
- Mechanical Engineering
- Metals and Materials Engineering
- Mining and Mineral Process Engineering

Office of the Dean

- Engineering Student Services
- Engineering Co-op Office
- Office of Continuing Education
- First Nations Access Program
- Computer Laboratory
- Undergraduate Programs (with the Faculty of Science):
 - Engineering Physics
 - Geological Engineering
- Graduate Programs:
 - Advanced Technology Management (with the Faculty of Commerce and Business Administration)
 - Fire Protection Engineering

The Faculty participates in several research centres and laboratories including:

- The Centre for Integrated Computer Systems Research (CICSR)
- The Advanced Materials and Process Engineering Laboratory (AMPEL)
- The Biotechnology Laboratory
- The Pulp and Paper Centre

