OWEN EGAN / JONI CUFOUR

Professor Jorge Angeles awarded McGill Medal

This year's recipient of the McGill Medal was Professor Jorge Angeles. A professor in the Faculty's Mechanical Engineering Department since 1984, he is a tireless researcher and educator, with hundreds of published articles, several textbooks, and nearly one hundred PhD and Master's students trained under his guidance.

Professor Angeles's interest in mechanics began in his father's jukebox business in his hometown of Oaxaca, Mexico. Following PhD studies at Stanford University, he joined the Faculty of Engineering in 1984, and co-founded the Centre for Intelligent Machines (CIM).

Through it all, teaching and research remained central activities for him. "For me, teaching and research are one," he said. "When I research I get ideas for teaching, and when I teach I get new ideas for researching." ■

Other appointments and awards for Faculty and alumni

Professor Robert Mellin (Architecture) won the **Newfoundland and Labrador Lieutenant Governor's Award in Architecture**

Professor Vikram Bhatt (Architecture) has been named to the **Royal Architectural Institute of Canada College of Fellows**

Martine Dion (BArch '92) has been elevated to **The American Institute of Architects' College of Fellows**, earning the distinction of **FAIA**.

Professor Jim Nicell has been reappointed as the **Dean of the Faculty of Engineering**

Professor Jozsef Kövecses (Mechanical) was awarded the **NSERC Synergy Award for Innovation**

Professor Allen Ehrlicher (Bioengineering) and **Professor Geza Joos** (ECE) have been named **Canada Research Chairs** (NSERC)

Professor and Dean Jim Nicell, and **Professor George Demopoulos** (Chair of the Department of Mining and Materials) are named **fellows of the Canadian Academy of Engineering**

Julia Gersovitz (BArch '75) has been appointed an **Officer of the Order of Canada**, and **Ronald Franklin Williams** (BArch '64) and **Peter Irwin** (PhDEng '74) were named **Members of the Order of Canada**

Professor **Mark Driscoll** (Mechanical) received the award for **emerging Quebec engineer under the age of 35** from the Ordre des ingénieurs du Québec

Professor Jeffrey Bergthorson and **Professor Marta Cerruti** were among the 9 McGill researchers chosen by **NSERC for a Strategic Partnership Grant** ■

The Dean's Report is published
by the University Advancement Office
at the Faculty of Engineering, McGill University.
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3480 University Street West,
Montréal QC, Canada, H3A 0E9

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McGill-Concordia collaboration wins big in eco-housing competition

After more than two years of hard work, Canada's sole entry in the 2018 Solar Decathlon China competition won first prize in the Architecture, Market Appeal, and Communications contests with third places in the Innovation and Engineering contests making TeamMTL the biggest winner in the expert review juries. The collaborative effort between McGill University and Concordia University competed against 22 teams from 38 schools and 10 countries to construct the best solar-powered house.

In the short span of three weeks, the 60-strong team raced against the clock, the sweltering summer heat and torrential downpours in Dezhou, China, to assemble and furnish their innovative row house from top to bottom.

When completed, TeamMTL's structure was among the most finished and presentable houses at the competition.

The group was judged on its performance in five expert peer-reviewed juried contests (architecture, engineering, innovation, market appeal, and communications) as well as five measured contests (energy balance, home comfort, commuting, home life, and appliances).

"This experience has been extremely informative and rewarding," said Benjamin Wareing, the Architecture Lead for Team MTL and a PhD student at McGill University. "I have learned so much over the last two and a half years and the three week construction period in China was an intense and enriching hands-on learning opportunity for us all."

Continued from page 1

"Working with external partners like SALTISE is important to the eLATE initiative," said Dr. Orjuela-Laverde. "Participating in the teaching community helps us to stay current with new research in education so that we can help our students become agents of their own learning process. This in turn prepares them for the jobs of the future, the jobs that don't even exist yet."

More proof of the eLATE model can be found in the case of Assistant Professor Sharmistha Bhadra. An instructor in the Electrical and Computer Engineering Department, Professor Bhadra was surprised by the student evaluations for her 200-series course in Electrical Circuits. She reached out to Dr. Orjuela-Laverde for her input on how to improve the situation.

"She convinced me to take the students' comments into account," Professor Bhadra said. "Using the old method, there weren't many opportunities to interact with the students, so I had no sense of how they were doing." By the fall of 2017, she had revamped the course to include in-class activities with students breaking into groups to work on specific problems. Responses to the changes were positive.

"Students won't really learn unless they do it themselves," Professor Bhadra said. "Active learning is an effective way to make sure that they are engaged with the material."

But while educators may be fond of eLATE, what are students saying? Meghan Marshall, a PhD student is enthusiastic about the initiative. "The new generation of students is highly focused on their own education," she said. "They want to have a say in their own learning, and eLATE gives them the tools to do that." ■

Leadership according to the leaders

The *Empower* initiative is aimed at givng students experiences that will help them foster their own sense of leadership. This initiative has been supported and guided by the volunteer members of the Faculty Advancement Board, which advises the Faculty on its strategic plans. We asked FAB members to share their thoughts on what leadership means to them.

John Saabas (PhD Eng '91, FAB Member since 2007): The best leaders can see the big picture, ask good questions and judge the quality of the answers, and are the ones who take responsibility rather than waiting for it to be given to them.

Ronald Chwang (BEng '72, FAB Member since 2007): I got a summer job offer at the end of my second year at McGill to work at MacMillan Bloedel's pulp and paper factory on Vancouver Island. Working through the factory line from pulling logs on the dock to paper testing in the lab really broadened my understanding of the real world of manufacturing and the labour/management relationship beyond the classroom.

Mary-Jean Eastman (BArch '71, FAB Member since 2015): In my experience, the most important ability is strategic thinking. In my firm we identify the strategic thinkers early in their careers and plan their assignments to give them the experiences they need to understand the intersecting facets of our profession. We give find the appropriate mentors and give them increasingly large roles and projects. Strategic thinking seems to be a skill that is innate and not taught.

Alex Conliffe (BEng '91, FAB Member since 2014): I think university is most meaningful when it has a strong community element. McGill and McGill engineering specifically was at its best when it was fostering not students who could pass tests, but future leaders who cared about important local, Canadian and global issues and supported those future leaders to apply some of their energy and to these causes.

DEAN'S REPORT

Faculty of Engineering

McGill

Fall 2018

Faculty of Engineering Professor Lawrence Chen (right) demonstrates eLATE teaching techniques to a group of students.
OWEN EGAN

Beyond blackboards: *eLATE* initiative aims to make education more active and long-lasting

Ask any engineering graduate about their time back in school and many of them will conjure up memories of hours spent listening to professors standing in front of a blackboard. But times have changed and many students and professors are questioning if the 'chalk-and-talk' method is really the most effective way for students to learn.

Another point to consider is that knowledge–like radioactive material – loses its potency over time. Some observers have defined a half-life for the knowledge learned during a typical engineering education to be "from seven to 2½ years" (according to William Wulf, the former president of the National Academy of Engineering).

The *eLATE* (enhancing Learning and Teaching in Engineering) initiative aims to counteract this phenomenon by creating a community of lifelong learning among not only students, but also faculty members. At its core, eLATE is based on 'Active Learning,' a strategy that engages students in their own learning process. Its mission is supported by using evidence-based research to inform new pedagogical activities. So what do these ideas look like in the classroom?

Imagine a classroom where the students spend as much time teaching each other as they do being taught, or a course that is evaluated without a final exam. Other examples include the use of instant surveys where student responses are logged in real time, or lightboards, an illuminated chalkboard that can be used to deliver lectures that are easily shared via internet.

Professor Christopher Moraes saw the potential for lightboards to enhance his teaching and built his own from scratch. "Lightboard videos take virtually no extra time to make, and give students help when and where they need it," he explained. "This flexibility encourages me to use more creative teaching methods, while giving me a 'syllabus safety-net' that ensures core material will be covered."

Apart from specific technologies or methods, eLATE is also building a learning community that extends beyond the Faculty to include other units on campus, and even other institutions. This was shown in the Teaching Week held last November, where a number of professors opened their doors and invited observers to watch their classes. Educators from Concordia University were among the participants, who were all interested in learning more about how to teach.

"McGill's Faculty of Engineering deserves credit for helping to build the learning community," said John Bentley, Senior Instructional Developer at Concordia University. "As practitioners, sharing ideas on what works is extremely valuable, and events like Teaching Week are an ideal vehicle for those exchanges."

The focus on the broader educational community stems from eLATE's origins, which began as the Teaching Enhancement Initiative in 2012 thanks to a foundational gift from an anonymous alumnus. It was prior to this that eLATE Pedagogical Coordinator, Dr. Maria Orjuela-Laverde took part in SALTISE (Supporting Active Learning & Technological Innovation in Studies of Education), a provincial organization composed of university and CEGEP instructors.

Working with SALTISE was Dr. Orjuela-Laverde's first involvement with active learning, which she later brought back to McGill. As further evidence of the eLATE commitment to community building, in May McGill hosted the SALTISE conference, an annual event since 2012 (guest speaker Dr. Richard Felder was a keynote speaker at the conference – see the sidebar for his comment on eLATE).

Continued on page 4

eLATE Statement

Dr. Richard Felder, the Hoechst Celanese Professor Emeritus of Chemical Engineering at North Carolina State University, is a world leader in learner-centered engineering and science education. Dr. Felder was keynote speaker at the recent SALTISE/eLATE Conference hosted by McGill University, and offered the following statement on the Faculty of Engineering's eLATE initiative:

For more than four decades, I have been travelling throughout North America and beyond, giving lectures and workshops on active learning (AL). Although overwhelming research evidence has shown that AL contributes significantly to students' achievement of almost every conceivable learning outcome, its integration into courses and curricula has been limited by resistance from some faculty members and students. The McGill University Faculty of Engineering's eLATE initiative with crucial support from Dean Nicell is doing an admirable job of promoting AL across the McGill faculty and at other local institutions. Organizing events such as the SALTISE/eLATE conference promotes broad awareness of the method, and the coordinated day-to-day efforts of initiatives like eLATE equip instructors to use the method effectively and to minimize or eliminate resistance to it. I congratulate the initiative leaders and Dean Nicell on their fine work, and wish them continued success in their efforts to improve engineering education. ■

Dean's Message
Where does learning happen?

Professor Jim A. Nicell, Dean of the Faculty of Engineering

Back when I began my teaching career, I was a young and eager professor, bursting with energy and desperate to show that I had what it takes. I recall my first few weeks of lecturing most clearly; I had prepared my notes meticulously, and I delivered them in what I thought was my best professorial manner. But as students left the classroom with glassy-eyed expressions, I began to wonder if there was something wrong with my teaching. Were they even learning anything from me?

The truth is that while universities are very much in the business of preparing students for their careers, the one job they do not prepare them for is being a university professor. Instructors have often been given minimal guidance on how to organize classes, lecture students and assess learning. They are handed a syllabus, given some encouragement, and little else. So while their PhD training may mean they are exceptionally knowledgeable in their field, they are not necessarily adept at conveying that knowledge to students.

This dynamic is compounded by new generations of students who enter university with increased expectations for their learning, increased pressure from society and family to succeed, overwhelming amounts of information at their fingertips, and the perpetual distractions made possible through the advent of hand-held devices. Taken as a whole, it can be a potent mix of lost educational opportunities.

This is why I am a strong supporter of what the eLATE initiative provides. Not only does this initiative help professors achieve better results in class, it also helps students derive more satisfaction from the process. They become active agents in their own learning, and thus share some of the responsibility of the teaching process. Our feature story on eLATE explains the shape this work takes in the Faculty.

But there's more to learning than just what happens in the classroom. And this brings me to the second theme of this edition of the Dean's Newsletter, which is the initiative called Empower. As the name suggests, it is all about giving students opportunities for them to contribute in ways that can be more spontaneous and creative than can be provided during a lecture.

There are many forms that Empower can take: joining a design team or organizing a conference are just two examples. If there is a topic that a student is passionate about, Empower gives them the ability to take up that cause and see it through to its conclusion.

The result of experiences like these is nothing short of incredible. I've seen shy, inwardly-focused students become completely transformed by their project. They have had the experience of exploring their ideas, convincing others of the merit of their activity, organizing and leading a team, carrying out the planning and logistics of their work, and delivering the final project, in whatever form it may take. In the end, they are transformed both personally and professionally and are ready to take on the world!

As educators, it is always our goal to see young people blossom into something that they themselves did not even imagine. It is what we live for, and that's why we are thankful for the alumni support that has helped us create these two tools to help us foster these kinds of transformations in our students. For instance, the recent victory of the McGill Rocket Team is a memory and a lesson that will be cherished by the team for years to come, and it could only have happened out in the New Mexico desert, not in a lecture hall.

The concrete results of initiatives like eLATE and Empower also have their impact on research, which remains an important function of the Faculty. Professor Jorge Angeles, who was recently awarded the McGill Medal for his lifetime contributions, expressed it well when he explained that for him, teaching and research are inseparable. You can read more about his remarkable career, as well as other research underway on the last page.

GET INVOLVED!

To move the Empower initiative forward, your involvement is crucial. You can help by mentoring a student or speaking to a design team, or by connecting us with other alumni who might be interested. Please contact us at the following address:

Email: ua-comms.engineering@mcgill.ca
Telephone: 514-398-2454
Mail: University Advancement,
Faculty of Engineering, McConnell Engineering Bldg., Rm 744
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Your involvement is sincerely appreciated.

Beyond classrooms:

Empower takes learning to new heights—and new places

Empower is an initiative that seeks to augment student learning. But unlike sister initiative eLATE, Empower is focused on activities that take place outside of class. Conceptually, this is known as 'experiential learning,' or learning by doing, and while ancillary skills development may be an added benefit, the initiative is really about helping students develop leadership capabilities. Empower is proving to be a popular option among the student body – and it is something that employers definitely look for when recruiting graduates. A complete list of all clubs, teams, associations and organizations that students can participate in is on the back page.

Members of the McGill Rocket Team prepare their rocket for launch at the Spaceport America Cup. The team went on to win the competition.

MCGILL ROCKET TEAM

McGILL CHEM-E CAR
Year established: 2014
Number of members: 70

Key events: Regional competition April 7-8, Rochester, NY; National competitions, October 26-29, Pittsburgh, PA

The Chem-E Car competition is organized by the American Institute of Chemical Engineers (AIChE). Teams create a small car capable of carrying a light weight, which is entirely controlled by chemical reactions. The trick is that the exact distance and precise weight are only revealed on the day of competition, which means teams have to adjust within severe time constraints. Most recently, the team earned 2nd place at a regional competition in Rochester, NY in April. The result qualifies them for a spot in the National event to be held in Pittsburgh, PA, October 26-29. "Being part of the team gives me a chance to be more creative than in class," said Co-captain Tatum Cutfield (BEng '18).

McGILL FORMULA ELECTRIC
Year established: 1994 (as Formula SAE)
Number of members: 220

Key events: Formula North, May 31-June 2, Barrie ON; Formula SAE Electric, June 20-23, Lincoln NB

An offshoot of successful participations in the Formula Hybrid and Clean Snowmobile competitions of previous years, the McGill Formula Electric (MFE) team has evolved to become one of the most significant racing teams in the Faculty. This year marks a new chapter for this popular team, as it merged operations with the now defunct Formula SAE Racing Team, which had been dedicated to gasoline-powered engines. The merger has been positive as the MFE took 2nd place in competition at the Formula SAE Electric competition held in Lincoln NB. "I've learned a lot about working in a team in a large project where every decision impacts somebody else," said Ella Reifsnyder (BEng '19), team co-captain.

McGILL ROCKET TEAM
Year established: 2014
Number of members: 100

Key events: Spaceport America Cup (IREC), June 19-23, Las Cruces, New Mexico

One of the newer design teams (ed: the team was featured in the 2017 edition of the Dean's Newsletter), the McGill Rocket Team (MRT) has seen its fortunes skyrocket – literally and figuratively – as it claimed top honours in this year's Spaceport America Cup competition, the world's largest intercollegiate rocketry contest. The faultless performances of the MRT's two rockets won them the Genesis cup, awarded to the top team overall. Team captain Sandro Papais (BEng '18) summarized the squad's result: "The students on this team are so bright and talented, I don't think most of them realize their potential. They are more than students; they are a group of future leaders who are destined to do amazing things."

McGILL BAJA RACING TEAM
Year established: 1984
Number of members: 49

Key events: Épreuve du Nord, February 2, 2018, Quebec City QC, SAE , Kansas, May 17-20, 2018, SAE Oregon, May 30-June 2, 2018

The SAE Baja competition challenges students to design and create an All-Terrain Vehicle that can climb a 30° incline and maneuver through a tight course, all while being cost effective enough to be potentially marketed to off-road enthusiasts. The events take place over three days, with scores based on presentation skills, static testing, and racing. The McGill team placed 13th and 18th at two events in this US this year, against a field of over 100 teams. Team captain Mark McGriskin (BEng '18) learned a lot from the experience: "Working around busy student schedules, budgeting and forecasting future expenses, communicating with sponsors; contending with these issues really helped me improve my management ability," he said.

McGILL CONCRETE CANOE TEAM
Year established: 2013
Number of members: 70

Key events: National competition May 10-12, Waterloo

For the past 25 years, the Canadian Society for Civil Engineering has been hosting a competition that asks engineers to do the impossible: build and race a concrete canoe. But there is a catch in the design requirements: the canoe must float even when it is full of water. This spring the team placed 9th in a field of 16 teams from across the country. "Being captain of the team allowed me to improve a range of skills that have been important to me in the industry: Project management, public speaking, and, most importantly, leadership," said Julianna Fischer (BEng '19).

MCGILL ARTIFICIAL INTELLIGENCE SOCIETY
Year established: 2017
Number of members: 500

Key events: Hackathon, September 2018

The club emerged to offer a forum for students to discuss and learn more about Artificial Intelligence and Machine Learning. They organize biweekly tutorials, a Hackathon event, and visits to local AI companies. The group also has a competitive side, taking part in the Neural Information Processing Systems contest to develop a Conversational AI system that can replicate human interaction. For Co-founder John Wu (BEng '19), it's been a pivotal experience: "The true reward that I gain from my participation in the McGill AI Society is in knowing that I have empowered others."

McGILL ROBOTICS
Year established: 2007
Number of members: 170

Key events: UVSI SUAS Competition (Drone), June 13-16, Patuxent MD, International RoboSub Competition, July 30 - August 5, San Diego, CA, University Rover Challenge, Hanksville, UT, European Rover Challenge, September 14-16, Starachowice, Poland, Robohacks, March, Montreal QC

McGill Robotics competes in three different disciplines: drones, rovers and submersibles, but the group also hosts its own event: Robohacks. Each spring for the past 3 years, Robohacks brings together up to 250 participants from across Montreal for a 24-hour dive into robotic development.

McGILL ATHLETICS
Year established: 1884
Number of members: 834 (102 from Faculty of Engineering)

Key events: Various

One of the hallmarks of McGill's tradition is the ability to balance academic excellence with extracurricular activities. Since its beginnings in the 1860's to its establishment as Canada's first student athletics program in 1884, McGill Athletics has been an outstanding program that has won several championship titles and has produced 120 Olympians. The McGill Martlets Women's Soccer team is just one example out of the 30 varsity teams. Since 1988, the team has won 11 provincial championships. Stefania Folino (BEng '18) has been a midfielder with the squad since 2014, and was selected in 2017-18 as an Academic All-Canadian by U Sports, the national collegiate sporting association, for maintaining an 80% grade average while competing in her chosen sport.

The *Empower* initiative covers a broad range of activities. Below is a complete list of all active Design Teams, Clubs, Associations, Departmental Societies and other student-run organizations.

Design Teams
AERO McGill (E)
Bridge Building Team (E)
Chem-E Car (E)
Concrete Canoe (E)
McGill Additive Manufacturing Student's Society (E)
McGill Formula Electric (E)
McGill Rocket Team (E)
McGill Robotics (E)
McGill Space Systems Group (E)
McGill Baja Racing (E)

Clubs
American Indian Science and Engineering Society (E)
American Society Of Heating, Refrigerating, and AC Engineers (E)
The Lean Initiative (E)
Engineering Investment Group (E)
Canadian Society of Civil Engineers(E)
Engineers Without Borders (S)
McGill Artificial Intelligence Society (E)
McGill Students Flying Club (F)
National Society for Black Engineers (S)
National Organization for Business and Engineering (E)
Pursuing Opportunities for Women in Engineering (S)
Queer Engineer (S)
Reboot (E)
Society of Petroleum Engineers(E)
Sustainable Engineering Practices (E)
Game Development Students' Society(E)

Associations
Blues Pub Committee (F)
Canadian Engineering Competition (E)
Clubs Fund Committee (S)
Design Team Fund Committee (E)
E-Week (E)
Engineering Adventure Committee (F)
Engineering Games Committee (F)
Engineering Peer Tutoring Service (E)
Engineering Socials Committee (F)
Engineering Student Academic Committee (E)
Engineering Undergraduate Equipment Fund (E)
EUS Equity (S)
EUS Ski Trip Committee (F)
EUS Sports (F)
Graduation Committee (E)
Handbook Committee (E)
IT Committee(E)
Junior Council (F)
McGill Engineering Competition(E)
Mental Health Committee (S)
McGill Engineers Rule The World (F)
Orientation Week Committee (F)
Open Air Pub (F)
Plumbers' Student Design
Student Space Fund Committee(E)
Student-Faculty Liaison Committee (E)
Sustainability in Engineering at McGill (E)
TechFair(E)
TechWeek (E)
The Plumber's Station

Departmental Societies
Architecture Students' Association
Bioengineering Undergraduate Student Society
Chemical Engineering Student Society
Civil Engineering Undergraduate Society
Co-Op Mining Engineering Undergraduate Society
Electrical, Computer, and Software Engineering Student Society
Materials Engineering Undergraduate Society
McGill Association of Mechanical Engineers

Other Groups, Services and Publications
Canadian Mining Games
CodeJam
RoboElectronics
Copi-EUS
Frostbite
General Store
The Cube
The Plumber's Faucet
The Plumber's Ledger

McGill Architecture student Kim Chayer gets a kick out of building the Deep Performance Dwelling as a member of Team MTL, for the Solar Decathlon China competition (see story on page 4).