

# WISEST

women in scholarship, engineering, science & technology



**JOURNAL OF  
STUDENT  
RESEARCH**  
2012



women in scholarship, engineering, science & technology

### **WISEST**

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### **The WISEST Summer Research Program**

The WISEST Summer Research Program is much more than a summer job! It's a chance to learn about diverse fields of study; to experience research hands-on in a University lab; and to develop the skills needed to succeed in a less-traditional role. The Program is designed to give students experience in all these areas and we expected students to take advantage of every opportunity provided.

### **Hands-on Experience in the Research Lab plus Professional Development:**

The WISEST Grade 11 students spend six weeks working as paid members of research teams at the University of Alberta.

Students acquire practical lab skills, learn about interdisciplinary research and gain insights into the careers and lives of professionals in science, engineering and technology.

The program also provides regular career and peer support sessions for the student researchers. They are brought together weekly to talk with people in less-traditional careers, tour other laboratories on campus, tour industrial facilities such as Syncrude Research Centre, Gilead Alberta ULC, Intuit and Maxxam Analytics. The students develop research-based and personal skills including scientific writing, networking, creating scientific reports, posters and giving presentations.

The summer ends with "Teachers' Appreciation Day" and "Celebration of Research" which highlights the successes of the Student Researchers. They present their high-calibre research posters to teachers, family, friends, University and government officials, Program Partners and Contributors.

### **The WISEST Summer Research Program aims to:**

- provide hands-on experience with cutting-edge research, building students' self-confidence in their abilities to contribute to an area that is considered less-traditional for their gender.
- provide opportunities to meet and be inspired by successful researchers and career professionals in the fields of science, engineering and technology.
- provide learning opportunities about the techniques and types of research being conducted in different fields of study.
- broaden awareness about less-traditional fields of study and career options.
- provide an introduction to academic and university life at the University of Alberta.
- provide opportunities to meet other young people with similar interests and to develop a peer support network.
- assist in the development of key professional skills.



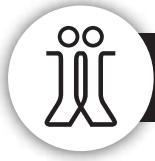
WISEST

SUMMER **RESEARCH PROGRAM** 2012

**JOURNAL OF  
STUDENT  
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**STUDENTS FROM THE 2012 WISEST SUMMER RESEARCH PROGRAM**





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# WISEST CELEBRATES 30 YEARS OF ENCOURAGING DIVERSITY

WISEST was created by the University of Alberta in 1982 with the goal of finding reasons why so few women were choosing careers in engineering and science and what can be done to change that. In 2012 we celebrate the 30th Anniversary of WISEST with a renewed vision to strengthen science, engineering and technology communities through diversity. Working closely with industry, government, academia, and hundreds of volunteers, WISEST offers programs and networks designed to provide knowledge, opportunities and hands-on experiences that promote and nurture interest in less-traditional careers. Community outreach events hosted by WISEST are dedicated to building a stronger, more diverse workforce in science, engineering and technology.

**WISEST PROGRAMS** actively involve students from urban, rural and Aboriginal communities in interactive and relevant experiences. The students are encouraged to see that science, engineering, and technology are something that they can succeed at and enjoy doing as a future career.

**Choices** – This one-day conference at the University of Alberta brings Grade 6 girls and their teachers together to investigate the wonders of science, engineering and technology and to discover these are things they CAN do.

**SET** – Young women in their high-school years are challenged to explore science, engineering and technology (SET) during this one-day conference at the University of Alberta. Through hands-on experiments and face-to-face conversations with role models, they gain insight into different careers in SET and advice on how they CAN get there.

**Summer Research Program** – This paid research experience at the University of Alberta provides Grade 11 students an opportunity to learn first-hand about trail-blazing fields of study, research and diverse careers. Through their hands-on experience in research projects that are less-traditional for their gender, students broaden their awareness of career opportunities and are encouraged to explore a future in science, engineering and technology fields.

**Meet-a-Mentor** – Live video-conference sessions bring SET activities to Grades 5-9 girls and boys in rural Alberta. The interdisciplinary sessions are designed and led by dynamic individuals from academia and industry.

**IlluminateIT:** Computer science and technology came alive to girls and boys in Grades 5-9 through our

outreach sessions to community groups. Students expand their IT awareness, develop 'Digital Citizenship' and engage in hands-on activities using Microsoft Kodu Game Lab and/or Lego Mindstorms.

**Tales from the Science Buffalo:** This new initiative is designed to engage Aboriginal students (girls and boys) in science. It includes 5 classroom visits with activities and interactive discussions that involve Indigenous Perspectives and are based on each of the five curricular units in Science.

**WISEST NETWORKS** strengthen and expand women's commitment to science, engineering and technology.

**UA-WiSE Network** – The University of Alberta Women in Science and Engineering Network gives undergraduate students opportunities for interactions that encourage and broaden their interests as they move towards becoming the next generation of SET professionals.

**WISER Network** – The Women in Science and Engineering Research Network supports and encourages career progressions for women in graduate studies or at an early stage in science, technology, engineering or mathematics careers through networking, interactions with peers and mentors, information exchange and professional development activities

**WISEST COMMUNITY OUTREACH EVENTS** raise the awareness of the importance and value of diverse voices being heard in all areas of science, engineering and technology.

**WISEST Annual Guest Lectureship** – This annual event, featuring a networking reception and a keynote presentation, was created in 2010 by the University of Alberta's VP (Research) Office

in honour of Dr. Margaret-Ann Armour, Founding Chair of WISEST. Guest lecturers have included: Hon. Anne McLellan, O.C., P.C. and Dr. Elizabeth Cannon, President and Vice-Chancellor, University of Calgary

**WISEST Annual Golf Tournament** enjoys participation from people from local industry, government and academic communities who support diversity. As well as a major fund-raising event for WISEST, the tournament is a great opportunity for men and women from the community to play golf, have fun with science experiments and help support WISEST initiatives.

For more information about WISEST initiatives and future directions, please visit [www.wisest.ualberta.ca](http://www.wisest.ualberta.ca)



## THE WISEST SUMMER RESEARCH PROGRAM



L to R: Denise Hemmings,  
Grace Ennis, Jen Duffy, Meagan  
McLavish, Kaitlyn Wall

By Grace Ennis (WISEST Coordinator)

The WISEST Summer Research Program, a valuable research experience at the University of Alberta, broadens high-school students' awareness of career and academic opportunities and it encourages them to discover their place in science, engineering and technology. Students (both young women and men) who have completed grade 11 spend six weeks working as a member of a research group within disciplines less traditional to their gender. For young women, these areas include engineering, science, and technology, and for young men, the areas of nursing, nutrition and human ecology.

In 2012, 60 students participated in the WISEST Summer Research Program and thus became part of a 28-year tradition of young women and men learning about diverse fields of study. Under the supervision of their scientist mentors and fellow research team members, the WISEST students learned first-hand about trail-blazing research, the techniques and types of research being conducted, the research career opportunities available, and they gained an introduction to academic and university life.

In addition to their interactive experiences in the research lab, the students engaged in weekly learning opportunities: 1) *Professional Development Seminars*, informative, interactive sessions led by scientists and researchers, which helped the students develop important skills and gain more insight into the diverse career and academic opportunities available in scientific research; 2) *Lunch 'n' Learn Sessions* provided students with the opportunity to learn and hone the new skills required to successfully navigate their way not only through the WISEST Summer Research Program, but also through their future careers.

There were Special Events in which students shared their knowledge and experiences with the broader community. *Teachers' Appreciation Day* gave high-school science teachers first-hand ex-

posure to trail-blazing research that could be relevant to the curriculum. The *Research Team Appreciation and Celebration of Research* gala events showcased the students' research posters and gave witness to the WISEST students' enthusiasm and broadened awareness of careers in diverse fields of study.

The success of the WISEST Summer Research Program is due to the support of many, many people, including high school science teachers, faculty supervisors, and research team members. We offer our thanks and words of sincere appreciation to all high school teachers who sparked their students' interest in the Program, and to all university people who mentored, guided and encouraged the WISEST students to explore their interests.

WISEST would also like to acknowledge the financial support given by many local industries, philanthropic groups, the Provincial and Federal governments, and the University of Alberta. Sponsorship from all of our Partners and Contributors allowed WISEST to pay the students an hourly wage and give them a variety of resources and experiences. A detailed listing of the WISEST Partners and Contributors is included in this book and on our web page [www.wisest.ualberta.ca](http://www.wisest.ualberta.ca).

The WISEST students have now returned to their final year of high school and will share their increased awareness of the research careers that are vital to Alberta's future as a knowledge-based centre. We wish the WISEST students all the best in their future endeavours.

We hope that you will enjoy reading the following student reports that describe in their own words the six weeks of learning, hard work, mistakes and triumphs, and the amazing discoveries both in and outside of the lab.



# WISEST 2012 PARTNERS SUMMER RESEARCH PROGRAM

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- Alberta Innovates: Health Solutions
- Alberta Human Services (STEP)
- Alberta Education
- Alberta Women's Science Network (AWSN)
- Allard Foundation
- Dow Chemical Canada Inc., Western Canada Division
- Edmonton Chapter Beta Sigma Phi
- Edmonton Glenora Rotary Club
- GlaxoSmithKline Foundation
- Service Canada (Canada Summer Jobs)
- Merck Frosst Canada Ltd.
- Nexen
- NSERC PromoScience
- Process Solutions Canada
- Suncor Energy Foundation
- Syncrude Canada Ltd.
- University of Alberta
  - Dept. Computing Sciences, Dr. Eleni Stroulia
  - Faculty of Agricultural, Life and Environmental Sciences
  - Faculty of Engineering
  - Faculty of Medicine and Dentistry
  - Faculty of Nursing
  - Faculty of Science
  - Department of Civil and Environmental Engineering
- Weyerhaeuser
- WISEST Golf Tournament
- WISEST Guest Lecturer Sponsorship in the name of Dr. Elizabeth Cannon, President & Vice-Chancellor, University of Calgary



# MAKE THE WISEST CHOICE

## Build a stronger, more diverse workforce in science, engineering and technology

*Help us encourage individuals to look beyond the traditional roles and learn more about diverse careers in science, engineering and technology. Build their enthusiasm. Empower them to advance in these fields. Promote a future of diverse voices in the workplace.*

### The Situation

Many young women are excelling in University of Alberta post-secondary programs, yet few women study in science, engineering and technology fields. Female students are scarcest in Physics (19.1%), Computer Sciences (12.5%), Electrical & Computer Engineering (17.7%) and Mechanical Engineering (13.1%). • The 'Women in Canada: A Gender-Based Statistical Report, 6th Edition, 2010-2011, Statistics Canada' reports 22.3% or less of the workforce are women in selected occupations of natural sciences, engineering, and mathematics. • Media reports have highlighted a similar under-representation of women in leadership positions within organizations. • Research by Catalyst, the global organization representing women in business, confirms the positive connection between gender diversity on corporate boards and financial performance.

### WISEST Solution

- Create interactive and engaging education experiences that broaden high-school students' awareness of diverse careers and build their enthusiasm for these fields.
- Connect early-career women in science, engineering and technology fields with each other and with the information, resources and professional development opportunities they require to advance in their careers.

### How Can You Help?

- WISEST Summer Research Program: \$3000 provides a six-week hands-on research experience in less-traditional fields for a high-school student. Multiply your Impact: Sponsor more than one student. Sponsor for more than one year.
- Networks for early-career women: \$600 supports a monthly network session for early-career women in science, engineering, technology and math.

### The Value to You

- Have your support recognized in WISEST events, materials, reports, website
- Demonstrate leadership within the professions, industry, and the general public
- Showcase your workplace by participating in network events for early-career women
- Your workplace benefits from gender diversity within science, engineering, technology careers

### Donate

Thank you for supporting the WISEST way.



Contact WISEST at (780) 492-1842

By email at [wisest.ualberta.ca](mailto:wisest.ualberta.ca)

Donate on-line at [www.wisest.ualberta.ca](http://www.wisest.ualberta.ca)

# PROFESSIONAL DEVELOPMENT



## RESEARCH IN ACTION: **GILEAD SCIENCES, INC. TOUR**

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*By Anwar Tuhl*

In grade 10 biology class we talked about what diseases can do to a person if left untreated and I found it terrifying to give up your life and hope because of a disease. While researching disease treatments, Gilead Sciences, Inc., a pharmaceutical company, was the company that I chose as one of the best in its field, because of their high quality research and products. WISEST gave me the chance to see this for myself, as we luckily had a tour to the company and it was an remarkable experience.

Gilead Sciences, created in 1987, is a company that shows efforts to deliver advanced therapeutics to improve the life of patients suffering from life threatening diseases by offering enhanced modes of delivery, more convenient treatment regimens, improved resistance profiles, reduced side effects, and greater efficacy. The company's primary areas of focus include HIV/AIDS, liver disease and serious cardiovascular/metabolic and respiratory conditions. It is the only company that has not one but two treatments for AIDS on the market. A partnership company of over 25 years, Gilead Sciences has become one of the largest biopharmaceutical companies in the world, with a rapidly expanding product portfolio and a growing body of investigational drugs. At the present time Gilead Sciences has 15 products on the market but the research isn't stopping there,

they are working towards more products in the upcoming years. Gilead Sciences has a three step process to get work done. They start with discovery from medical chemistry as it's the first synthesis of a visible drug condition. Secondly they move to development, which is the process chemistry part as it's the first batches of safety and early clinical stashes. And lastly, the commercial phase which is the manufacturing part of the process. The Edmonton location specializes in the development and commercial part of the process.

Most people that work at Gilead Sciences' facility have a degree in chemistry in some way or shape, and they enjoy their jobs and career paths. After going there for the tour, I realized that every single person that works in the company is very important. They all take work as coming to pursue their passion to help other people, and less like a job and source of income. When I asked them what sets Gilead Sciences apart from the other biopharmaceutical companies in the industry, their answer was the safety, accuracy, high success rate and the amazing results. Learning more about Gilead Sciences, Inc. was a dream to me and having the pleasure to go inside the building, talk to the people that work there and writing this report about it was such a pleasure and phenomenal experience that I will never forget.





## RESEARCH IN ACTION: INTUIT TOUR

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*By Alex Czeto*

As taxes are one of the two things in life a person can depend on it's important that the process is kept at the lowest level of stress possible. Customer service is a prime value to the INTUIT program providers, one of the leading in online financial management who are know most widely for their tax management software Turbo Tax. However, if one gets the chance to talk to a member of the INTUIT Canadian team like the WISESTs researchers of the summer of 2012 there widely popular software is not there most highly regarded prestige. That honor goes to their amazing dedication to team moral and communication and that is was the thing most prominent value showcased when the team graciously opened their doors to said WISEST students.

We started the tour with and introduction to the motivational standards that all employees are held to, to produce a product that the whole team can be proud of. This is another mechanism to guarantee the most proficient product to the customer. As the group furthered the tour we were able to see quality control room where INTUIT views people using their product to better determine the pages and aspects that the customers finds confusing. We then travelled through the offices of the software programmers who seemed very intrigued by the amount of us who chose the option

of seeing their offices instead of the tech support cubicles. We were then taken down to a lounge on the bottom level where we meet with a variety of INTUIT of employees, from quality control to software designers. Here we were able to discuss what brought them to the company and what has brought them to computer software designing in the first.

Many of us much appreciated this chance to speak with these women who had experience in a field of science outside what some of us had been researching in. It allowed us the chance to delve deeper into the personal requirements of a not only a software developer but computer science in general. They gladly welcomed questions on person stories of self-discovery through INTUIT and the computer sciences. It was stressed that a person's job does not define that person however their place of employment is where they spend the majority of their day. All of the team members of INTUIT raved about the treatment of the employees by management and the team spirit that was fostered and carefully maintain. A clear message all the WISEST's students could take away from this outing was that our scientific fields of preference may vary but all of us should be willing and open to opportunities to find a company team as strong as the team at INTUIT.

## RESEARCH IN ACTION: **MAXXAM ANALYTICS TOUR**

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*By Rachael Nay*

This summer several WISEST students, including myself, were given the opportunity to participate in an Off-Campus Industry tour of Maxxam Analytics. When I learned that we had the chance to tour the Environmental Remediation and Infrastructure section in the Edmonton location of this market leading company, I was intrigued. Never having heard about the company before, I decided this was the perfect opportunity to learn what they were all about. Looking back now, I am glad that I did because it opened my eyes to the many opportunities there are for careers in industry relating to science.

Established over 40 years ago, Maxxam provides analytical services and solutions to the energy, environmental, food, and DNA industries. The 2,200 dedicated employees lead the industry in depth of scientific and technical expertise and serve customers through the only Canada-wide network of laboratories. We were fortunate enough to be given the opportunity to tour the many labs of this section and were given an inside look into how Maxxam analyzes the environmental samples that it receives.

When the samples are first received, they are labelled according to what tests are needed, the customer name, and by all of the other pieces of information that are crucial for processing. From there these samples are then sent through many different labs, such as their Organics and/or Inorganics labs etc., according to the tests that are needed in order to get results. After processing and analyzing, the results and samples are sent back to the customer. The employees make sure that they are as accurate and precise as possible in order to make sure that their customers have correct and concise information.

We were also privileged enough to receive an inside look into a future method this sector of Maxxam intends to use to analyze data in the field. The creation of a mobile lab is in the works with the intention that it will be able to go out to sites where immediate action is necessary and be able to give results that the client can use to make decisions on the appropriate actions that they should take. Later, we were able to ask a few of the employees about their experiences and backgrounds, how they had become interested in science, and other general questions about Maxxam Analytics and the labs. Many of the employees said that they had never imagined that they would be working at a company such as Maxxam, but were extremely happy that they had discovered the amazing career opportunities available in the company.

This tour gave me a glimpse at the many science career options that are available in industry and I am thrilled that I got to participate.



## RESEARCH IN ACTION: **SYNCRUDE CANADA INC. TOUR**

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*By Sara Jawdat*

During the six weeks of the program, most of us were assigned a specific room to work within. Working on a single project for a lengthy period of time definitely takes your mind off of all the other scientific action surrounding us. The off-campus industry tours gave us a chance to explore the world around us, and settings that apply the research worked done in labs.

The Syncrude tour was one of the first two tours we had the pleasure of participating in during the program. But unlike the rest of the tours, the Syncrude tour was not an application of research, but a tour of another research facility. Approximately half of us boarded the bus and after a short ride, arrived at, not Fort McMurray, but an actual Syncrude Research Facility located in Edmonton which I was previously completely unaware of. It was definitely a surprise to find a research facility outside of the university and hospital! After a few brief introductions, we were introduced to the world of Syncrude, and the facts and figures attributed to us by a PowerPoint presentation.

As soon as the presentation was over, we were jointly split into four different groups, and allied with hard hats, goggles, and lab coats with buttons, we embarked upon the tour. We were shown many

different types of equipment, including rotational and vibration spectrometers, scanning electron microscopes, a Laser Diffraction Particle Size Analyzer, and a plethora of test tubes and flasks. Our tour guides also explained many of the different tasks they carry out, some of which include: microscopy, analyzing the corrosion of oil pipes, analyzing tailings pond samples, and chromatography. At the very end of the tour, we visited the large Coker machines available at the facility, and they were a sight to behold! We also learned about co-op programs available for third and fourth year university students that allow them to gain work experience in a certain facility of their choice.

The research being done was definitely interesting, but the most captivating component of the tour would have to be the people who work there. They explained the drive and passion that they have for their work, as well as how they look forward to it every day. The feelings they possess for their work as well as their enthusiasm towards what they do is truly inspiring. The tour guides all gave us a short explanation of their career paths, and the advice given was helpful and greatly appreciated. I am sure that the tour was an eye-opener for research available outside the university for many of us!



## NETWORKING FAIR: TALKING WITH ROLE MODELS

By Danvy Tran

There are over 6 billion people living on Earth, any of whom, can impact and change your life. However, even in this age of social networking and expeditious travel, each and every one of us only interact with a handful of individuals. Needless to say, despite only connecting with a minuscule fraction of the world's population, there are many chances to be inspired, influenced and guided by the role models you come into contact with. WISEST gave students the chance to speak to and listen to mentors at the Networking Fair.

Led by a facilitator, the role models were prompted to share their stories on their career options, career paths, challenges and successes. The role models were people in disciplines less traditional for their gender. I was fortunate to be in a group consisting of a civil and environmental engineer, a mechanical engineer, a nurse practitioner, and a university professor involved in oncology. Through their stories we learned that more often than not, life is not a linear path. Quite the opposite really! We heard that one engineer was set on becoming a dentist until she walked into the engineering building here at the University of Alberta. We also heard that the nurse practitioner had plans to be marine biologist up until his grade twelve year. In fact, his decision had changed because he was invited to go on an Academic Recruitment Program for Nursing at the University of Alberta, and realized that nursing fit his personality more than marine biology. This caused our group to bubble with excitement. Was WISEST going to help point us in the right direction as well? Would we be sitting in one of mentor's position a few years from now telling other young adults about a program that led us to our current career?

We also learned how it feels to work in a field dominated by the opposite gender. Although our role models worked in fields less traditional for them, it was gratifying to hear that they faced little prejudice in their workplaces and with the right amount of determination and commitment; they found they could overcome any challenge. Every mentor stressed the importance of embracing change and the importance of networking and snatching up every opportunity that came our way. They praised us for already taking the initiative to sign up for a program like WISEST and insisted that we if we kept searching for opportunities, whether scholarships or work opportunities, we would get where we wanted to go.

Each WISEST student listened diligently, scribbling down the tips that each mentor gave about university life and career decisions. After each speaker had spoken, we had a chance to ask our own burning questions: How helpful was it to know a second language? Would you recommend going into graduate studies? How did you



apply your high school interests into figuring out what field you wanted to go into? Each speaker's reply was insightful and honest, giving us a lot to think about. At the end of Networking Fair we had a chance to linger for one last moment to thank the mentors for their time and receive their contact information so we could ask them some more questions as we moved through the rest of high school and university.

Not all of us are born knowing what our passion is. As our role models have shown us, sometimes we just happen to stumble upon our passion. Sometimes we have to backtrack and make the wrong decision for us to find our final destination. Regardless, we have to take every opportunity, even if we don't think it's ours, because it might be a life-changing experience. WISEST did not only give us a chance to interact with some amazing people, it is also exposing us to a variety of careers so that we might be able to find our ideal career and move towards it.



## EXPLORING U OF A RESEARCH: **NANOFABRICATION LAB TOUR**

*By Scarlett Chen*

The Nano-Fabrication Laboratory definitely became one of the many components of WISEST that complemented our experience studying at the University of Alberta. It was amazing to have the opportunity to visit this laboratory and to be introduced to not only various Nano-scale technologies are conducted, but also how these sophisticated research work can be extended to develop more useful applications in daily life.

Being one of the major large scale research projects on campus that requires collaboration between different research groups, the Nano-Fabrication Lab is known for its specialized lab environment in terms of clothes and technology. Since the samples being analyzed in this lab are mostly sensitive to ultraviolet radiation, the windows and the interior lights are all shielded with a layer of transparent yellow paper to filter out the ultraviolet light. To access the lab, full body protection is required; this is not for the protection of the human body, but rather to protect and preserve the limited number of micro particles inside the lab. Since the samples being investigated are all on and below the microns scale, they can be easily damaged by other relatively larger particles such as dust.

Studies conducted with these micro particles at this laboratory

can be generally categorized into three areas: lithology, thin film deposition, and plasma etch. These also conclude the major procedure required to produce semiconductors such as silicon wafers that are commonly required in the industry. Adding or removing different components to the wafer by thin film deposition and designing different structures by lithology and plasma etch can produce microelectronic mechanics systems of high purity.

Building these Nano or Micro scaled components not only aids in the studies of mechanical and electrical engineering, but also plays a major role in the studies of tiny cells and particles such as protein in human body. Seeing how one research laboratory provides necessary equipment and techniques for multiple disciplines from engineering to life sciences has truly broadened my view on science researches and studies. I would like to sincerely thank Dr. Flaim and the WISEST Committee for the organization and guidance of this amazing tour.

More information about the Nano-Fabrication Laboratory can be found at: <http://www.nanofab.ualberta.ca/general-information/about-the-nanofab/>



## EXPLORING U OF A RESEARCH: **U OF A OBSERVATORY TOUR**

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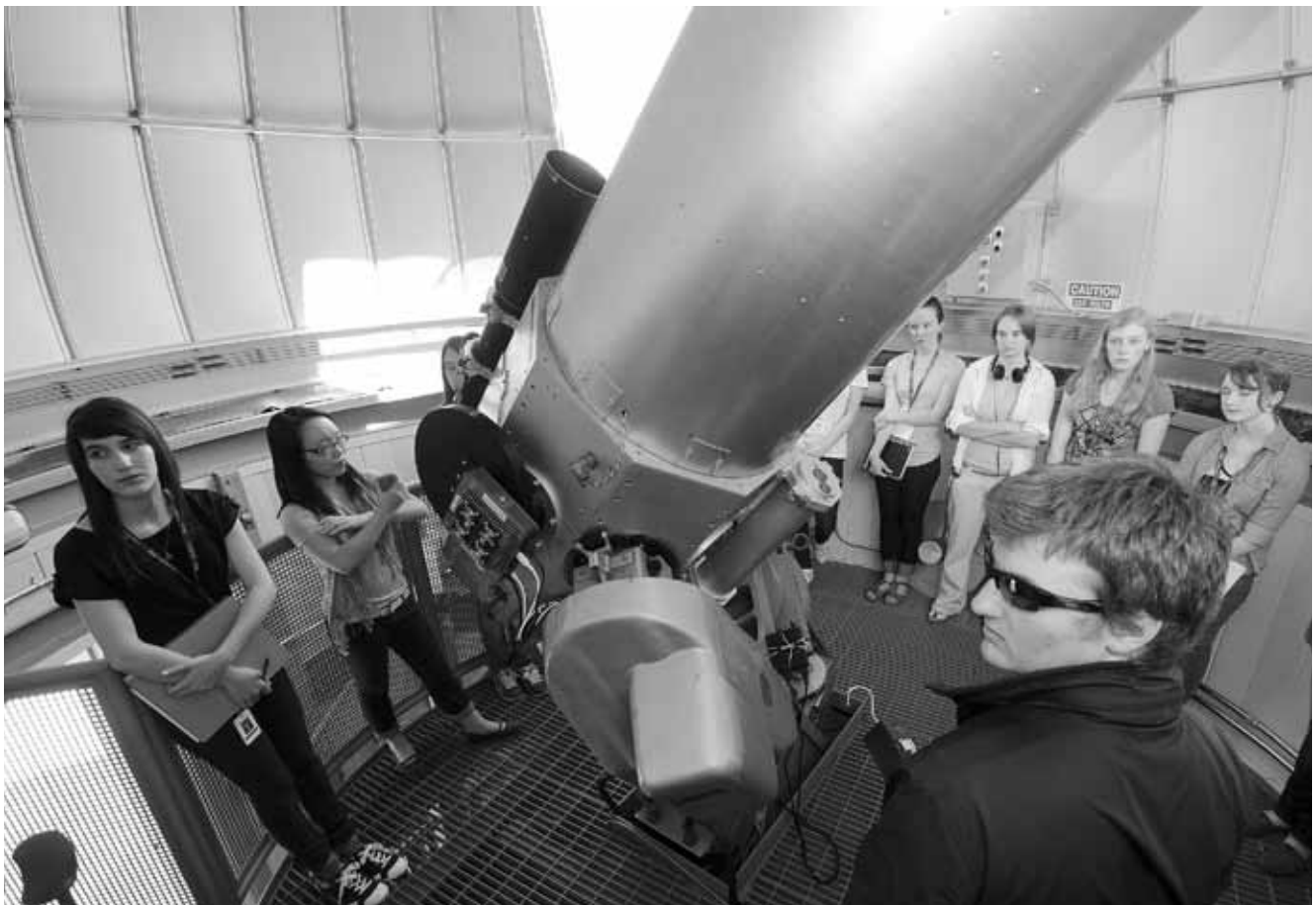
*By Sarah Semeniuk*

It is not often that we are given the opportunity to safely stare at the sun but that is exactly what the WISEST Summer Research students got to do on the tour of the University of Alberta Observatory operated by the Department of Physics. After welcoming us into their lab the observatory students, as well as the WISEST Summer Research Program student Teresa, explained what causes the aurora. Essentially, it is caused by the sun. The sun's outermost layer, the corona, produces solar winds which travel to earth. Most of these solar winds are reflected away from earth but those that are not cause the aurora. From here, we were lead onto an exterior part of the lab which contains the three large telescopes as well as a smaller telescope. With the assistance of special filters, students could utilize the telescopes to examine the sun. On such a cloudless day, the image was very clear even from the smallest telescope and sun spots could easily be viewed.

While leading us from telescope to telescope the observatory staff informed us of the types of research the various telescopes were being used for. The largest of them was being used to photograph the varying brightness of stars because a variance in a star's brightness could prove that a distant planet had passed in front of it. Along with the telescopes there was also an assortment of radio telescopes which were being used by university students for re-

search. Once inside again, we heard from Dr. Sharon Morsink who elaborated on her research which focuses on black holes and neutron stars. The informative tour was completed by showing the students meteorites which the university has collected. From the northern lights to black holes, this tour introduced an interesting and complex area of science to the students as well as demonstrating how phenomena and objects millions of miles away could affect us here on earth.

To read more about the U of A Observatory, please refer to: <http://www.ualberta.ca/~stars/index.html>



## EXPLORING U OF A RESEARCH: **RIVER ENGINEERING LAB TOUR**



*By Arsalan Ahmed*

The river engineering lab was an inviting tour and provided some insight into a career in river engineering. It helped us identify many of the issues and concerns involved when working in a river setting. From this exciting field, the volunteers were Mat Langford (Civil and Environmental Engineering), Caitlin Huggard (Civil and Environmental Engineering), Vincent McFarlane (Civil and Environmental Engineering), and Jennifer Nafziger (Civil and Environmental Engineering). They explained the work being done with Alberta and its rivers, and took us through simulations to illustrate the issues and significance of river engineering in the world today. When we first entered the river engineering lab, we were greeted with a giant sandbox paved to hold a model river, it's currently controlled mechanically by a valve. As acting engineers, we were to first measure the volume of the river using only a calculator, ruler, and a stopwatch. It was interesting to learn how math could be applied into such situations where it would cost both a lot of time and money to estimate the river's actual volume. Then we were asked to place toy houses along the "river" for best location; addressing the concern for house flooding and landslides due to heavy river current. A well placed home is both far from the bank of the river and high. The danger of river flooding during the spring and summer are real threats to our communities, and as river engineers, it is their duty to identify high-risk and safe areas for housing. The river simulation was both an exciting and involving activity that gave us all the opportunity to work with the physical field work aspect of engineering rather than lab work.

After our river simulation, the group was put into a mock council, split into four groups all arguing for a share in the river. The groups included: agriculture, industry, environment, and municipal. The group tackled various issues for their respective groups, and we learned how everyone needs the river, and yet, to preserve the natural resource, water from the river must be consumed and recycled wisely.

In a greater sense, our tour group learned the value of problem solving in both emergency and preventative situations, the need to



preserve natural resources, and the concern for sharing the usage and demand for natural resources within our community. We were able to see that our river's contribution to our environment has a significant impact on our lifestyle. This career offers the ability to work with city council, large oil industries, work in agriculture, as an environmental representative; the privilege of having so much variety within a career makes it an experience, essentially, where the job itself isn't defined to a single type of work.



# EXPLORING U OF A RESEARCH: **SMART CONDO RESEARCH PROJECT**

*By Shelby Turner*

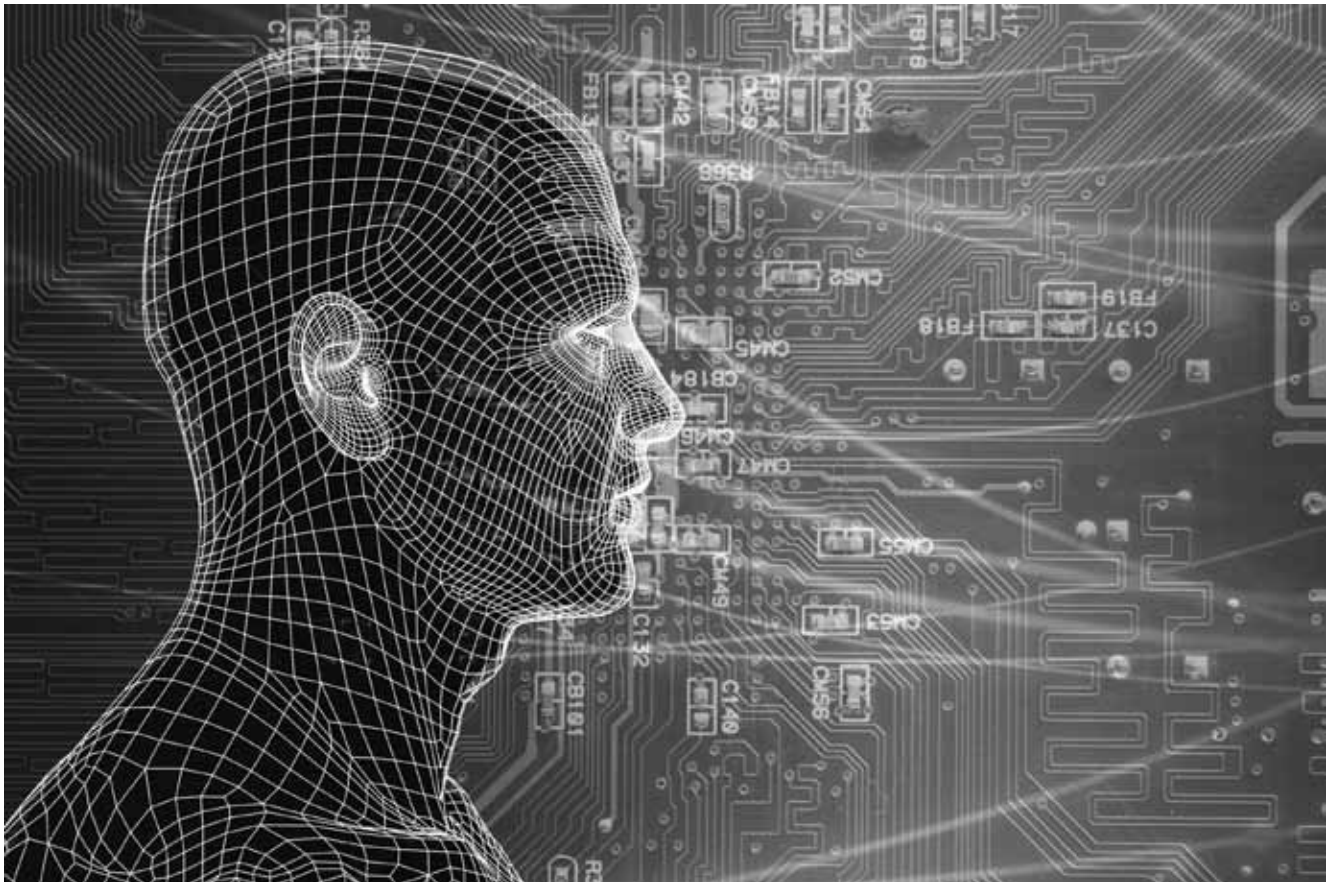
The Edmonton Clinic Health Academy (ECHA) Smart Condo was a very exciting research project to see being done on the University of Alberta campus. Throughout the tour of the Smart Condo, we learned how it solves a problem that faces the aging population. How can elderly people live independently but still be safe? The Smart Condo is in the research stage, which allows patients to stay a period of time in the condo to help the development of the idea. With each patient that stays, the research team can learn about what does and doesn't work for the technology to be used in condos outside of the University.

With a variety of advanced, but simple technologies, patients can be monitored without their privacy being invaded. After we entered the Condo, we were shown a television screen and a small model of the Smart Condo. Iulia Vlasenko and Matthew Delaney from Dr. Eleni Stroulia's lab began to show us what the condo was capable of in a smaller scale by using the interactive model and virtual world. On the TV screen we watched a virtual world come to life when there was activity in the model. Iulia would open a door, and the character on the screen would open the door. This technology was created to keep the patients private life to themselves. Instead of using cameras and microphones to record the patient day and night, a virtual world is observed to see what the patient is doing

without seeing the unnecessary details.

The research being done in this facility is outstanding because it solves a problem that every person in the world will eventually face. Being shown all the exciting technologies used in the Smart Condo shows the possibility of a new way of life in the future. I am happy to have had the opportunity to explore the Smart Condo with other WISEST Students.

More information about the Smart Condo can be found at: <http://www.hserc.ualberta.ca/Resources/Spaces/SmartCondo.aspx>





## BECOMING LEADERS

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By Prabhjot Punnia

One of the objectives of the WISEST Summer Research Program is to assist in the development of key professional skills. Throughout the program, WISEST provided the summer student researchers with numerous opportunities to acquire diverse skills. WISEST 'Professional Development Seminars' were not only informative and interactive; they also provided us the opportunity to explore and network. We knew that 'Becoming Leaders' session would hone our public speaking skills, but this experience was far beyond our expectations.

'Becoming Leaders' was an exceptional session that armed the student researchers with a new talent to express themselves clearly, confidently, and concisely. Knowing that public speaking skills are ranked #1 among the other skill sets added to our desire to know more about this skill set.

Public speaking is the skill of speaking to a group of people in a structured, deliberate manner intended to inform, influence, or entertain the listeners. The tips not only helped us with how to control our butterflies while presenting, but they also taught us how to plan, prepare, and perform.

Feeling some nervousness before giving a speech was natural, but it quickly disappeared as we presented to each other. By the end, we were armed with a new talent for language. We felt confident for our poster presentations at the 'Celebration of Research' and the 'Teacher Appreciation Day'.

Later on, having an opportunity to hear WISEST Coordinator, Grace Ennis, and the WISEST Chair, Denise Hemmings, was invaluable as

well. The importance of diversity, in both industry and academia, was brought into focus, which led us to appreciate the efforts being put into address the continuous disparity between both men and women in non-traditional careers. Getting to know more about the other programs running under the WISEST, such as the SET Conference, the UA-WISE and WISER Networks, and the Meet-a-Mentor video-conference program, confirmed that only such initiative can allow everyone can follow their dreams. Participation in these programs not only helps students broaden their awareness of career opportunities, but it also encourages them to explore a future in science, engineering and technology.

Furthermore, Denise Hemmings shared the importance of maintaining an organization, like WISEST, in our society. She explained that even though the number of men and women in non-traditional careers are increasing, our society still needs WISEST to continue to provide tremendous opportunities, support, and encouragement to the youth.

Overall, I am confident to say that this seminar was really beneficial as it increased our confidence, gave us a boost to accept feedback, and prepared us to take our role as a WISEST ambassador.

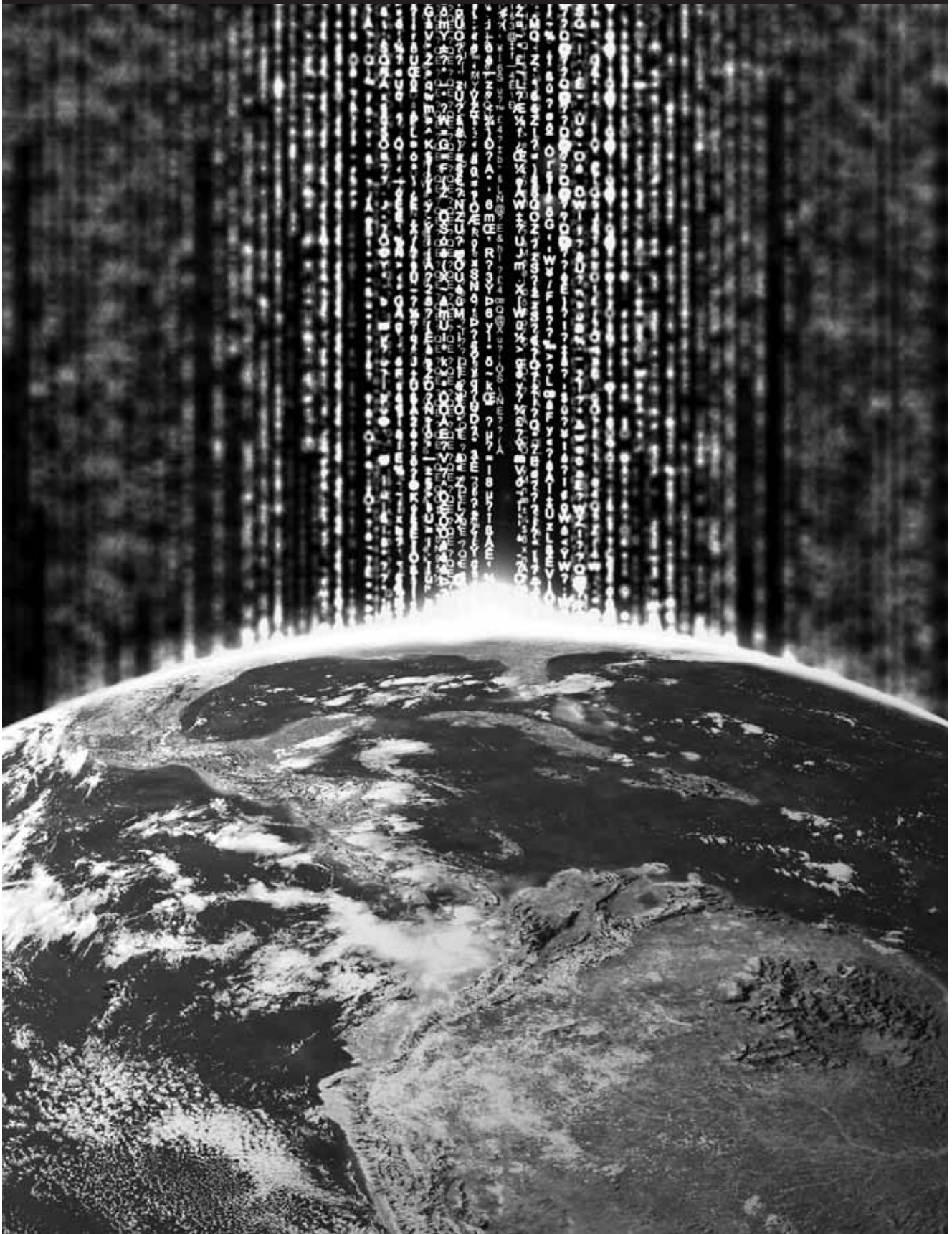
I feel it has been an incredible honour and an exceptional opportunity for us to be part of WISEST 2012 experience. I do not see our relationship with WISEST ending as our six weeks are due. I look forward to becoming involved with WISEST over the coming years so that diversity of voices can help build better tomorrow.

*"We gain strength, and courage, and confidence by each experience in which we really stop to look fear in the face . . . we must do that which we think we cannot."*

Eleanor Roosevelt



# STUDENT OPPORTUNITIES



## WISEST TEAM CHALLENGE

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By Navjot Singh

July 6th “Team Challenge 3:00pm” That’s what it said on our program calendar and today was the day. It had been the topic of the week. As we met one another we would shyly as, “Hey, do you have any idea what the Team Challenge could be?” It was only our third day as WISEST Student Researchers and we had no idea what to expect. Some of us thought that perhaps it was another scavenger hunt; similar to the one we had on orientation day. But that seemed slightly unlikely, especially when orientation was only a day ago. Could this be an intellectual activity? Would we be put into teams and have to pay attention to a presentation? These were some of the thoughts of excited student researchers as we slowly began to infiltrate the campus making our way to the Edmonton Clinic Health Academy.

Although we were to meet at 3:00pm, a few of us made plans to meet up earlier to venture out to find ECHA1-190 together, and this seemed like a challenge in itself. Those who arrived early were handed a stack of note cards that had numbers written on them with sharpie. As others began to show up, we realized the numbers were used to divide us into teams of about five to six. While waiting for the others, we wondered, will we be taking notes? Are we going to be building with them, just as we do with playing cards? Once everyone arrived, the team challenge was finally revealed.

It was a Dragon’s Den themed task. Within the time limit, we had to build a building using the note cards, with scissors and tape at our disposal. As though the time limit was not enough pressure we had requirements that the buildings had to meet such as their height and strength. Each building had to be designed in such a way that it would not collapse under the force and weight of a Chemistry 20 textbook dropped from shoulder height. While we had all this to keep in mind, there was a pitch we had to plan out to present before the judges, Kaitlyn and Meagan. We had to convince our judges to invest in our buildings by stating the type of research facility it was going to be, the type of work that was going to take place, and why

this facility was absolutely necessary on campus. Of course, each team wanted to ensure they would win, so we went to town with colors and markers, making our buildings pieces of art.

Regardless of winning or not, we had a wonderful time! We cheered with joy when the buildings withheld the textbook, and we all felt rather sad when they collapsed, however we laughed it off knowing they only buckled because we spent more time talking than working. By being placed into groups with students whom we did not know, it was a great way to meet new people and get the chance to get to know our fellow colleagues. We had the opportunity to share our interests, files of research, the types of work we did, and best of all, make new friends. When it comes to talking to someone who we have never met before, it can be awfully daunting and this was a great way to break the ice and a lot of fun. Working under pressure and having to collaborate definitely made this into the many WISEST memories.





*by Angelica Almeria*

This summer, 60 high school students were brought on campus for an experience that exposed a number of future career paths. Surely, one cannot expect all of them to know everything about what to do to achieve their career goals and how to do so. This was why our very first Lunch 'n' Learn session was a terrific way to start off the program. On July 13, 2012, we walked into the Edmonton Clinic Health Academy for the University of Alberta Question and Answer session. I know that I can speak on behalf of every other WISEST student when I say that this event was greatly anticipated.

As the last few students walked in the lecture room, the presentation was ready to begin. It started with Ms. Courtney Wagner, a volunteer from the recruitment office, clearing up popular myths about university. We listened attentively as she talked about the "sea of students" with 500-person classes, and being "stuck" in a faculty once you've registered in it. She clarified that over 80% of the classes had less than 100 students, and outlined how we could transfer from one faculty to another. This quick presentation gave us a huge sense of relief. Afterwards, we broke up into smaller groups of about 10 to discuss specific questions about university.

Ms. Courtney Wagner and Ms. Kayley Swonek, our group's wonderful volunteers, led us towards the seminar room. Shy smiles were exchanged as we took our seats and gathered around them. It only took a few minutes to break the ice, and as we went further into the session, more topics were addressed – which meant more questions for them to answer.

Some of the main topics that our group focused on were recruitment, switching faculties, tuition, residence, grades and scholarships. Courtney and Kayley gladly listened to our questions, and their responses were very informative and detailed. One issue that we all wanted to know more about was admission from high school, since that was something we would have to do in the near future. They talked about applying as early as October to be accepted for early admission, and registering by April for our courses if accepted. They could see the panic in our eyes, so they gave us the reassurance that even they didn't know what they wanted to do after high school by the end of their grade 11 year.

Tuition for university was also a popular topic in our group. Scholarships were addressed, and they mentioned that the University of Alberta alone offers almost \$25 million worth of scholarships. They talked about how many scholarships and bursaries go unclaimed each year, so they encouraged us to talk to our school's counselors about them ahead of time. Also, Courtney brought up a really interesting point about student loans when she said that investing in education is never a waste of money. Its value and worth would never deplete, but, instead, would be of so much more value over time.

There were also good questions about engineering, which was convenient because one of our student volunteers, Kayley, was a current engineering student at the University of Alberta and a proud WISEST student two years ago. She talked to us about the Co-op program and how it is a great way to get experience while studying. She also talked about the different departments of engineering, such as mechanical, civil, chemical and materials, and biomedical engineering. It was great that she was so willing to help us, and it was even better seeing how much she enjoyed a field considered less-traditional for women.

This Lunch 'n' Learn was just one of the many valuable opportunities that we had; it helped us gain more knowledge about university life, and made us even more excited for what's ahead of us.

## THE ART OF NETWORKING

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*By Anam Rizvi*

If you were ever to meet Dr. Margaret-Ann Armour, you'd have never thought that at one time she had wanted to be a bus conductress. Yes, this PhD professor and associate dean was once just as unsure about the turns her life would take, as we are now. Yet, sometimes the answer can be as easy as making some friends. Through networking we are able to meet lifelong mentors, who can expose us to a world of possibilities.

Sound simple enough? For many though, it is a long road of qualms as they are forced to step out of their comfort zone. "Nothing is ever as hard as joining a closed circle" (-Dr. Armour), I'm sure everyone can relate to this. Networking is all about how you interact, she suggested that you be open about your concerns, build trust, and overall be a good listener. It's also not a game of chance, but requires you to take initiative and be intentional about meeting your role models. Don't be intimidated by their air of authority because as long as you are enthusiastic and engaged at what you do, you have the ability to be an asset to them.

Mentors are here to guide and encourage us through this ambiguous time in our lives. "Some professors will enter a class and announce 'At the end of this semester, only half of you will remain', this is one of the most discouraging things you can say." (-Dr. Armour) As you work to meet the expectations of your mentor, you must also hold expectations for them. Don't be afraid to voice your concerns because your opinions are important and this will lead you to having a more open relationship with your mentor.

Networking is an excellent way of discovering your career aspects, but aside from that, one of Dr. Armour's greatest advices was to never stop dreaming. The possibilities are endless and time is plenty. When we dream, we allow ourselves to explore the unprecedented

and who knows where that could lead us! Once you've found your passion don't let other's bring you down, and in turn, encourage others to follow their dreams as well. The most simple and powerful words that can be said are "You can do it." -Dr. Gordin Kaplan.

Overall, Dr. Armour stressed the importance of making the most out of university. We can learn more from our own experiences rather than the written word so she encouraged us not to spend all our time studying. By trying new things and getting involved you can meet many new people and also be able to relate with the experiences of others. Join a club or a team; just anything that will stretch your mind, because we are fortunate enough to have these opportunities all around us. If you ever get the chance, Dr. Armour also suggested travelling. In this way we can meet diverse people and experience global issues hands on. There is no better inspiration.

If you are still unsure of where you are headed, don't panic! It is only a matter of finding the right resources. Through Dr. Armour's reassurance, we found that there are professors and counsellors available all over, who would be more than willing to answer our questions. "Can you please help me?" could be the sentence separating you from your future career.

Needless to say, we left the classroom that afternoon thoroughly inspired by this passionate woman whose wise words made us feel as if we'd been told the secrets of life. However, our learning didn't just stop there. Before leaving we were given two instructions for homework: 1. Jot down your influential mentors; 2. Jot down your dreams. It may not seem like much, but you'd be surprised where your dreams can take you. Thank you Dr. Margaret-Ann Armour for sharing your extensive life experiences with our adolescent minds.

## LIVING IN RESIDENCE AT ST. JOHN'S INSTITUTE



*By Michelle Liu*

Living away from family, friends, and the place we call home is not an easy thing to do. For many of us, it was the first time living on our own. Added to that was our work as student researchers and some would say we had our work cut out for us. However, each of us took this challenge in stride and turned it into one of the most memorable undertakings of the program. Our time at St. John's Institute has complimented our involvement in the program and has given each of us a valuable experience that will prepare us for the years to come.

Residence became a second home to us. Our bubbly residence advisor, Emily, made our experience in the WISEST program more enjoyable and exciting for us. She made sure that we felt right at home and was always around to talk to, give us advice, and take our minds off work. Emily, along with the thirteen WISEST students, the two HYRS students we adopted plus their residence advisor equalled six-weeks of unrivaled fun and unforgettable friendships.

Coming back from a day at work, we would always look forward to hanging out with friends, watching a movie, karaoke nights, movie marathons, card games that frequently got vicious, and more movies. The recreation room was the hub of all our fun, a place to go find others and learn about each other's day. On weekends, there were always plans to go explore the city of Edmonton and what it had to offer. Emily devised a lot of outings to festivals, the farmer's market, and West Edmonton Mall to explore the culture of Edmonton. She also helped us navigate through the city which was a big relief for us. We were entertained at the Street Performer's Festival, watching interesting acts from around the world and learned more about diverse cultures at the Heritage Festival. For some, a highlight of the many activities we participated in was the Zabava party, a Ukrainian dance organized by the Osvita Ukrainian Summer Immersion stu-

dents and counsellors. Here, we forged more friendships with the Ukrainian students, learned more about the Ukrainian culture, and had lots of fun. For others, it was going on the thrilling rides and rocking out to the Simple Plan concert at Capital Ex. Whatever it was, everyone had an enjoyable experience.

From the first day to our last, we were able to quickly transition to living on our own. Each of us was supportive and friendly to each other while we got a taste of independence and explored what it would be like to live on our own, which will undoubtedly prepare us for the university life. While we didn't need to learn how to cook because of the wonderful cooks at St. John's Institute who prepared our meals each day, we still learned how to live a balanced lifestyle and how to do basic housekeeping. We had to do the laundry, remember to take the garbage out, the importance of going to bed early, especially on workdays, and balance work, sleep, food, exercise and fun.

The experience living in residence at St. John's Institute this summer is one that nobody will forget soon. Each of us in residence will come away with more friends, a sense of independence, and memories that will last a lifetime.

The WISEST students staying in residence would like to thank the WISEST team for coordinating our stay in residence, St. John's Institute for their wonderful hospitality, and the donors of the Margaret-Ann Armour Endowment Fund for Rural Students because without them, many of us would not have been able to stay in residence. Thank you especially to each of our sponsors for making our participation in the program possible and for bringing together bright and like-minded students from across Alberta and the Northwest Territories.



# MAKE THE WISEST CHOICE

## Build a stronger, more diverse workforce in science, engineering and technology

*Help us encourage individuals to look beyond the traditional roles and learn more about diverse careers in science, engineering and technology. Build their enthusiasm. Empower them to advance in these fields. Promote a future of diverse voices in the workplace.*

### The Situation

Many young women are excelling in University of Alberta post-secondary programs, yet few women study in science, engineering and technology fields. Female students are scarcest in Physics (19.1%), Computer Sciences (12.5%), Electrical & Computer Engineering (17.7%) and Mechanical Engineering (13.1%). • The 'Women in Canada: A Gender-Based Statistical Report, 6th Edition, 2010-2011, Statistics Canada' reports 22.3% or less of the workforce are women in selected occupations of natural sciences, engineering, and mathematics. • Media reports have highlighted a similar under-representation of women in leadership positions within organizations. • Research by Catalyst, the global organization representing women in business, confirms the positive connection between gender diversity on corporate boards and financial performance.

### WISEST Solution

- Create interactive and engaging education experiences that broaden high-school students' awareness of diverse careers and build their enthusiasm for these fields.
- Connect early-career women in science, engineering and technology fields with each other and with the information, resources and professional development opportunities they require to advance in their careers.

### How Can You Help?

- WISEST Summer Research Program: \$3000 provides a six-week hands-on research experience in less-traditional fields for a high-school student. Multiply your Impact: Sponsor more than one student. Sponsor for more than one year.
- Networks for early-career women: \$600 supports a monthly network session for early-career women in science, engineering, technology and math.

### The Value to You

- Have your support recognized in WISEST events, materials, reports, website
- Demonstrate leadership within the professions, industry, and the general public
- Showcase your workplace by participating in network events for early-career women
- Your workplace benefits from gender diversity within science, engineering, technology careers

### Donate

Thank you for supporting the WISEST way.



Contact WISEST at (780) 492-1842

By email at [wisest.ualberta.ca](mailto:wisest.ualberta.ca)

Donate on-line at [www.wisest.ualberta.ca](http://www.wisest.ualberta.ca)

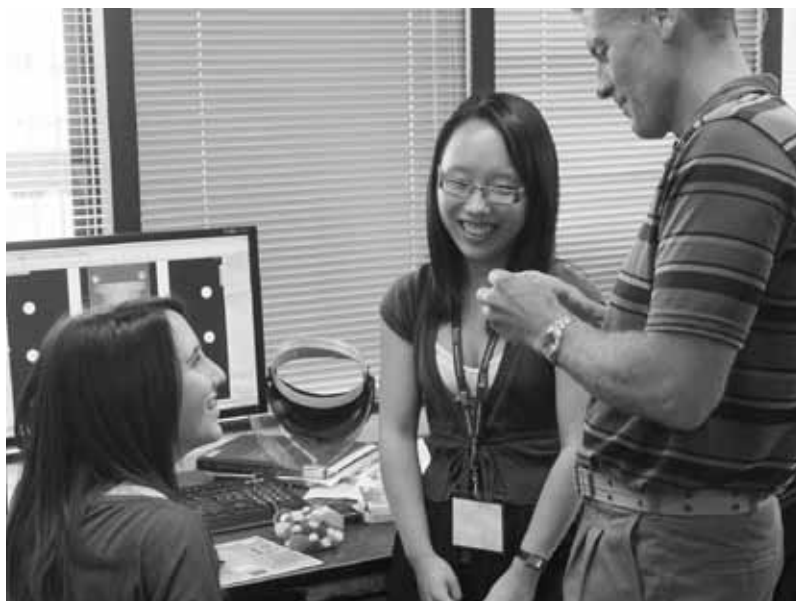


# SPECIAL EVENTS



## TEACHER APPRECIATION DAY

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By Nicole Wang

There is a well-known Chinese proverb which states that while “teachers open the door, you must enter by yourself”. I believe that I can speak for my fellow WISEST researchers when I offer my gratitude to our teachers for the sheer number of doors that they have opened for us over the years. Their determination and passion for science inspired us to embark on this research journey; without their support and guidance, we would not have the background nor the confidence needed to “enter” the research by ourselves. As a token of our thanks, we invited teachers from across Alberta to partake in the Teachers Appreciation Day—an event where they were familiarized with the ground-breaking research that we have been involved in this summer.

In the first part of the day, teachers participated in “Learn More” sessions where they visited labs that dealt with everything from the research being performed at the U of A to myth-busting common misconceptions with the help of engineering principles. For my lab in particular, the visiting teachers were also very inquisitive about the student research and more importantly, our summer experience with WISEST. After attending these “Learn More” sessions, the teachers were also treated to two presentations: *The Joy of Chemistry* with Dr. Margaret-Ann Armour and *The Joy of Gases* with Dr. David Lawrie. Both mentors provided invaluable ideas that teachers can integrate into their own curriculums in their continuous efforts to broaden students’ awareness and passion for science and research.

The highlight of Teachers Appreciation Day was presenting our posters to both our fellow researchers and our teachers. Although some of the WISEST researchers had the chance to work in a team environment this summer, the poster presentation was in fact the first time we were introduced to the specifics of each other’s work. These peer presentations allowed us to appreciate the amount of time that all the researchers have invested into their projects and

helped us build our confidence for the subsequent presentations to our teachers. Coming from a highly scientific high school, I was fortunate to have Mr. Brian Lee, who teaches me both physics and chemistry, to attend the event. Having the opportunity to present to the teachers who helped to write our WISEST references was a valuable experience that demonstrated how we benefited from this amazing research opportunity—one which they helped us to attain. In addition to presenting to teachers from our own schools, we also showcased our projects to teachers from institutions from across Alberta. These teachers presented us with questions that prompted us to think about the “big-picture” applications our research and helped us to bring into perspective their future implications to society and what they thought could be potential challenges. Being immersed in one project for six weeks often allow us to lose sight of our research goals and the teachers’ questions were an excellent means for us to recognize how our scientific research is going to make a difference in our world today.

Teachers Appreciation Day allowed us to take pride in our hard work and more importantly, show our gratitude to all the teachers who have helped us, motivated us, and inspired us to challenge ourselves and pursue our passion for careers in non-traditional fields. Their experience and accompanied insight into the diverse fields of research highlight the interdisciplinary nature of science and the necessity of collaboration and cooperation. Nevertheless, the most special part of this event was when my teacher told me how proud he was of my accomplishments this summer. This simple phrase embodies the most prominent influence that our teachers have had in our lives—the awareness of our own potential. As students, we will always be thankful for the endless mentorship that our teachers have provided for us and the confidence that they have instilled in us.

## RESEARCH TEAM APPRECIATION

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By Makena Kigunda

Before heading over to the Research Team Thank You, a colleague warned me that, since there was free food, researchers would flock to the event like sheep. Sure enough, five minutes after the guests arrived, most were holding pastry-filled plates in one hand and a cup of coffee in the other. But it didn't even take that long to see that the research teams were interested in more than tasty snacks and that the hall was filled with people that upheld WISEST's call to be Remarkable Role models and Researchers.

Researchers they proved to be as they took a great interest in all the research, from various fields at the University of Alberta, compounded into 60 posters made by each student researcher. Our posters were set up as a symposium, so guests walked around and stopped at those posters that appealed to them. Although researchers first looked for their own team's WISEST student, they also stopped at other projects, some comfortably familiar and others so different that they were hard to comprehend.

Students were as anxious to present as the researchers were to listen—and anxious is right word here, since no one wanted to make a mistake in front of the same people they had worked with for over a month. Even though my own research team was away and could not make it, I still felt jitters about presenting in front of researchers who worked on the same floor as me. But it turned out that there was nothing to be nervous about: whether researchers knew me and my project or worked in completely different labs, each person I talked to was genuinely interested in what my team and I had done. They nodded their heads, pointed at graphs and diagrams on the poster, asked tons of great questions, and showed an inquisitiveness that flowed from their enthusiasm for learning. No one had to say that we should be excited to learn—they showed this

through their actions. Not only were these guys researchers, they were role models.

Seeing this during our Research Team Thank You made me even more appreciative of the time and energy our research teams put in to make sure we understood what we were doing and that we were able to do it to the best of our ability. They led us through new and difficult concepts and enabled us to overcome the steep learning curve with which we were presented, and then came back and encouraged us to take ownership of our contributions to the knowledge base. By giving us the opportunity to both learn about and add to the work done at the university, these researchers were role models not for a day, not just for six weeks, but for years to come. That's pretty remarkable.

After these remarkable researchers visited poster presentations for about an hour, there was a formal program with speeches from the WISEST administrative team, as well as a quick speech by a WISEST student researcher. All of the speakers openly shared their appreciation for each researcher's investment in the WISEST Summer Research Program and its participants.

The Research Team Thank You was not just a time to celebrate and show off everything we student researchers were able to accomplish. It was a way for our research teams to celebrate with us, as everything we had done was something they could be proud of as well. Our presentations were their presentations. Our posters were their posters. And our accomplishments were their accomplishments. That was a way of saying *thank you* in itself, and a little free food wasn't a bad way to say it either.



## CELEBRATION OF RESEARCH

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*By Ruby Yang*

Wow. What a day! The Celebration of Research marked the last event of the WISEST Summer Research Program of 2012. And I can truthfully say that it was the paramount way to conclude our research experience. Each student presented their exhilarating journeys throughout the past six weeks. I could see smiles from guests that felt the pride and confidence built up in all of us. It was a beautiful day. In fact, a perfect day to end these short six weeks. With sixty students sharing knowledge, it showed the diversity that science and research can hold. The energy and excitement of the event was outstanding and inspirational. All I could see was the growing potential in each student.

During this event, we had the great opportunity to use the skills previously developed in us over the past few weeks. We learned how to present professionally from our Lunch and Learn's and also developed the skill of networking through Dr. Margaret-Ann Armour's session. Through the Celebration of Research, students applied these skills and confidently shared their projects within a professional mindset. This occasion also offered a chance to connect with people while sharing information and the passion established in all of us. It was not only a way to teach subjects of interest but also to learn from others.

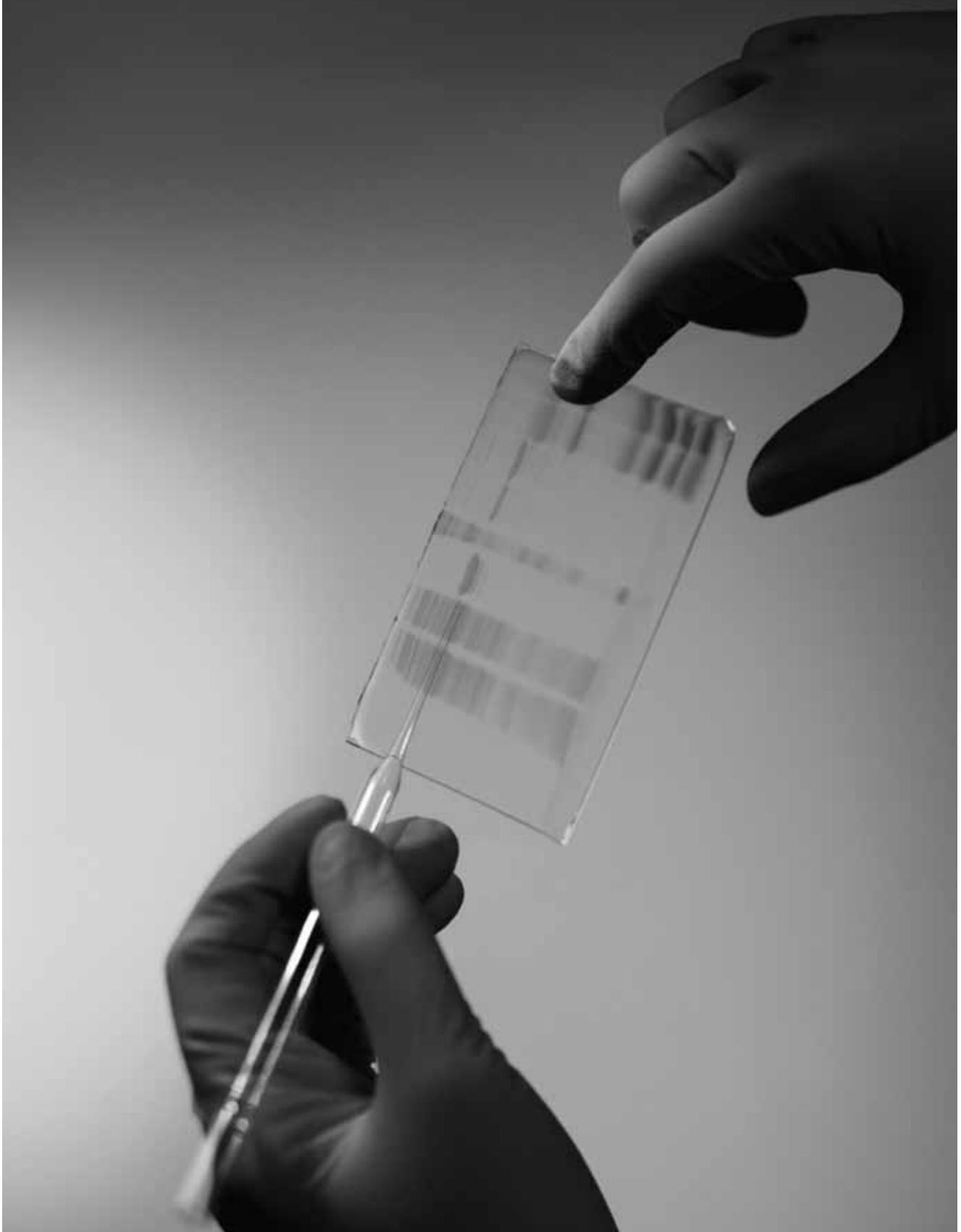
Seeing every student enjoying their projects and be proudly presenting their posters was a true motivation to me. It showed me that in each student a dream came true. And I knew that this dream was similar to mine; dream led by the passion of science and research. We were all ecstatic to learn on the first day of WISEST. But by the last day, we were more delighted to be able to share a memory that could possibly be the key to our future.

Getting the chance to present a poster that showed the product of my six weeks was definitely rewarding. I finally had the results I was eagerly willing to share. This day was a true celebration of how much we've all learned and the distance we've come to the end of these past weeks. It was a very satisfying feeling to see interests in the eyes of our guests which showed the appreciation of the hard work all student researchers have put into their project. It was a chance to make our parents proud. I realized that parents are really the motivation that keeps the fire lit in all of us. It is because of the nurture of our parents that we are able to have today. They are the ones that pushed us when our adrenaline gave up. But at the end, they are also the ones that attended this event with a gleaming smile showing their pride of their child's astonishing accomplishment. I'd like to thank family members for their endless support and respect for their child's passion.

As this event concluded, many good-byes were said and many tears were shed. It was a bittersweet ending. Even though I can now sleep-in and engulf what's left of summer, I could no longer work in a lab filled with bright minds, and eat lunch with my research team or even attend the WISEST sessions with my new ultimate friends. It is all coming to an end. It is time to leave it all behind. But one thing for sure, I'm taking this experience as a life-long memory. With amazing pictures and new friendships, I will never forget this amazing summer filled with knowledge and laughter. WISEST 2012 is officially done, but I know that it is just the beginning of the many doors to open. Best of luck to all student researchers! "The world is round and the place which seem like the end may also be the beginning." Ivy Baker Priest.



# STUDENT REPORTS



## Alex Czeto

Supervisor: Dr. Duane Szafron / Computing Science

Sponsor: Edmonton Chapter Beta Sigma Phi

*“The core of the WISEST’s experience is not just the research however; it is giving the students a more solid stepping stone into the future.”*



Do you remember the time not too long ago when videos came in tape form and you could smash them, thrash them, throw them across the room and still pop them into the VHS player to see the moving pictures that made magic come to life? I do because that is when I was first introduced to the art of animation. Little did I know at the time that the painstaking art of making a cowboy doll talk for a minute could be boiled down to the science of ones and zeros. In fact there was little I knew at all about the millions of possibilities for my future in science, and how they could link to my personal interests, before WISEST.

First and foremost I must glowingly admire the WISEST team’s efforts in placing the research students into fields of their interest. I heard nothing but enthusiasm from the other students about their own research and I myself couldn’t believe how well they placed me based on my application. I was assigned to the Believe lab of Dr. Duane Szafron in the Department of Computing Science. The research team I am currently working on developing a program called ScriptEase. ScriptEase was created to make that task of scripting, or writing code, simpler and more accessible by attaching simple sentences to several lines of code. My job in the research team was to find and record all the bugs in the system. I was taught the some basics of the coding language thanks to the patients of the ScriptEase team, and more importantly the mentality one must take on to understand code and programming. Programming is all about precision and string complex ideas into a logical order that the computer can understand. The other half of my research was directly assisting my supervisor, Neesha Desai, with her project on developing ways for non-player characters (NPC) to have their emotional states more clearly understood. I created game objects for a virtual world that Neesha would later use to run psychological tests. I had the amazing opportunity of sitting next to a real artist as I learned the basics

of modeling and animation. I am truly grateful to my research team for all their teachings and cannot thank them enough.

The core of the WISEST’s experience is not just the research however; it is giving the students a more solid stepping stone into the future. Twice a week if not more frequently, the WISEST group me for an activity. These ranged from touring labs on and off campus to having question about campus life and how to get where we want to be in the future answered. I could always be sure I could take something vital and thought provoking away from these experiences. We had the amazing opportunity to hear from Dr. Margaret-Ann Armour on dreams, and how we use them to propel us forward. I really enjoyed visiting the other labs. Labs such as Maxxam, where we were able to see chemical analyse, or the SMART condo where we learned how all the departments can come together to involve in a single project. That was the biggest thing I think we can all take away from WISEST, the idea that all the Science interconnect. I may go on to pursue a career in the biological sciences, but along the way I’ll use chemistry and physics, and maybe even some of my art skills. WISEST has taught me that I am not pin holed based on my gender or my interests, I now truly believe that a career in the sciences can expand faster than the universe.

# Alexandra Sadurski

Supervisor: Dr. Tom Etsell / Chemical and Materials Engineering

Sponsor: Service Canada (Canada Summer Jobs)



*“Past the technicalities of the procedures, disappointments and ideas that I will never understand, the WISEST program was surely an experience that I will never forget.”*

Coming into this summer, I expected to become fully immersed in a research environment, but I soon realized that I didn't truly know what research entailed. After 6 weeks in the Chemicals and Materials Engineering lab, I found one quote from Werner von Braun that could explain my time here: “Research is what I'm doing when I don't know what I'm doing.”

When I walked into the lab on my first day, I had no idea what I was doing, and in all honesty I still don't. However, with the help of my supervisors, Josh Cunningham, Dr. Amir Hanifi and Dr. Tom Etsell, I was able to adjust to an environment of conducting experiments and getting results which sometimes weren't ideal or completely understood.

In the first few days, I was bombarded with tons of complicated, new information and not a whole lot of time to sort it out. As much as I had tried to prepare for my project on Solid Oxide Fuel Cells (SOFCs), nothing could truly prepare me for my work here.

My work started at the basics, creating molds in which the tubes would be cast into. I slowly progressed to making my own slurry, a mixture of solid particles and water to create a ceramic tube when hardened. The slurry was a mixture of nickel oxide (NiO), yttria stabilized zirconia (YSZ), 6 $\mu$ m (micrometer) diameter polymethylmethacrylate (PMMA) spheres, and water. The slurry spends 3 days grinding in a ball mill, then hydrochloric acid (HCl) is added to adjust the pH. After the tedious process of creating the slurry, the slurry was cast into the molds at various times, allowed to solidify and dry out before attempting to remove them. The delicate tubes are then slowly heated to 100°C, then to 250°C and finally 1150°C, where the tube shrinks and hardens. burns off the PMMA to create pores to allow the fuel gas molecules to pass through. The tubes are then dipped into a series of dips in an Anode Functional Layer (AFL)

to improve the reaction kinetics and Electrolyte to assist the reaction of the anode and the cathode. A Thin Porous Layer (TPL) was then applied to a small strip in the center of the tube followed by a layer of LSM (Lanthanum nitrate, Strontium Nitrate, and Manganese Nitrate). The long process of Ni-SDC (Samaria doped Ceria) infiltration came next where the tubes had to be saturated with Ni-SDC in order to be more electrically conductive. However, in order to find a peak electrical output, some tubes were infiltrated 5 times, and others were infiltrated 50 times. Out of all these steps, came a finished, ready to be tested tube.

Although the tubes are yet to be tested thoroughly, my research allows the team to determine the optimum number of Ni-SDC infiltrations on a 10% NiO 6 $\mu$  PMMA tube. Many tubes in the lab are made with 20 $\mu$  Graphite and not PMMA which means that my project explores a material which is rarely used in the lab as a pore former. This helps find the optimum mixture of substances to create the most efficient and powerful fuel cell possible.

Past the technicalities of the procedures, disappointments and ideas that I will never understand, the WISEST program was surely an experience that I will never forget and I have definitely come out with knowledge and experience which I would never be able to gain otherwise. I would like to thank my sponsor, Canada Summer Jobs for allowing me to have this opportunity. I would also like to sincerely thank my supervisors, Dr. Amir Hanifi, Dr. Tom Etsell and Josh Cunningham for putting up with me this summer, being my mentors, and providing me with knowledge which I can take into all my future endeavours.

## Amanda Krysler

Supervisor: Dr. Chris Sturdy / Psychology  
Sponsor: Service Canada (Canada Summer Jobs)

*"This story inspired me because having a career as a woman requires you to take into account different priorities."*



This past summer has been an incredible experience. Beginning with the inspiring speeches at Orientation and then meeting my Supervisors for the first time, I knew I was in for the ride of my life. I'm going to miss every part of the lab; from the cute chickadees that we got to feed every day, to the hours cutting and measuring fee-bee songs for my supervisor's research. Freaking Vickie (the other WISEST student in my lab) out with the worms we fed the birds was just one of the many exciting perks of my job. I was also able to contribute to the rarely studied songs of the female black-capped chickadee, helping my supervisor, Allison, in furthering her research. By collecting this data Allison was able to use this information to compare and contrast between males and females. She will then be able to use this information to study other chickadees in a variety of situations. I feel honoured to be a part of her research and to have contributed my little part to her project. Another experience I got to partake in was observing how humans understand and perceive music. Having to chance to be involved in a variety of projects throughout the summer was a rare opportunity that was better than I could ever have imagined.

WISEST has done more than get us into a lab for the summer. They have provided us with sessions such as how to create proper research posters, the University question and answer (Q&A) and the networking fair. Without the first session I wouldn't have had anywhere to start for my poster. The tips and tricks that they gave us were so useful. I loved the University Q&A because I plan on attending the University of Alberta. Any information I got, such as where to buy cheap textbooks, where to sign up for clubs or how to balance studying and extra-curricular activities will be important to me. The networking fair was my favourite session from the summer program. I honestly didn't expect to get that much information but I was blown away by some of these women. One had a child after

dropping out of pre-med, went back to university to become an engineer and also showed horses around the world. This story inspired me because having a career as a woman requires you to take into account different priorities. To hear that she was able to accomplish all that and have a kid was incredible. She also touched on the fact that it's never too late to change your mind. This story taught me two life lessons. Anything is possible if you're determined enough and it's never too late. WISEST is more than a summer job; it's a program to help you get ready for university, a career and opens your eyes to what options are available to women in the world of science.

I think I am going to remember the people the most. I didn't expect to meet so many amazing individuals; the research team, the people giving tours and involved in networking and the people in WISEST. I know that the things I learned about everyone and their own life experiences will stay with me and influence my own decisions in the future.

Being able to work under Dr. Sturdy and Allison Hahn has been an honour and I can't thank the research team, Dr. Sturdy, Allison Hahn, Lee Vilinsky, Marisa Hoeschele, Lauren Guillette, Daniel Lee, Ann-Marie Przyslupski and John Hoang, enough for their patience and time. I have learned so much from everyone and you have made a life-long impression on me. Thank you for everything. I would also like to thank my sponsor, Canada Summer Jobs. Without their support, I wouldn't be here this summer. This has been an amazing experience and I am so grateful that I was provided this opportunity.



## Amara Slaymaker

Supervisor: Dr. Mariusz Klobukowski / Chemistry

Sponsor: Merck Canada Inc.



*“However, although I don’t know exactly what I want to do, I now have a better idea of all the things I could do.”*

My six weeks at the WISEST Summer Research Program were amazing. It was a one of a kind program that allowed me to learn and experience so much that I would not have had the chance to otherwise. The field I worked in was computational chemistry. I have always loved chemistry, and the idea of doing chemistry with computers opened up a whole new world of possibilities.

I had the opportunity to work on two different projects during my time in the program. The first involved studying an anti-cancer drug, Taxol. We used the computational chemistry programs to study the interactions between Taxol and individual amino acids it can bind with, in order to determine which residues Taxol interacts with most strongly. With this information, alterations can be made to the drug in order to optimize its effectiveness.

The second project I worked on involved protein tyrosine phosphatases (PTPs), which are enzymes important in cell signaling, and peracids, which inhibit PTPs. I looked at the energy of dissociation reactions of peracids with different hydrocarbon chains, to see if this related in any way to their varying inhibition strengths.

The research group itself was a very big, very exciting part of the WISEST experience. However, WISEST is about more than just that. It give its students as many opportunities and as many varied experiences as possible. Every Friday during lunch hour, we would have Lunch ‘N’ Learn sessions that gave us valuable information to help us succeed not only in the program, but in life. I especially enjoyed when Dr. Margaret-Ann Armour, a WISEST founder, gave a presentation. Her encouragement to dream big, rather than just plan, was very inspirational. She reminded us that often, what you expect of something or someone is what you get out of it, so you should always set high expectations and try to make the most out of every moment.

Another valuable component of WISEST was the Professional Development Seminars. These often involved visiting industries involved in science and engineering, speaking to people involved in those fields, or visiting other research facilities. All of these things helped expose the various opportunities and possibilities available to us as we progress with our education and career. My favorite was when I visited a research facility on the University of Alberta campus that researched using lasers for nuclear fusion, to create safe, green energy.

One of the main reasons I decided to apply for WISEST was because I thought it could help me figure out what I want to take in university. I was wrong – I still have no idea what I want to take. However, although I don’t know exactly what I want to do, I now have a better idea of all the things I could do. And, more importantly, WISEST has taught me that it is okay not to know. At WISEST, I learned that coming to university isn’t just about knowing what you want to do, but trying things out and slowly discovering what you want to do. The path to a career does not have to be linear – there are usually turns and bumps in the road.

Without the many people that got involved in WISEST and made this opportunity possible, I would never have had the chance to learn or experience any of these things. Therefore, I would like to acknowledge Merck Canada for sponsoring me, the University of Alberta for supporting this program, and WISEST for accepting me. I am also very grateful that Mariusz Klobukowski and Cassandra Churchill decided to accept a WISEST applicant into their lab. I learnt a lot, and had lots of fun working with them. My other lab members also contributed greatly to making my summer so wonderful. I know WISEST would not have been the same, or may not have even been possible, without any of these people.

## Anam Rizvi

Supervisor: Dr. Kim Chow / Physics  
Sponsor: Syncrude Canada Ltd.

*“One very memorable tour for me was when we visited the Intuit software company.”*



No chemistry lab could ever compare to the exhilaration of not being able to contaminate your sample with even a speck of dust. It's safe to say that my lab this summer far exceeded my classroom dreams. I still feel a swell of pride and accomplishment as I say "I've been researching the intrinsic properties of Manganites," but truthfully, my experience throughout this summer cannot be put into one simple sentence (no matter how well phrased). I was told I'd be working in the Physics department so on my first day I imagined something along the lines of lots of x-rays and applying formulas. Although it did involve this, one of my greatest realizations was on how interdisciplinary this field was.

We started off in the chemistry lab calculating and combining the compounds we'd need. I was taught to use many techniques and equipment; my favorite being the diamond cutter because of its precise nature. I also enjoyed some electrical engineering moments as I built a relay box and attached wires to create the current and voltage. Then came the x-ray, which—to my surprise—I was allowed to load and operate. Finally, I settled into learning computer programs such as Origin and FullProf, in which I analysed the data from our x-rays and resistance readings and created graphs. Out of all these experiences though, the most fulfilling aspect of this placement was when I found that the sample that I had created was displaying promising results which could be relevant towards my supervisor's next research paper.

Aside from job experience, WISEST also provided us with tours and learning opportunities to broaden our knowledge of engineering companies and meet influential role models. One very memorable tour for me was when we visited the Intuit software company. Being there immediately created an image in my mind of the kind of atmosphere I'd enjoy working in, and also the values I held in

a workplace. We were also able to gain insight on the jobs and life experiences of their workers, and even able to talk to them one on one. I have to admit, after this tour I was ready to submit my resume.

Our coordinators did a wonderful job of organizing tours and networking sessions with people all across the University of Alberta. We were shown innovative new research projects like the smart condo lab. This particular lab was designed as a safe and monitored home for the elderly and disabled, so that they may be able to maintain their privacy and independence. We not only got to tour a model of this project, but we were also given hands on activities to explore and learn of its many features. The question and answer sessions were another godsend as I'd heard many rumours of university, yet I knew very little.

I came into Edmonton from a town that was probably 1/5th of its size, so being here alone was a huge transition. However, I was truly fortunate to be able to stay in residence, along with my fellow out-of-town WISEST friends. We constantly adventured all over Edmonton, enjoying all the culture and festivities that it had to offer. Often, many of us WISEST students would meet up during the weekends to go enjoy events like Capital Ex and the Heritage Festival. We left these activities thoroughly sun-burnt and mosquito-bite ridden, but also as life-long friends.

For all these wonderful experiences and the thousands more that I will carry throughout my life, I would like to thank my sponsor Syncrude Canada as well as the WISEST coordinators. I would also like to acknowledge Dr. Kim Chow and Tawhid Mahmud for providing me with hands on training and a role in their lab. This September when I return to school, I am happy to say that I'm going to have some of the best stories to tell.

## Andrea Dacko

Supervisor: Dr. Daryl McCartney / Civil & Environmental Engineering  
Sponsor: Alberta Human Services (STEP)



*“WISEST also created a network of mentors and role models that have built a backbone of strength and inspiration for me.”*

*“Practise makes awesome” –Pulat Isobaev*

These three words will forever bring me back to this unforgettable summer. Before my WISEST experience, I was the one dodging questions that dealt with my future solemnly because, I myself had no idea what I wanted to do. I had put thought into the matter, but really, there was no textbook out there that could provide me with hands on experience like the WISEST program did. That being said, I learned that it is not about the destination, but about the trip itself. The ‘practise’ component of “Practise makes awesome” was really what changed my summer. WISEST has not only allowed me to explore my current interests, but also opened my eyes to what seems like an infinite number of different doors I never deemed imaginable.

This summer I had the fortune of working with another WISEST student researcher, Ellen Buckie, in Dr. Daryl McCartney’s lab in the Department of Civil and Environmental Engineering. Our time in the solid wastes lab was spent with our supervisor Kristine Wichuk and two PhD students; Marclus Mwai, and Pulat Isobaev, who were both carrying out very unique research.

Marclus is currently working on landfill leachate (excretions from a landfill) chemistry. His research takes a look at how tire shreds can be a suitable alternative to gravel in dealing with leachate filtration while keeping in mind that our ground water must never be contaminated. Marclus’ research even brought us over to the Edmonton Waste Management Centre where we toured the whole facility. On site, Marclus has an apparatus that pumps leachate through 4 different columns. Each of these columns is filled with a different media to represent different tire and gravel. There are 7 different heights, each with a tap, that allow us to ultimately determine clogging first on a model, and apply that to a full-scale landfill.

Pulat’s research focuses on the smaller things in life, and by this I mean microbiology. With such an increase in compost usage in Canada, it has become important to ensure that this is a safe practise. Since compost has the potential to be harmful to humans because of the presence of human pathogens in some feedstocks, Canada has regulations in place to ensure hygienic compost practise. Our research branched from this idea as we worked to determine the behavioural changes of strains of *E.coli* interacting with *Salmonella* in different temperature conditions. This can then be used in the quantifying process during compost testing. Through numerous trials, we attained information about *E.coli* strains that will now help us understand factors additional to temperature that affect its survival in the environment.

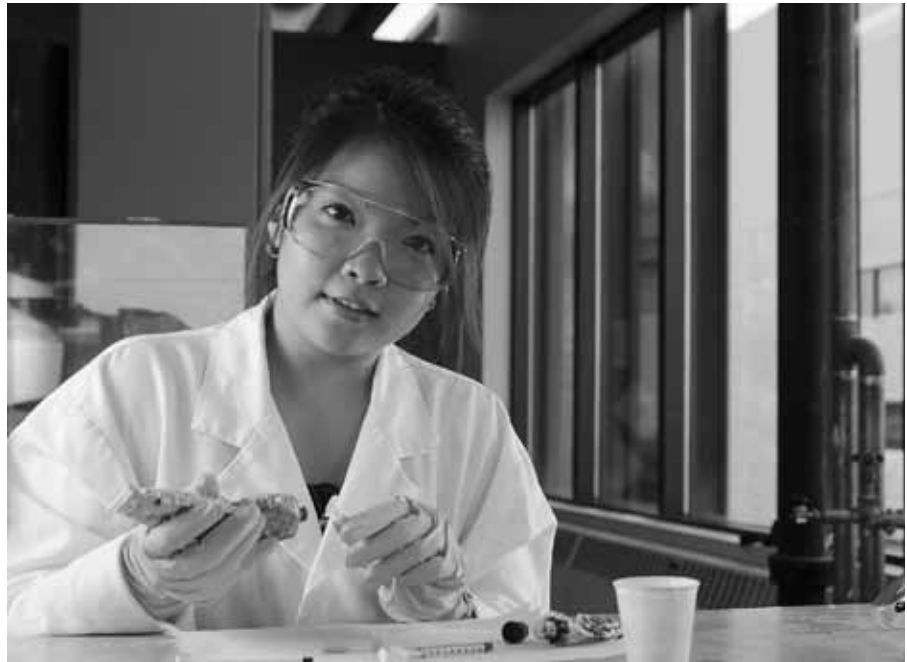
While working on these projects throughout the summer I was able to gain more than just results. Not only did my pipetting skills drastically improve, but I also learned a new way of thinking. Through numerous Lunch’n’Learns and organized tours both on campus and around the city, I was really starting to get a sense of the science and engineering world and how I wanted to fit in it. Be it touring Maxxam Analytics (analytical services company), or learning all about the art of networking, I found myself constantly finding new things not only about the industry, but about myself too. WISEST also created a network of mentors and role models that have built a backbone of strength and inspiration for me. It is safe to say WISEST exceeded every expectation imaginable.

I would like to thank my sponsor AB Human Services (STEP), the WISEST program, and my whole research team, because without them, I would have never had the chance to experience such a life changing summer.

# Angelica Almeria

Supervisor: Dr. Jason Carey / Mechanical Engineering  
Sponsor: Alberta Human Services (STEP)

*"I would like to thank my direct supervisor, Jamieson Dafoe, for sharing his knowledge about the project and for his patience with me throughout the summer."*



Ivan Panin once said, "Of the future, man knows least; yet, about this, he worries most." This quotation flawlessly describes my condition prior to the WISEST Summer Research Program. My anxiety about the future is the reason why I applied for WISEST, hoping that it would help me narrow down my choices for the future by helping me see which areas I excel at and enjoy. However as the summer passed by, I realized that this program would do anything – and everything – but that.

This summer, I was placed in the Biomedical Lab of Dr. Jason Carey, and under the direct supervision of Mr. Jamieson Dafoe in the Department of Mechanical Engineering. The project's goal is to eventually synthesize a substance that will mock the periodontal ligament (PDL) around teeth, and find a way to incorporate it into the Orthodontic Simulator (OSIM). The PDL is a soft connective tissue that connects the tooth root to the alveolar bone surrounding it, and is a factor of tooth movement because of its viscoelastic properties. When pressure is applied on the tooth, the PDL experiences stress and pulls on the alveolar bone. This eventually leads to bone deposition on the side that experiences tension and bone resorption on the side that experiences compression. The OSIM serves to quantify the forces applied to teeth during orthodontic treatment. Having the PDL modeled on the OSIM will provide an accurate representation of orthodontic treatments. Learning this within three days meant a very steep learning curve, but definitely enjoyable!

Jamieson worked on testing single root tooth and socket models with a silicone material mocking the PDL. These models were used for load testing to see if the silicone would exhibit the same properties as human PDL through force measurements. My project was very similar, except I worked with a double rooted tooth. The models were generated using a 3D computer program called

SolidWorks™, and were printed out in 3D using a prototyping machine. We had a 3D model of the double rooted tooth, so the challenge was to model its socket. I was excited to do this, but there was one problem: I didn't know how to. He mentioned that there was a course dedicated entirely for SolidWorks™, and there I was learning how to use it within a week. It was an extremely fun, yet incredibly challenging thing to do.

The WISEST summer experience was not all work; we also had Professional Development and Lunch 'n' Learn Sessions every Mondays and Fridays, respectively. These are very influential seminars as they helped us develop valuable skills and knowledge. An example of such an event was the University of Alberta Question and Answer Lunch 'n' Learn Session. We were able to talk to current university students about university life, admissions and much more. Another event that I truly valued was exploring different areas of research here at the U of A. Seeing them has made me more intrigued, and made me want to be involved in the future. An example of one that really inspired me is the tour of the SmartCondo. We were able to see research from computing sciences, pharmacy, engineering and more come together to create a state-of-the-art condo to provide medical assistance.

I would like to take this time to thank the people who made this experience simply extraordinary. I extend my gratitude to Dr. Jason Carey for allowing me to be a part of his remarkable research team. I would like to thank my direct supervisor, Jamieson Dafoe, for sharing his knowledge about the project and for his patience with me throughout the summer. I also extend my thanks to my sponsors, Alberta Human Services (STEP), and WISEST for making this program possible. My experience here really cannot be summed up in these 650 words, but I know one that describes it perfectly: unforgettable.



# Anwar Tuhl

Supervisor: Dr. David Stuart / Biochemistry  
Sponsor: Weyerhaeuser



*“Meeting inspiring role models, making true friends, learning something new every day and the residence life are experiences I wouldn’t trade for anything.”*

It’s already August 2012. It’s weird how time flies. I remember the day that I applied to WISEST, the day I got accepted, the first day in the residence, the orientation, the day I met my Principle Investigator and the first day I wore my lab coat. Then there is the first tour, the first lunch ‘in’, my first media interview, newspaper article, PCR reaction, agarose gel and the day I started liking biochemistry. Every single day in this program is special and will never be forgotten. This experience feels like a magical dream that I don’t want to wake up from. I have forgotten that it’s a job because it doesn’t feel like one. I honestly can say that this summer is the best summer I have had, I defiantly learned way beyond what I expected and made many delightful friends from the residence, WISEST and HYRS programs, which I hope to keep for ever. WISEST opened my eyes to numerous paths around me that I didn’t think existed. Just being in the University of Alberta while still in high school is something I never thought it will happen. Meeting inspiring role models, making true friends, learning something new every day and the residence life are experiences I wouldn’t trade for anything. I had the pleasure to represent Grande Prairie and the Composite High School as I am the only student from there. I am very grateful to be a part of the WISEST program that aims to show how young women and men can be very successful in less-traditional fields as they are important part of our future.

I work in the Department of Biochemistry in the medical science building and I am the only WISEST student in this department. I had the pleasure to work with Dr. David Stuart my PI that has been a great role model and taught me numerous things in the lab. Also the graduate students, Diana Pham and XiaoDong Liu, have taught me countless things. Last but not least, there is Winston Gamache, a student from HYRS program that I’m glad that I work with as we learn and help each other in every step of the way. My project is

engineering yeast cells to produce advanced bio fuels and “green” replacement for petrochemicals from waste material and so far it’s been working great. In one of the lunch ‘n’ sessions I learned that you should dream big and it doesn’t matter how many challenges and stress you face you should keep on going, and until this point I didn’t exactly draw my path for the future, however I would like to pursue my dream of being a surgeon and going to medical school, but on the other hand I hope that research takes a part in my career path as well.

I want to use this opportunity to thank everyone that helped me get to this position. Including Denise Hemmings, the WISEST Chair, and Grace Ennis, WISEST Coordinator, they are both huge inspirations for all the WISEST students. I would especially like to thank my phenomenal student coordinators that made this summer the way it is, Meagan McLavish and Kaitlyn Wall. Without their hard work and support I would’ve never knew what to do. And of course I wouldn’t be here without the support of my wonderful teachers Taryna Calvert and Valerie Martel and my supportive family back in Grande Prairie. Also my second family from residence, Emily, my residence coordinator, Kyler, Brad, Michelle, Maddie, Leah, Anam, Rachael, Hanna, Danvi, Scarlett, Payton, Kristen, HYRS residence coordinator, Mike and my roommate Maithili. I definitely can’t forget that without Weyerhaeuser my sponsor I wouldn’t be here, so a very big thank you goes to them. Last but not least my amazing PI, Dr. Stuart that allowed me to participate in his project. There is nothing impossible; all you have to do is do YOUR best!

## Arsalan Ahmed

Supervisor: Dr. Karen Goodman / Medicine  
Sponsor: Service Canada (Canada Summer Jobs)

*"Working in the field of public health, a generally female dominated field in science, I never felt displaced to be working in a less- conventional atmosphere."*



This summer I worked in Dr. Karen Goodman's lab and collaborated with the CANHelp working group. The research team focused on public health concerns in Northern Aboriginal communities in Canada, and analyzed data through the science of epidemiology. A community-initiated framework, the research team was requested for by residents of Aklavik, Northwest Territories due to an unusually high number of stomach cancer cases in the community. The team works clinically with residents in the northern community, collects surveys, then analyzed quantitative data and clinical samples in Edmonton labs. The science behind the study was because researchers believed the high stomach cancer rate was due to a high H. pylori infection rate within the community. Studying Aklavik, a northern, isolated community on the Mackenzie Delta, was particularly interesting because, most commonly, H. pylori affects those in warm, crowded, equatorial regions of the world. My duty as a student researcher was to research about H. pylori, help compile an online database for collected data, and complete a media analysis.

The H. pylori infection is still a puzzle to us. Its source and method of transmission is still unknown. Dr. Bailey, University of Alberta, states that "it's always been where humans have been." Only found within the human stomach, this bacteria is most commonly known to cause peptic ulcers and stomach cancer. H. pylori is usually contracted through birth and difficult to remove naturally; science suggests that about 50% of the world's population is infected with the bacteria, making it the world's most widespread infection. Luckily, this bacteria is not harmful; serious symptoms may show only after being infected for many years where it has thrived. The bacteria can be detected through the use of an *13C Urea Breath test*- if a person is infected with the bacteria they will break down the urea solution and produce excess carbon dioxide in their breath. A more invasive procedure used within the research project was an endos-

copy, where an endoscope would be inserted through the nose and retrieve a biopsy from the patient.

This summer I entered data into an online database collecting information from H. pylori breath tests to individual and household questionnaires. Data collection is important for a research team in that it helps researchers analyze real results and determine how to help members of a community and save lives- in this research project, biopsies from Aklavik residents were sent to labs in Edmonton where the bacteria was grown; each individual case that tested positive was given a customized treatment to get rid of the bacteria, and thus, prevent stomach cancer. Science suggests that the examination of mass media messaging and framing can contribute to the assessment of public perceptions and behaviours. I completed a media analysis to observe community reaction to the research and help ensure that the research team was meeting the needs and concerns of the community. Because this research is community-initiated, the community's input is crucial to the success of the research- the media was an effective tool to collaborate with the community.

Working in the field of public health, a generally female dominated field in science, I never felt displaced to be working in a less- conventional atmosphere. Public health is an exciting field that promotes a broader sense of thinking and challenges an individual to explore a new medium for clinical and research practice, focusing on community concerns and community development as compared to most clinical practice focusing on the individual. As a researcher in public health, you make a difference for an entire community.

Public health is not simply about the data collection, it's about communication and development for all peoples in a community. Public health is more than just research, it's an adventure, where problem solving and perseverance will bring success.

## Bradley Thom

Supervisor: Dr. Lisa Bourque-Bearskin / Nursing  
Sponsor: Faculty of Nursing



*“Even though WISEST takes up a portion of your summer you gain so much from it, and to top it off, you also get paid.”*

A little bit of everything.

Have you ever heard the quote “time goes by faster when you’re having fun”? Well that is what it feels like right now; it feels like it was just last week we all first met each other at the orientation playing weird icebreakers.

Even though WISEST takes up a portion of your summer you gain so much from it, and to top it off, you also get paid. You gain experience from every aspect of the program not just the faculty where you are placed. You get to meet a lot of amazing people, take part in extraordinary tours, professional development seminars, lunch-and-learns, and you can even say “I worked at a university”. My summer here at WISEST is a summer that was well spent, and one that I will never forget.

I have had the opportunity to work at the Faculty of Nursing. While I was working here I travelled to three small communities, participated in a university level class, met students from other countries, and saw a mock emergency room, which I got to use later on. In each of the small communities we gave presentations about the university, the faculty, what nurses do and played games with them. The class that I participated in was about extracting blood from your arteries and being demonstrated in how to do it.

Now I know how a research team works out all the kinks in whatever they do. I was granted the opportunity to make two diagrams for the grant on “Promoting Equitable Access through a Popular Theatre Approach”. This is basically about helping some Aboriginal people cope with the discrimination resulting in poor care in the emergency room.

Other than working at the faculty, WISEST planned some pretty awesome tours and seminars. The “Exploring U of A Research” tours

were the best of all the tours, because you have so much fun and you get awesome tours of the places at the U of A that you wanted to see. Like the River Engineering Tour in the Department of Civil and Environmental Engineering where we got to measure the water current speed, and the tour of Dr. Carlos Lange’s lab in the Mechanical Engineering Department where he talked about the Mars rovers.

I had the opportunity to stay in the residence with amazing people. There was never a dull moment. You can walk through the residence and always see a smiling face because of all the great times we had together. If only instead of, “had” we could be, “having”. Our friends at the residence are friends for life, because there is no way you’re going to live with 15 other students and forget about them. The residence group was more than a group; we were a family. In fact we were woven together better than a straw hat in the summer time.

My personal favourite part of WISEST would be something you wouldn’t guess for a science lover like myself. But I think the best part was, writing my report, because it makes me think about everything you did and all the people you met over the summer. It makes me feel sad to leave because I still want to learn and experience much more. If it wasn’t for WISEST and the Faculty of Nursing for sponsoring my position, I probably wouldn’t have really chose the U of A for my post-secondary school of choice. Now I am considering coming to the U of A for school.

## Danvy Tran

Supervisor: Dr. Suzanne Kresta / Chemical and Materials Engineering

Sponsor: Faculty of Engineering

*"The people I met, both in my lab and in the WISEST program, were witty, admirable and helped me develop my character."*



I took over 5000 photos while in WISEST. Not just of the University of Alberta campus, although it was certainly breathtakingly beautiful. Instead, I took micrographs of water droplets in diluted bitumen samples. Using an Axioscope light transmission microscope, I imaged the bitumen at different times during the process of bitumen clarification. After 15 intense days of taking the micrographs, the harder part came: analyzing the images. The main purpose of my project was to develop a method to analyze the images. I put Photoshop and MATLAB to use in order to find the size and frequency of the water droplets. I also manually went through the micrographs to take qualitative observations of the behavior of the water droplets, looking at their flocculation and dispersion. There was another campaign going on in my lab that investigated the water content by mass in the bitumen at the same time intervals and the collaboration between our projects was simply remarkable.

A major issue in Alberta today is the amount of tailings produced from oil extraction and refining. Before WISEST I was unaware of the diverse and sheer amount of research dedicated to reducing tailing ponds. Improving the treatment of bitumen is one way to reduce tailings and to do that, there needs to be cheap and effective ways to examine the dynamics of the water droplets in bitumen. Reduction of water in the bitumen is also important to reduce corrosion in the transport network. In a time of nanotechnology and quantification, sometimes we forget to use our own senses as a tool for analysis. However, by using micrographs we can actually see the distribution and size of the water droplets.

Sometimes it's not about the destination, but the journey that gets you there. That's what I learned in my lab. It's refreshing to have almost no idea of what the end of the project will bring. Having a hypothesis to what the results might look like, but then having to really stretch your mind to figure out why the results might come

out differently. The little tips and skills that I picked up while in WISEST were extremely helpful and made this experience all the more beneficial. From learning how to network effectively to simply learning how to use Microsoft Excel more efficiently, there's a lot I can take back to high school and use in university.

There is more than knowledge that I can take back with me, there are lifelong friends too. Going on off-campus tours not only gave us the chance to explore different industries, but to talk with some of the WISEST students. On the long bus rides we exchanged stories, shared laughs and watched friendships blossom. Personally, my favourite tour was Smart Condo. It was amazing to see how the collaboration between different departments in the University of Alberta could create such a unique apartment that could monitor the health and habits of the resident while, at the same time, give them the privacy of their own home.

When I first applied to WISEST I had hoped for hands-on experience and to meet likeminded people like myself. What I got exceeded my every expectation. The people I met, both in my lab and in the WISEST program, were witty, admirable and helped me develop my character. I was able to learn more about the University of Alberta and university life and got a glimpse into the realm of research and industry as well.

This research experience was simply inspirational and unforgettable. I would like to acknowledge and thank the graduate student who took his time to explain the project to me and entrusted me to take some good micrographs, Shaun Leo; my Principle Investigator, Dr. Suzanne Kresta; Jengyi Chong; all the WISEST staff members; and finally my sponsor, The Faculty of Engineering at the University of Alberta. Without you all, I would not have been able to have the summer of a lifetime.



## Ellen Buckie

Supervisor: Dr. Daryl McCartney / Civil & Environmental Engineering  
Sponsor: Alberta Human Services (STEP)



*“One of the things I looked forward to each week were the tours of other labs, whether on campus or somewhere in the city.”*

Coming into the WISEST Program, I had no idea what to expect. To say I was pleasantly surprised would be an understatement. This summer, I had the opportunity to spend six weeks in the Solid Waste Lab in the Department of Civil and Environmental Engineering. Although at first intimidating, I quickly learned that the goal of the Solid Waste Lab is to improve how Edmonton disposes of its waste; to make it greener, safer, and more efficient. Along with fellow WISEST student, Andrea Dacko, I was welcomed into the lab by supervisor Kristine Wichuk, PhD students Pulat Isobaev and Marclus Mwai, and Professor Daryl McCartney.

The first project deals with deactivation of pathogens in compost. At the Edmonton Waste Management Centre, compost comes not only from household organics, but also from the Gold Bar Waste Water Treatment Plant. This means there can be dangerous bacteria in the compost; therefore Canadian time-temperature regulations ensure the compost is safe. The goal of Pulat Isobaev’s project is to see whether these regulations are working. This meant a lot of microbiology. We plated lab species of *E. coli* and *Salmonella* to see how they reacted in different environments. This data will help in understanding the numerous other factors that influence pathogen growth in compost.

The other project is focused on leachate, the liquid that comes out of a landfill. Currently, leachate is filtered through gravel before entering a drainage system. The goal of Marclus Mwai’s project is to determine whether or not gravel filters in a landfill can be replaced with Tire-Derived Aggregates (TDA), which are similar to tire shreds. He is currently in the second phase of his project, where he has built a large scale model, featuring four columns that each house different media which act as filters. We tested the clogging behavior of the different types of TDA, and compared them to gravel that

is currently found in landfills. We did a lot of leachate testing to determine the qualities of leachate samples in different locations. Analyzing this data indicated if and where clogging problems were occurring. With Marclus, we visited the Edmonton Waste Management Centre twice, to collect samples and data on site.

One of the things I looked forward to each week were the tours of other labs, whether on campus or somewhere in the city. The Water Resources Engineering Lab was especially memorable, as the whole group had the opportunity to play in the sand of the miniature simulated river. Also, the hands on demonstrations in the Laser and Plasma’s lab were exciting. Despite having known Dr. Armor almost my whole life, her presentation to us on mentors was none the less inspiring and motivating.

When I applied to the WISEST Program, I knew I was interested in engineering. However, I wanted to try it first hand before making a decision about whether or not it was right for me. I not only got a feel for environmental engineering, but also for mechanical, structural, and biomedical engineering, from the numerous tours we took of other WISEST student’s labs. I have learned that engineering is the art of using science and mathematics to solve real world problems. Everyday we learned something new and had opportunities to try new things; we were even interviewed by CBC. Also, I have had the chance to meet inspiring mentors, and amazing friends. There are many people who have made this summer such a memorable one; thanks to my sponsor, Alberta Human Services (STEP), the WISEST Program, and the Solid Waste Lab for their generosity, patience, and encouragement. The WISEST Program is much more than just a summer job, it has been an opportunity to learn about science, engineering, and myself.

## Emily Barlow-Bolch

Supervisor: Dr. Colleen St. Clair / Biological Sciences

Sponsor: Edmonton Chapter Beta Sigma Phi

*"The work we did in the lab turned out to be interesting, sometimes challenging and incredibly diverse."*



My feelings were jumbled at the beginning of the WISEST program. The blend of excitement and nervousness, coupled with my worries about the program, (Would I get along with Rachael Nay, my fellow WISEST student in the lab? Would our work be interesting and challenging?) resulted in the worst case of "butterflies" that I have ever had. These quickly fluttered away however as my worries were swiftly proven to be completely unfounded.

Orientation was excellent and made me feel incredibly welcome. It also gave me the opportunity to meet with and start to get to know the other WISEST students, with whom I immediately felt a sense of kinship. We all had the same driving love for and interest in science and I could have contentedly spent the day getting to know everyone, however we were soon whisked off in different directions to meet our supervisors and go to our labs. Rachael and I were incredibly fortunate to get both a wonderful lab and caring, kind supervisors. We were in the lab of Colleen St. Clair, being supervised by Alicia Capello. I am incredibly thankful to both of them for making me feel so welcome and for providing this wonderful experience.

The work we did in the lab turned out to be interesting, sometimes challenging and incredibly diverse. We had the opportunity to be involved with three different projects. The Urban Coyote Project, which focuses on the study of coyotes in an urban environment and residents responses to the coyotes. Secondly, the Research on Avian Protection Project (RAPP), which looks at ways to increase the protection of birds in the oil sands region of Alberta. Finally, the Elk Behavior Project, which researches elk personality and behavior.

Our duties varied wildly from day to day, keeping us busy and entertained. We learned several valuable skills, such as literature searches and working with excel. One of the perks in our lab was

that it involved a significant amount of field work. We learned how to set up hair snags and motion sensing cameras, went kayaking, tested a radar system, found and recorded data at coyote road crossings, and all around had a fantastic time in and out of the lab. A particularly memorable morning was spent in a "fish derby" capturing baby fish in pipettes for a part of a research project. The record holding score (held by myself!) was 7 fish captured in 15 seconds. There were so many wonderful experiences with our lab that I could not possibly hope to mention them all.

WISEST also organized numerous lunch and learns and professional development seminars for all of the WISEST students. Among my favourites was the smart condo tour, which provided an insightful look at different technologies and research, the Gilead tour, which both provided a glimpse into the world of pharmacy and chemistry as well as showcasing several interesting career options that I had previously been unaware of. All of the lunch and learns were informative and interesting, and most importantly gave me an opportunity to get to know everyone in the program.

The entire 6 weeks were a wonderful blur of new friends, experiences and learning. I had hoped that it might help me to narrow down my future career options, however the opposite proved true. It has made me aware of countless different careers that I had previously never known existed, as well as solidified my passion for the science field. I cannot wait to finish with high school so that I can come back to the University of Alberta and discover even more! I would like to thank Beta Sigma Phi for sponsoring me in this program. Without their generosity none of this would have been possible. Thanks also to Dr. Colleen St. Clair and her entire research lab; you all gave me the summer of a lifetime. Finally, thank-you to WISEST, this summer will be something I never forget.

## Gabriella Peter

Supervisor: Dr. Samer Adeeb / Civil & Environmental Engineering  
Sponsor: Service Canada (Canada Summer Jobs)



*"I personally found the networking fair to be greatly beneficial, as it was interesting to hear from women working in science and engineering and learn about their views and opinions."*

To be able to say that I spent my summer preceding grade twelve working in a university lab doing groundbreaking research is quite a privilege. The WISEST Summer Research Program is an excellent opportunity for young women, as well as men, to explore career options in less-traditional fields. My experiences have greatly expanded my views of the diversity of options that are available to me. I have gained a greater understanding of my own interests within science and engineering, and I have been able to experience the trailblazing research that is happening at the University of Alberta.

I was placed in the Department of Civil and Environmental Engineering for the six-week summer program, in the lab of Dr. Samer Adeeb and Dr. Marwan El-Rich. I worked with a few graduate students within the lab on a number of projects related to biomechanics. I was able to do research on sit-to-stand motion in relation to leg brace improvements, the analysis and measurement of scoliosis development, and improvements to ankle joint implants; through these projects I learned how to analyze data, create 3D models on computer software, and I was exposed to the entire researching process within a university lab.

My main project was focused on looking at the talus bone within the ankle joint, and attempting to standardize the sizing of implants for this bone. There are many ailments associated with this bone and joint, so standardized implant sizes, rather than custom designs, would be greatly beneficial. I used software to analyze the shape and size of different subjects' talus bones, and compared the volumes and 3D deviation to those of 5 implant sizes, and found that the average deviation was quite minimal. This technique was found to be quite promising, and future work will include applying this technique to a greater number of subjects, and developing numerical models to do further testing.

In addition to working in a university lab, during the WISEST Summer Research Program I also had the opportunity to participate in tours of facilities related to my areas of scientific interest, go to lunch and learn sessions, and attend sessions that ranged from a university Q&A to a networking fair. I personally found the networking fair to be greatly beneficial, as it was interesting to hear from women working in science and engineering and learn about their views and opinions. It was extremely reassuring to learn that they had the same fears and worries when they were finishing high school as we do now. Myself and the other WISEST students received wise advice on choosing university courses, dealing with adversity, and pursuing goals.

When I sent in my application for the summer research program, I had very little idea of what to expect to gain from the summer. I came into the program with an open mind, and the opportunities for learning have far surpassed my expectations. I will take away more from this experience than I ever imagined.

My experience with the WISEST Summer Research Program would not have been the same without support from many people. Thank you so much to Dr. Samer Adeeb and Dr. Marwan El-Rich for allowing me to come into their lab and participate in the many fascinating research projects there. Thank you to my direct supervisor, Jonathon Schofield, for answering many questions and arranging tours and projects, and thank you to the rest of the students in the lab who shared their research, allowed me to work on their projects, and answered any questions I had: Amin Komeili, Kamrul Islam, Behzad Vafaeian, Tanvir Mustafy, Muntaseer Kainat, and Hongru Zhou. Thank you to Canada Summer Jobs for their generous sponsorship. Finally, thank you so much to WISEST for giving me this amazing opportunity; the amount of knowledge and experience I have gained over the last six weeks is completely invaluable.

## Grace Bellerose

Supervisor: Dr. Jason Acker / Laboratory Medicine and Pathology  
Sponsors: Alberta Innovates: Health Solutions

*"I wore a smile to work every day – along with gloves, goggles, and a lab coat."*



It is difficult to believe that it has already been six weeks since I first began my work in the WISEST summer program. Although, the word "work" really does not seem to do the experience justice at all. To me, this has been entirely so much more than a job! I cannot emphasize enough how absolutely thrilled I was to be accepted.

Unlike my would-be unemployed summer days of monotony and sleep, as they otherwise would have turned out, this summer has been different. I am always learning something new, something exciting, and something awesome! I am still unbelievably overjoyed that I was able to work under Dr. Jason Acker at Canadian Blood Services. It has long been a dream of mine to work in a lab such as this. With the supervision and constant support of both Mariia Zhurova and Jessica Asgarpour, I always felt pushed to do my very best work. They believed that I could handle progressively greater responsibility, and helped me grow to meet the challenge. My confidence grew, and it wasn't long before I felt like a real part of my research team. The specific project I was involved with, was analyzing the effect of treating fresh red blood cells (RBCs) with 7.5mM of a cholesterol-extracting chemical called Methyl  $\beta$ -cyclodextrin (M $\beta$ CD). The reason we were studying the impact of removed cholesterol on the RBC membrane is to relate it to the effect that statins (blood cholesterol drugs) have on RBC properties. These drugs, on which so many people rely, not only remove cholesterol from blood vessels, but also from RBC membranes.

During my research I had the most incredible opportunity to learn many new skills, and was even able to operate many of the (at first) intimidating machines. I loved my job. The fascinating lab work and professional atmosphere was entirely different from that of my high school life, and I found it really enjoyable. The people I worked with, and not only my direct supervisors, were always friendly and cheer-

ful, and were never too busy to answer a quick question. I wore a smile to work every day – along with gloves, goggles, and a lab coat.

However, putting my research aside, the WISEST program itself had many more excellent opportunities. Every Monday afternoon we were able to participate in Professional Development Seminars, where we were taken on interesting and informative tours both on and off-campus. There, we were exposed to many panels of research and learned more about university life. On Fridays, we also had Lunch n' Learn sessions where they encouraged us to network, taught us how to organize our scientific posters, and gave us tips on how to gain the most from each career path we may choose to take. Dr. Margaret-Anne Armour was especially helpful in this aspect - listening to her passionate advice is always such a pleasure.

My time working through WISEST at Canadian Blood Services has been one of the best experiences and more than anything I expected it to be. I could not have prepared myself for all the fun I would have, knowledge I would gain, or friends I would make. Applying for this program was definitely the right decision, and I am so thankful to everyone who has helped me along the way. I would like to thank my sponsor Alberta Innovates – Health Solutions for their sponsorship – without it I would have likely never had the chance for such an incredible experience. I am especially grateful to Dr. Acker for giving me the unbelievable opportunity to work in his lab, and also to Mariia Zhurova and Jessica Asgarpour for their familiarity, guidance, and encouragement. My work here may have ended, but I know that what I have learned here will follow me wherever I go.



## Hanna Jevne

Supervisor: Dr. David Pilgrim / Biological Sciences  
Sponsor: Service Canada (Canada Summer Jobs)



*“The most valuable part of the Summer Research Program for me has been the knowledge that university is about exploring your interests.”*

When I first applied for the WISEST Summer Research Program, I thought that six weeks was going to be a long time. Regardless, I knew it was too good an opportunity to pass up. Not too long ago, I got the call that I had been accepted and I was thrown into the wild world of scientific research. My project was about characterizing muscle defect mutations in zebrafish. The purpose was to identify the location of the mutation *still heart*, which causes a still heart, in the gene *smyd1b*. At first, I had no idea what I was doing, but I was surprised at how quickly I caught on. After the first week, I had learned how to perform a Polymerase Chain Reaction (PCR) and run the results on a gel independently. From the sequencing reaction we did off the PCR product we found differences between the genetic code in the parents and the offspring which can be used to map the gene containing the mutation. Every day in the lab offered something new to learn.

However, I wasn't cooped up in a lab all summer. WISEST offered many chances to tour other labs during informative Professional Development sessions. We always had our choice of interesting industry and campus laboratory tours. My favorite was when I toured a bird song psychology lab on campus. This lab was in the same building I worked in every day, but I had no idea that so many different kinds of research were going on, right on my floor. We also had weekly Lunch 'n' Learn sessions where we learned different things every week, from making a research poster to sharing our WISEST experience. At the WISEST sessions, I met many inspiring women in science who prove that you don't need to know what you want to do right away, and learned about some very unconventional, though effective career paths. These sessions offered many opportunities to meet new people and discover new areas of science.

Another excellent aspect of this program was staying in residence at the St. John's Institute. Just a twenty minute walk from work, "The Institute," as we affectionately called it, was close to everything you could need. I got a taste of the responsibility associated with living on my own, preparing me for university. I also became fast friends with the other students and we spent many an hour together in the recreation room, watching movies, playing cards, or just hanging out.

I am coming away from the WISEST Summer Research Program with new skills and new friends. In my work, I learned valuable skills that could be transferred to any scientific setting. The WISEST sessions gave me valuable information for after high school, as well as exposing me to new experiences and giving me chances to talk with inspiring women in science. The most valuable part of the Summer Research Program for me has been the knowledge that university is about exploring your interests. I will return to school confident about what comes next, instead of dreading the unknown.

I would like to thank everyone who made this incredible experience possible for me. I would like to thank my supervisor, Kendal Prill, for patiently teaching me and answering my constant questions. I would also like to thank Dr. David Pilgrim and his whole research team for making me feel welcome in the lab. As well, I would like to thank my sponsor, Canada Summer Jobs. Thank you, also, to the WISEST Team for their hard work organizing all our activities. I would also like to thank my Resident Advisor Emily Jackson and the staff of the St. John's Institute for making my stay in residence so enjoyable. Without any of these people, this experience could not have happened. As I have learned, six weeks is too short, if anything. Time flies when you're having fun.

## Isabella Tu

Supervisor: Dr. Jillian Buriak / Chemistry  
Sponsor: Syncrude Canada Ltd.

*"The fact that everyone in the lab took a personal interest in answering my questions, teaching me and helping me perform my tasks was heart warming."*



Heading into the WISEST program, I was caught between barely contained excitement and nervous unease. WISEST offered six weeks to take a test drive of working in a lab, and living on my own. That being said, it also came with a daunting list of responsibilities and uncertainties. Would I be competent in the lab? Would I be able to learn, and enjoy myself while doing so? Would I have fun this summer, even in a strange city with no friends? Looking back, I realize that I shouldn't have worried.

On orientation day, I was met with a room full of likeminded individuals. Here were other teens who I could relate to, not just because of our mutual interest in science. The people I met through WISEST are the sort of friends I would like to keep for life. Even in my lab, there was no lack of companionship. Other researchers were more than willing to answer my questions about school, work, and life in general. Conversations ranged from the benefits of becoming an engineer, to theories on what the actual words were that Nicki Minaj was singing in her latest hit (our hypothesis: it wasn't actually English). Anyone who believes that working in a lab is dull has been sadly misled. Everyone I met through WISEST was extremely inviting, and they made this summer one of the best I have ever had.

My worries about working in the lab were quickly eased. My supervisor, Jeffrey Murphy, walked me through the steps necessary to perform work in the lab, and did his best to ensure that I was comfortable and confident in my work. The difference between Chemistry 20 and the chemistry involved in block copolymers was a huge change, but my supervisor did his best to ease me into it. The fact that everyone in the lab took a personal interest in answering my questions, teaching me and helping me perform my tasks was heart warming. Even when I made mistakes, the people in my lab were very understanding.

Starting off the summer, I had no idea what a block copolymer was, let alone how to solvent anneal one. Over the course of six weeks, I learned an enormous amount about their fabrication, and the chemistry behind it. Thanks to Mr. Murphy's revolutionary ideas, I even managed to make a contribution to the science behind making patterns on a nanoscale. Under Mr. Murphy's instruction, we managed to create a pattern of gold nanowires using a PS-b-P4VP block copolymer solution. As far as we know, no one else has been able to produce these results so far. The feeling you get when you aid in discovering something new is beyond extraordinary. I would like to thank my lab, WISEST, Syncrude Canada and everyone who has ever sponsored those in WISEST for allowing me the opportunity to experience it.

WISEST isn't just about working in the lab. WISEST also exposed me to many fields of study, and even more inspiring people. It opened my eyes to exactly how much is out there, and it gave me the motivation to dream as high as possible. I would recommend it to anyone. It's a lot of work, and not all of it is the kind that will keep you on the edge of your seat in excitement. However, the experience is one that will stay with you forever. The people you meet, the knowledge you gain, and the fun you have is worth every second of your hard work and effort.

## Jenelle Pelletier

Supervisor: Dr. Cynthia Paszkowski / Biological Sciences  
Sponsor: Syncrude Canada Ltd.



*“There are many companies and people who without their support and contributions my WISEST experience could not have happened.”*

From the moment my grade 10 science teacher mentioned the WISEST program to my class I knew that it was going to be my new dream. When I got accepted I was overjoyed. I came into the program expecting an adventure and a new way to gain knowledge about the university and the world of research out in the field. My research project was to study the travelling patterns and preferred habitat of the wood frog, (*Lithobates sylvaticus*), in constructed and natural wetlands around the Edmonton and Sherwood Park area. We chose this approach to see what the effects of human developments around the wetlands had on the Wood Frog’s habitat selection and their travelling patterns after they are done mating. At natural wetlands the frogs will usually travel from the water into the woods. Because of the loss of woods around the wetlands from human development the frogs no longer can travel those distances.

My research team and I went out to the field every day to the wetlands to use the receiver to track our frogs (they had little belts with a transmitter attached), and do habitat assessment when we found them. I learned right away to wear long pants and what stinging nettle was. I learned so much about Wood Frogs and wetlands. An example is the Wood Frogs calls sound a lot like a duck and that natural wetlands can prevent flooding a lot better than constructed ones. I had the opportunities to use the light level meter, soil moisture reader, receiver and antenna and to do habitat assessments. The project when finished will help us understand what habitat people should conserve in order to maintain the health of the wetlands for Wood Frogs. On Fridays and Mondays the WISEST committee put together industry tours and Lunch & learns (learning sessions held during lunch every Friday). My favorite tour was the river engineering lab at the North University of Alberta Campus. There was about 20 WISEST participants in the tour and we were broken up into groups of 4 where we measured the flow rate and water depth of a

river they had set up and showed how a flood can affect cities. We then were assigned a group (agriculture, municipal, environmentalist and oil sands) where we planned out the flow of water to the different facilities and where it was lost, gained and used. I found that after I left that lab I knew a lot more about how water is used by different industries and what they all do to cut back on water usage. The Lunch & Learn session that I found the most interesting was the how to network that was presented from a former WISEST Chair. She was really inspirational and told how she came to be so successful and wished us to pursue our dreams.

There are many companies and people who without their support and contributions my WISEST experience could not have happened. I would like to thank Syncrude Canada for sponsoring me so that I was able to be in this program. I would also like thank Dr. Paszkowski, Murdoch Taylor, Tyanna Rudolfson, Randy Glenn and Curtis Veiville. They made the days exciting, educational and fun. Last but not least I would like to thank my family and friends for their support, all the WISEST coordinators and any people who gave up their time to make the program a great experience. Because of this program I would love to go to the University of Alberta to take a degree in either Conservation Biology or Forest Ecology and be a researcher out in the field. To anyone who is even considering this program I would fully recommend it! It is the best program that I could ever dream of if you are wanting to explore a career in non traditional careers at the University of Alberta.

# Jennaye Bellerose

Supervisor: Dr. Jason Carey / Mechanical Engineering

Sponsor: Edmonton Chapter Beta Sigma Phi

*"I know I will continue to use what I have learned in this program as I enter my senior high school year and carry on into university."*



Having completed a summer of research, it is no surprise that I feel a budding sense of accomplishment. Ordinarily, my summer would be long and drawn out, and the monotonous and sleepy summer days would pass by unnoticed, until they slipped away completely. Once I began the WISEST Summer Research Program, I began each morning with a smile of anticipation – this was my first job, and already the work I was doing was considered significant, I was being relied upon, and I was recognized as a student researcher. These are the summer days I will remember forever.

Prior to entering the WISEST program, I had never had the chance to learn much about the field I am interested in, which is engineering. Thus I was delighted to discover that I would have the opportunity to work in Dr. Jason Carey's Biomedical and Composite Materials Lab. With my humorous and encouraging supervisor, Garrett Melenka, as well as my other friendly co-workers, notably Cheequn Leung and Jamieson Dafoe, I thoroughly enjoyed the past six weeks. My task was to improve upon the current procedure used for testing orthodontic brackets. This was necessary because the current method is susceptible to human error and inconsistencies, which affect the repeatability of the tests. To resolve this, I, with the help of my supervisor, created 3-Dimensional designs of devices that could be used to raise and lower the orthodontic brackets onto the metal dowels used for testing. Also, various methods that could be used to apply a precise amount of epoxy onto the metal dowels were investigated, and the pros and cons were evaluated. This was done to create a more precise and accurate method for testing the brackets so that in future tests, the results generated will be more repeatable.

Besides my work, the WISEST program generously provided Professional Development Seminars on Mondays and Lunch 'n' Learn

Sessions on Fridays, wherein I learned about potential careers that are considered non-traditional for my gender, how to network, and how to create a research poster. These sessions also allocated time for us to explore the university campus and become acquainted with many diverse labs. Not only were these occasions interesting and informative, they greatly contributed to my understanding of university life and the workforce. While I worked, I was met with incrementally difficult challenges as my co-workers required more from me, and I grew to fulfill their expectations. I know I will continue to use what I have learned in this program as I enter my senior high school year and carry on into university.

WISEST wasn't the only one who organized the tours, though. My research team also organized fun campus tours, where we could explore other labs, learn to navigate across campus, and be introduced to variety of cool factions, which involved Nano-fibers, lasers, and robotics.

I originally hoped to be chosen for the WISEST program in order to glean a sense of what working as a researcher would be like, but I gained so much more. Any questions I had about engineering were promptly answered, and I felt that I truly became an asset to the team. I am so grateful to WISEST for accepting me into this program, Beta Sigma Phi for sponsoring me and making all this possible, and to Dr. Jason Carey and his research team for teaching me about biomechanical engineering and preparing me as a researcher in his lab. Garrett Melenka really made every day fun and exciting, and I would like to give him, Cheequn Leung, and Jamieson Dafoe a huge thank you for mentoring me, and making this experience truly wonderful.



## Josephine Junas-Grant

Supervisor: Dr. Erin Bayne / Biological Sciences  
Sponsor: Service Canada (Canada Summer Jobs)



*"I particularly enjoyed visiting other programs throughout the university, like the observatory, which gave interesting insight into a field very different from Biology..."*

At first I was reluctant about WISEST. I'd have to give up 6 weeks of precious camping time to possibly sit in a lab for 7 hours a day. I knew it could be something more, but what I didn't realize was that those hours would come to be spent in a fascinating and vibrant environment. Another WISEST student, Katie, and I were placed in Dr. Erin Bayne's lab, where people were working on an incredible array of projects which opened my eyes to the immense number of research possibilities within Biology alone.

One of the projects we did was related to earthworms, which, I was wholly surprised to learn, are actually an invasive species in Canada. Erin Cameron, a member of the lab, started a campaign to raise awareness about the species' invasive nature aimed at encouraging anglers to refrain from dumping bait worms off the side of the dock once they were done fishing, thus preventing their further spread. A survey was done in 2009, prior to the campaign, for a baseline understanding of people's awareness. We helped complete the follow up – here's where my unexpected camping comes in! A few times, we drove out to lakes across Alberta and surveyed anglers about their bait use and awareness of the campaign. Generally, we found that, firstly, people did not know earthworms were invasive and secondly, they were not using them as bait. Collecting this data first-hand and getting into the field were both incredibly valuable experiences.

Back in the lab we focused on a project pertaining to Ferruginous Hawks (*Buteo regalis*) and their nesting throughout the Great Plains of Canada. For a number of years, many nests have been observed from mid-April to August. Cameras were also placed in a number of nests and we observed and recorded activity from this footage. With this data and the rest of the video data collected for 2011, I chose to take a closer look at fluctuations in adult activity and prey

delivery throughout the day. From around 7AM to 9AM there was a significant increase in both adult activity and prey delivery; a mean of  $5.5 \pm 3.8$  (SD) prey items were delivered in the hour of 7AM, compared to the overall hourly mean of  $2.6 \pm 2.2$  (SD) prey items, which is a statistically significant difference. I expected to see a similar peak in the afternoon, but there was only an increase in adult activity, not prey delivery. It is unclear why, but heat stress and a related drop in prey activity are likely factors. The morning peak in prey delivery is an important observation because steps could be taken to reduce disturbances to feeding habits, such as vehicle traffic, during that critical time.

Although the research projects were fascinating WISEST had even more to offer. Through events like Professional Development seminars and Lunch 'n' Learns I gained exposure to things like career opportunities and the nuances of networking. I particularly enjoyed visiting other programs throughout the university, like the observatory, which gave interesting insight into a field very different from Biology, and the Bird Psychology lab, which came at the study of living organisms from a different angle. These events also provided an environment in which all WISEST students could connect. It's not often such a diverse group can be brought together by a common interest. The result was many great conversations and a lot of fun.

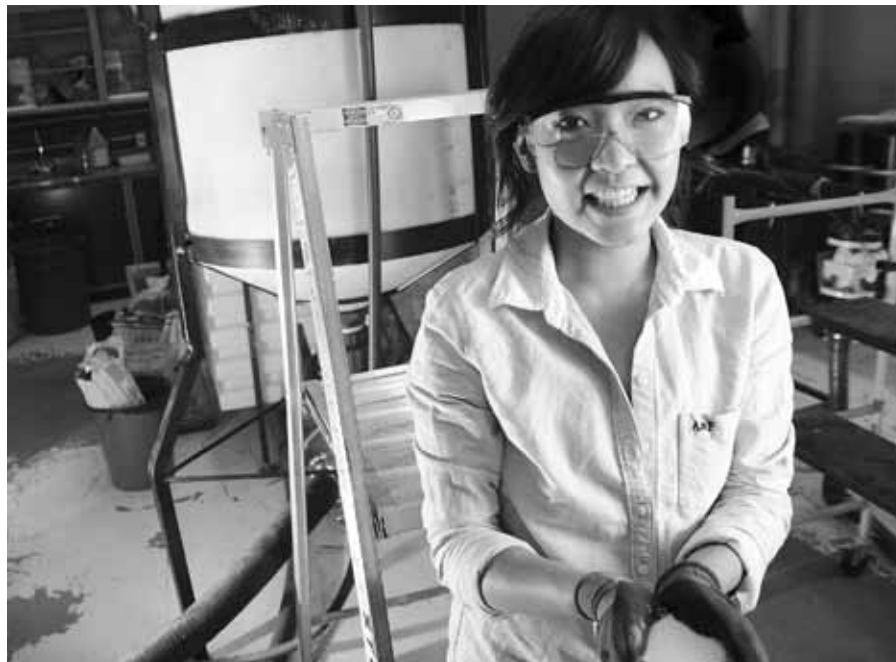
Thank you to Erin Bayne for opening his lab to me, Justine Kummer and Erin Cameron for being my supervisors, and Janet Ng and Ryan Fisher for their constant help and infectious enthusiasm. You all made me feel immediately welcome. Also, thank you to the whole WISEST team for your expert coordinating and to Ms. Linda Duncan, MP, and Canada Summer Jobs for funding this life changing program. I know I will get many opportunities to go camping, but WISEST only comes once.

## Julie Diep

Supervisor: Dr. Michael Lipsett / Mechanical Engineering

Sponsor: Edmonton Glenora Rotary Club

*"The tours exposed me to potential career options, allowed me to network with individuals in various fields, and gave me an insight into real life careers."*



As a child, I wanted to be a teacher. As a teenager, I considered being an esthetician. As a young adult, prior to this program, I was extremely unconfident about my future, not knowing what to go into, not knowing what I liked and what I didn't like. Prior to this experience, I had been under the misconception that this program would narrow my future career choices and set me on a straight path; it has instead, exposed me to a large variety of potential career options that I would not have previously considered. I had greatly underestimated the monumental impact that this program would have upon my academic aspect and individual growth.

My research project was challenging, thought-provoking and to say the least, confusing. I was placed in the Department of Mechanical Engineering in Dr. Michael Lipsett's lab with Amanda Kotchon as my supervisor. I participated in the research of slurry flow in pipelines to better understand the regularly occurring phenomenon of inner pipe wall damage. In a 12 meter model pipe loop, slurry of silica sand or glass beads at different concentrations were pumped at various speeds. Particle velocity and trajectory were measured in a clear pipe segment by shadowgraph. Shadowgraph involved using a light source to cast shadows of particles in the slurry and a high-speed camera to capture the shadows. The data was then analyzed on the program DaVis to examine the change in velocity of selected individual particles that collide into the inner pipe wall and to analyze the kinematics of the particles.

Through fourteen trials it was found that the average velocity of the particles in the pipe loop was lowest near the bottom, moderate near the top and greatest in the middle. Upon analyzing the kinematics of the particles, it was seen that the denser particles sunk to the bottom of the pipe creating a slow moving bed with a tumbling motion. In the middle of the pipe segment, particles would transition between

the top and bottom of the pipe depending upon density changes. Due to the turbulent nature of the slurry, particles in the middle and top section of the pipe segment were in disordered motion and were seen to move in rotational motions. Particle impacting onto the inner pipe wall was analyzed and showed loss of velocity upon impact, thus resulting in energy being absorbed into the pipe wall as heat, sound and erosive damage.

My research experience was a vigorous and steep learning curve that exposed me to many new academic concepts. There were moments where I was left perplexed by complicated theories and software, or where I was absolutely enthralled by new concepts or immersed in fancy workshop and laboratory equipment.

Other than research, WISEST offered professional development seminars and lunch 'n' learn sessions. I attended tours at Syncrude Research and Development Center, Gilead Sciences and the Biological Greenhouse located on campus. The tours exposed me to potential career options, allowed me to network with individuals in various fields, and gave me an insight into real life careers. The Professional Development seminars and Lunch 'n' Learn sessions taught me valuable skills that could be utilized in the future, such as the importance of networking, taking initiative and utilizing the opportunities available to maximum my own potential.

It has been an unforgettable experience and I cannot wait until I start my new journey as a university student, in hopes of being part of future scientific advances. I would like to thank my principle investigator, Dr. Michael Lipsett, and my supervisor, Amanda Kotchon for making this summer the best research experience that I have ever had, the WISEST team for organizing this program and my sponsor, Edmonton Glenora Rotary Club, for funding my summer research experience.

# Kathryn Wyring

Supervisor: Dr. Erin Bayne / Biological Sciences  
Sponsor: Suncor Energy Foundation



*“My supervisors have a wealth of knowledge that gave me a greater appreciation for the research and helped me adjust easily to the work.”*

Ever since I attended the SET Conference in 2010, it has been a dream of mine to participate in the WISEST Summer Research Program. This summer, that dream was fulfilled. I experienced an invaluable opportunity, and gained essential life skills. When I first received confirmation of my acceptance into the program, I was thrilled to have been chosen to partake in this innovation. WISEST does incredible work in encouraging women to pursue non-traditional careers. From the beginning, I have been excited by what WISEST has to offer.

On the first day we were provided with a good understanding of what our summer would constitute, but it merely touched on the enormity of what we would learn. Here we were introduced to our supervisors and our projects for the summer. I was chosen to work in the Biological Sciences Department, under the direction of Dr. Erin Bayne. My three amazing supervisors were Erin Cameron, Janet Ng and Justine Kummer. Working alongside me this summer was Josephine, a fellow WISEST student.

I worked on several projects that introduced me to the exciting world of research. One of the main assignments was studying the extent of human involvement in the spread of invasive earthworms across Alberta. To test whether an education program implemented in 2009 was effective, we surveyed anglers at several lakes across Alberta. Unfortunately, this data indicated no significant change in public awareness about earthworm invasions since 2009. I was one of many Albertans who are unaware that earthworms are an invasive species and have negative impacts, but now I am more educated about this important issue. My supervisors have a wealth of knowledge that gave me a greater appreciation for the research and helped me adjust easily to the work.

The other major project this summer was monitoring endangered

Ferruginous Hawks through video surveillance. Due to increasing land development, habitat of the Ferruginous Hawk is being destroyed. Their territory is mainly on the prairies, and only a portion of Southern Alberta and Saskatchewan contains viable land. Therefore, several researchers are monitoring the nests, partly through video cameras, in order to determine the extent of human impact on the species. The tasks I undertook this summer allowed me to see the important work researchers are doing, and made the research more applicable.

Working in the lab was not the only stimulating part of my summer. We were also presented with sessions that helped us explore career options, tour lab facilities and provided us with many skills. Not only was I able to experience first-hand what it means to be a researcher, I also met people who taught me so much. Working in biology has opened many doors for me, and I am so grateful to have this chance. Simply being on the campus everyday has allowed me to become familiar with it, which will make the transition to university much easier. Now that I have seen what the University of Alberta has to offer, I am even more excited to continue my education here.

This summer would not have been so amazing without the hard work of many people. I would like to express my sincere gratitude for the entire WISEST team, especially our student coordinators. WISEST also sponsored me, so I would like to thank them for their support. Finally, I would like to thank the research team and my supervisors this summer for all the knowledge they imparted, and all the adventures they took us on.

This research program has provided me with the tools and experience for success. The greatest lesson I learned this summer is to always follow your dreams no matter where they may take you.

## Kelly Willox

Supervisor: Dr. Robert Driver / Civil & Environmental Engineering  
Sponsor: Nexen Inc.

*"From this point on, I found myself letting go of the pursuit to gain wealth and searching for career options that truly interested me."*



Growing up, the naivety of childhood caused me to believe that by this age my life should be all figured out. Unfortunately, reality has proven that this is not the case as I am still struggling to discover my interests and goals regarding the future. Therefore, with University approaching faster than expected, I jumped at the opportunity to get a head start and be a part of Scientific University Research.

During the application process for WISEST, I was leaning towards pursuing a career in Engineering. For this reason, I was placed with the Department of Civil & Environmental Engineering studying structures in the Morrison Structures Lab. My supervisors' project is based on the design of a type of steel beam-to-column connection called an extended shear tab. The purpose of this research is to determine the amount of force that a specimen can withstand until the point of failure. Most of the program was spent preparing and waiting for delivery of the steel test specimens. Before the specimens arrived in the lab, a large portion of my time was spent doing computer work. I learned how to interpret engineering drawings; was taught to use computer programs such as AutoCAD and Excel; and gained a basic understanding of how to use the lab equipment in order to prepare for testing. Once the steel arrived, the work became a lot hands on.

Coming into the program, my heart was not set on any particular area of research; this due to the fact that I knew very little about the programs that are offered by the Faculty of Science. One of the greatest aspects of the Women in Scholarship, Engineering, Science & Technology (WISEST) experience was the fact that no matter what department you were placed in, numerous opportunities were provided to explore other options. On Mondays throughout the program, myself and all of the other WISEST students were exposed to a wide array of lab tours. More than anything, these

tours served as a test of what areas of research kept my attention and which put me to sleep. Lunch hour on Fridays were dedicated to Lunch 'N' Learns. During these sessions, I gathered with fellow students to hear from a guest speaker. Whether the lunch covered the dos and don'ts of networking or involved simply listening to the accomplished Margaret Ann Armor share her wisdom regarding her amazing life, they were always informative. Most importantly, the WISEST experience gave me options, maybe too many; but options. By no means did I walk in the first day and feel the pressure to buckle down and choose the direction of the rest of my life. This reassured me that someone my age is not expected to know exactly what they want to do but that they must be open minded and have determination to discover their passion.

When thinking of the highlight of my experience, my mind is constantly drawn to the tour I took of the Biomedical Engineering Department. During this tour, I began to view engineering as something that I could enjoy, rather than something I could do. From this point on, I found myself letting go of the pursuit to gain wealth and searching for career options that truly interested me. This got me excited for my hypothetical career path.

More than anything this experience has been an eye opener for me in regards to my intentions going into university. For giving me the opportunity to realize this, I would like to thank my supervisors Kristen Thomas and Smitha Koduru and Dr. Robert. G Driver. They were always extremely patient and were willing to introduce me to many areas of the university when in doubt about my long term interest in my placement. Furthermore, I would love to thank the WISEST student co-ordinators Megan McLavish and Kaitlyn Wall for being on call 24-7 and my sponsor Nexen Inc. for making this a reality.



## Kerri Whitlock

Supervisor: Dr. Heather Bruce / Nutrition & Food Science  
Sponsor: Faculty of Agriculture, Life & Environmental Sciences



*"I learned so much from these sessions as they prepared me for the projects within the program and gave me valuable information for my future."*

When I first heard about the WISEST Summer Research Program, I knew I wanted to be a part of it. I had always been interested in science and I believed that this was the perfect opportunity for me to explore less-traditional careers in science. I hoped to gain experience in a lab setting to determine if I wanted to be involved in research in my future. When I heard that I would be working in the Department of Agricultural, Food, and Nutritional Science on the tenderization of beef, I had no idea what to expect. It was something totally new to me, which was exciting. I got the opportunity to learn so much during the time I spent in Dr. Heather Bruce's lab.

I took part in the analysis of beef samples and worked closely with my supervisor, Astri Slinde. Before I entered the program, Astri had injected the beef samples with four different enzymes extracted from kiwi, kachri, papaya, and ginger plants. Their job was to break down the connective tissues found in beef. Collagen, a fibre found in connective tissue, is a factor that plays largely into the toughness of beef because it is wound tightly in a triple helix and resists compression. Our research involved finding which enzymes would break connective tissue down most effectively, thus making the meat most tender. To obtain our results, we put the beef through three processes. As part of the heat solubility assay, a portion of each sample was cooked to determine the amount of heat soluble collagen. The more collagen that leaked into the solution, the more tender the meat. Another portion of each sample bypassed this assay to determine if cooking the meat changed the results. The next process consisted of acid hydrolysis which broke down protein in the sample to allow us access to the amino acid hydroxyproline. Once we had access, we did a third process which determined the amount of hydroxyproline in a sample. The exact measurement was given by a spectrophotometer. Knowing that hydroxyproline makes up, on average, 14% of collagen, we were able to determine

the amount of collagen present. We then compared the amount of collagen between the samples that had not had any enzymes added to them, and the samples that did. This determined how well the enzymes broke down the connective tissue. Our results showed that the papaya enzyme improved the quality of the beef the most by making it most tender. These results occurred when the samples were cooked. We also found that there was statistically no significant difference in the amount of collagen between the control samples and the ones that were injected but not cooked.

Even though the majority of time was spent in the lab, the WISEST program also offered different approaches to learning in various settings. The WISEST students took part in Professional Development Seminars every Monday and Lunch 'n' Learns every Friday. The seminars allowed exploration of less-traditional careers on and off campus. While touring the various facilities, we had the opportunity to meet and talk with women that worked there. They were great opportunities to explore possible career options. The Lunch 'n' Learn sessions taught valuable skills such as how to network, make a research poster, and write a report. I learned so much from these sessions as they prepared me for the projects within the program and gave me valuable information for my future.

I would like to thank WISEST for having such a wonderful program that I could be involved in, my principle investigator, Dr. Bruce, for allowing me to spend the summer in her lab and my supervisor, Astri, who taught me so much over the summer. I would also like to thank my sponsors from the department of Agriculture, Life, and Environmental Sciences, without whom I would not have been able to take part in this amazing experience.

## Kristen Irwin

Supervisor: Dr. Fiona Bamforth / Laboratory Medicine and Pathology  
Sponsor: GlaxoSmithKline Foundation

*"On top of experience, I was also privileged to discuss and get advice on the experiences of university from the technologists I worked with."*



Six months ago, my plan for the summer consisted of participating in the Daring Lake Tundra science Camp and then working the rest of it away as a cashier at Shoppers Drug Mart. If research has taught me anything, it's that your plan rarely remains the same overtime. My summer had changed from typical to once in a life time with just one application. WISEST gave me the chance to work in Laboratory Medicine and Pathology; I was given the possibility to have hands on experience in a field that I was truly interested in.

I had the opportunity to work with Dr. Fiona Bamforth and Jolene Yuen-Jung in the Newborn Metabolic Screening and Biochemical Genetics Lab. Newborn children are screened for 17 metabolic disorders, one of which is Carnitine Uptake Disorder (CUD). Carnitine is a protein that brings fatty acids into the mitochondria to be transformed into energy. My project was focused on CUD: a condition where carnitine is not present in the cell. When testing patients for CUD, it is preferable to analyze urine samples; however the Biochemical Genetics Lab does not currently have a reference range for carnitine concentrations in urine, only for concentrations in blood serum and plasma. The goal of my research was to create a reference range for children aged ten and under and for adults over the age of ten. To create a reference range, many samples have to be quantified. I had 140 samples (70 samples for each age group). However, given that I could only process 17 samples per run, with an average of two runs a week, and given that many times samples had to be repeated and there are only six weeks in the program, it soon became apparent that I would be only able to do the pediatric samples. My project was changed to creating a reference range for carnitine concentrations in urine for children ten and under. Instead of 140 samples to process, I only had 70. My project became specialized to children.

Not only do WISEST students get a chance to work hands on in a lab that is untraditional for their gender, they also get many opportunities to tour other labs on and off campus. Practically every week there was a tour organized through WISEST and students were allowed to request informal tours of labs where other WISEST students work. Although I did not take advantage of touring other student's labs, two students from the residence toured my lab.

Having always been intrigued by science, the WISEST Summer Research Program was something that I could not ignore. Before I was even accepted, my expectations were set. First, gaining experience by working in an actual science lab and later using that experience to my advantage in post-secondary. Second, gaining the independence and responsibility needed for university. Not only would I be independent in my work, but I would be also living on my own in residence. Both those expectations were achieved and surpassed. On top of experience, I was also privileged to discuss and get advice on the experiences of university from the technologists I worked with.

I'd like to thank all the Newborn Metabolic Screening and Biochemical Genetics Lab technologists for helping me out this summer, especially Vanessa Wolan for training me and answering my never ending questions. I'd like to also thank Dr. Bamforth and Jolene for leading me through my project and always having time to explain it. I'd like to thank WISEST for funding my research project this summer and NSERC Promo Science for funding my stay at the St. John's Institute. The WISEST Summer Research Program is something I will recommend to future grade eleven students interested in science. Also, if possible, I highly recommend staying in residence. The others at the residence make it summer that you'll never forget, because they won't let you forget.

## Kyla Nyroos

Supervisor: Dr. Tom Etsell / Chemical and Materials Engineering

Sponsor: Service Canada (Canada Summer Jobs)



*“In reality the lab was a small, laid back team that made themselves approachable in order to answer my questions and ease me into how the research worked.”*

Before the program started I somehow had the idea that research laboratories were gigantic, pristine places with state of the art equipment and teams of technicians at every station. If I were to be put in a place like this I had a feeling that I would make mistakes and not be able to keep up, generally getting in everyone’s way. I am so glad that I was able to take part in the WISEST Summer Research Program in order to set that thinking straight.

Perhaps there are some labs out there like the one I described, however I had the pleasure of working in Dr Etsell’s Fuel Cell Laboratory. In reality the lab was a small, laid back team that made themselves approachable in order to answer my questions and ease me into how the research worked. Although I made some mistakes, such as taking a while to finish some tasks and breaking a beaker, it was all taken in stride by my supervisors and lab partner. It took until about the second day of work to relax and realise that even if I did make mistakes and get in the way sometimes, this lab had volunteered for this, I was there because they wanted me to be.

Solid oxide fuel cell development was originally planned to power cars in the future, however now it is rather seen as an alternative for powering and heating houses and companies. The solid oxide fuel cells that I was working on this summer can be run on multiple kinds of fuels, such as methane or hydrogen. The development process involved many parts, such as creating the anode, cathode, and electrolyte, and when some cell’s worked and others didn’t, it sometimes happened that even the senior researchers didn’t know exactly why.

The times when I did meet with the rest of the WISEST student researchers and coordinators were also filled with fun times expanding my social skills and career knowledge. On Mondays we had the opportunity to go on both off and on campus tours of research

facilities that opened up my understanding of not only different types of careers, but also how I can apply to jobs after university. Throughout it all, the coordinators made meetings fun and set up many events such as meetings with role models at a networking fair, and learning sessions on how to do posters and reports at lunch on Fridays.

Being in a professional laboratory really forced me to realize how close the future can be when working with dangerous chemicals. Although we learn about chemical safety, this summer showed me that by forgetting to put on my mask or gloves, I could permanently injure myself or get cancer in the future. When using the personal safety equipment it made me realize that if I make this my career then I would be putting my life on the line every day I went to work. At the same time I saw that I am okay with that, because at the everyday that I do research, what I find and develop may improve or even save someone’s life.

Having to work full time really put into perspective the amount of effort that others, such as my parents and teachers, put into my life, I would really like to thank them for taking care of me even while balancing their own jobs. I would also like to acknowledge Canada Summer Jobs for sponsoring me, Dr Etsell for allowing me to work in his lab, and Dr Hanifi for sharing his invaluable information and career advice. Lastly, but certainly not least, I would like to thank the Joshs (Cunningham and Seens) for making every day a fun and new experience even while trying to help me understand university level engineering.

## Kyler Mullins

Supervisor: Dr. Gita Sharma / Medicine  
Sponsor: Faculty of Medicine

*"I was able to produce work that directly supported the work of the AGHRG. This was very rewarding."*



When I first learned of the WISEST Summer Research Program I was very unsure of what to expect. I remember wondering why I would apply for a women's program. At the time I didn't realize how valuable WISEST was for men. This once in a lifetime opportunity will narrow down your search for a future career and help you consider careers or areas of study you may not have considered. Being exposed to less traditional careers for men was much more interesting than I thought it might be. I learned about fields of science I had not thought about like nutrition and epidemiology. I learned that research done here and now can have far reaching effects on populations at home and abroad.

I was the student researcher for the Aboriginal and Global Health Research Group (AGHRG) sponsored by the University of Alberta Faculty of Medicine and Dentistry. The AGHRG consisted of more than a dozen dedicated researchers finding ways to improve the health and lives of Aboriginal men, women, and children in all parts of the world. Their diverse research has been conducted in many countries such as South Africa, Cameroon, Ghana, Jamaica, Barbados, Trinidad, Brazil, Indonesia, Nepal, Iran, India, United States and Canada.

My summer research centered around building a visual representation of the research grant submission process that the AGHRG uses to secure funding for their research projects. The AGHRG made me feel welcome and part of the team. I was able to produce work that directly supported the work of the AGHRG. This was very rewarding. I assisted with a wide variety of tasks including grey literature searches, writing summaries and reports, searching and sorting through photos and uploading data to the Canadian Institutes of Health Research website. The AGHRG helped me so much by being patient and mentoring me in my new role.

WISEST is about exposure to new career paths and learning and

sharing new knowledge and skills. I now know how to conduct a grey literature search, create a professional research poster and write summaries concisely. My writing skills have improved immensely from my time with WISEST and the AGHRG.

WISEST allowed me to learn about campus life, campus layout and how the university system works. WISEST arranged several learning opportunities that I was able to take advantage of. Some of these included: professional development seminars (visits to a river research lab, a mechanical engineering lab and a leadership seminar); networking and community building activities (meeting with other WISEST summer researchers and learning about what they were doing and seeing their passion for science); attending the Celebration of Research where I was able to present my research poster; and off campus tours to get a sense of how and where external organizations use research. I was very fortunate to have been able to live in residence at the St. John's Institute. This experience was just as amazing as the WISEST program itself. Getting to know the other WISEST students from around the province and even the North West Territories was a really great time. I highly recommend living in residence if one is able. Living away from home for the first time was a little scary but very exciting. It prepares one to assume more adult responsibilities. I highly recommend the WISEST program to any student, male or female, who wants to broaden their understanding of career opportunities and build community connections. I hope that hearing about my experience with WISEST encourages others to take advantage of this fantastic opportunity.

A special thanks for the University of Alberta Faculty of Medicine and Dentistry's sponsorship, the guidance and mentorship provided by the WISEST team, and the knowledge and experience provided by the Aboriginal and Global Health Research Group!



## Leah Moldowan

Supervisor: Dr. James Harynuk / Chemistry

Sponsor: NSERC PromoScience



*"I made some close friends, got a feel of university life, and it changed my perspective on my future."*

My expectations of the WISEST Summer Research Program led me to believe that by the end I'd know what I want to do as a career, but that was not one of the many benefits of this program. It only opened me up to countless choices; I'm now interested in careers that I had never heard of before this summer. I did learn that it's fine to be unsure, I don't have to choose right now and be stuck with that decision forever I am allowed to change my mind and path. This experience is more than I could have ever imagined, coming from Yellowknife, opportunities like this are rare. I am very thankful of my chemistry teacher for encouraging me to do this program because this experience has done so much for me. I made some close friends, got a feel of university life, and it changed my perspective on my future. I can now say that I'm not as scared to grow up.

I was placed in Dr. Harynuk's chemistry lab with Nikolai Sinkov as my supervisor; I was told I would be doing forensic analysis of fire debris in arson casework. I had no idea what that meant or what to expect, but it had to do with fire which to someone fascinated by fire sounded pretty striking. All the information I found about it was extremely complicated and that terrified me. I thought it was going to be completely over my head, but once Nikolai explained it and what I'd be doing I was no longer scared and felt quite confident.

The main objective of the project was to develop a chemometric tool that can identify the presence of gasoline in casework arson debris. I worked on the creation of simulated debris aspect of this project. My six weeks was filled with burning household items, not just for entertainment, but to make simulated fire debris. I created almost 200 samples, which were split up into two batches. One batch was spiked with different types gasoline while the other was untouched. The samples were extracted and run through a gas chromatograph-mass spectrometer (GC-MS), which at first was a

mystery to me. The data from the GC-MS of the two batches was then compared, which was not a concept I grasped quickly, but after asking numerous questions it became clearer to me. I was surprised at how much I got to do in the lab, I expected to shadow someone for the whole six weeks, watching more than doing, but that was not the case at all. I got to do my own hands on work, which is much more desirable than just observing.

Lots of the skills I've learned weren't from the lab, but from tours and weekly lunch sessions. I learned about what university is truly like, which was very different from the image I had in my head; I was introduced to a variety of careers in science and engineering and had the pleasure of meeting people involved. All of the events we attended were beneficial and thought provoking particularly the networking fair. Afterwards I spent hours pondering everything the mentors had talked about including careers, changing paths, and how a family fits in to it all.

I would like to like to thank everyone involved in WISEST for organizing such an amazing program. I am so grateful for the generosity of my sponsor, NSERC PromoScience, and everyone involved in the Margaret-Ann Armour Endowment Fund for Rural WISEST Students, without their help none of this would have been possible for me. Another huge thanks to my resident advisor, Emily, the activities she planned made this summer even more memorable. Finally, thank you to my fabulous research team for having me, especially to Nikolai Sinkov for providing all the help and guidance I needed and to Dr. James Harynuk for inviting me into his lab.

## Maddie Hall

Supervisor: Dr. Micheal J. Serpe / Chemistry  
Sponsor: Service Canada (Canada Summer Jobs)

*"In high school I never thought that I could be working in a research lab with grad and undergrad students..."*



If asked to pick one word to describe my time at WISEST, I would probably say 'wow'. Now, that's a term normally over used, or with a great deal of sarcasm behind it – I however, use it as an enthusiastic response to my summer, as a word to describe my excitement upon entering the lab, and to describe my extraordinary success after leaving it. Wow was a word I commonly thought about; in residents thinking 'wow, I can't believe you just said that', during orientation thinking to myself 'wow, that's a lot of information right there', or just plain old 'WOW' in the lab. One word can describe my moments of being overwhelmed, extreme happiness, moments of not knowing, and moments of complete chaos. So, I guess it's easy to say my summer was an adventure that I have never had before, and one to be remembered.

During my six week work period at the University of Alberta I was placed in a chemistry lab under the supervision of Dr. Michael J. Serpe studying solvent detection using Poly (N-Isopropylacrylamide) microgel based etalons to determine the composition of gasoline. My work started off with using different chemicals and procedures to make my etalon (a photonic devise that is temperature responsive, solvent sensitive) and later normally consisted of a titration a day, in which I would monitor the color change of my etalon in different solvents, along with any small tasks that needed to be done in the lab.

In high school I never thought that I could be working in a research lab with grad and undergrad students, but it's even harder for me to believe that I could be working on a project that nobody has ever done before and that has the possibility to help people in third world countries by detecting gas quality using an etalon. Every day I went to work I felt like I was changing the world, and it was comforting to have a strong group of people behind me in the lab to

help when things got tough.

WISEST may be about encouraging less traditional jobs though it's not the only thing it offers. Weekly Professional Development Seminars and Lunch'n'Learns were organized for all 60 student to come together to talk, learn, and share experiences. Dr. Margaret-Ann Armour's speech at a Lunch'n'Learn was particularly interesting, motivating and insightful. As she told us about her journey and role models one thing that stuck out to me was when she asked us to think of where we want to be in two, five and ten years. My answer to that; I have no freaking idea. Though I learned at the networking fair that it's okay to not know what you want to be or do in life, in fact most of the people, former WISEST students and successful women in science and engineering, which I talked to didn't know what they wanted to be either. I thought coming to WISEST would help me select a career path and open more doors for the future, but between the students in my lab and the sessions organized by WISEST, I found out that there are an endless amount of doors that could be opened and lot more options for jobs out there then one would expect.

WISEST isn't all about the future though, it's about making friends, having a network behind you, learning and taking the best out of situations, something you soon learn to do when you partake in a scavenger hunt in the rain with, at the time, strangers. I've learned a lot being here. I would like to thank Canada Summer Jobs for funding my position. Between my lab, my research team, living on campus, and various activities held within and out of WISEST, I have learned to take all you can from an experience because today will never happen again and tomorrow is unpredictable.

# Madeleine Graham

Supervisor: Dr. Peter Hurd / Biological Sciences  
Sponsor: Edmonton Glenora Rotary Club



*“My experience this summer has had a tremendous impact on my life and my expectations for the future.”*

Nearing the end of high school, I have found people asking me more and more often, “What do you want to do with your life?”. This is a daunting question that I was hoping to have answered after my participation in the 2012 WISEST Summer Research Program. I knew that the program exposed young students to the diverse and numerous career paths in the field of math and sciences, and was hoping that I would have my future figured out by the time my six weeks at WISEST was over. I don’t, at all. However; one of the many things I have learned this summer is that I don’t *need* to have my life completely planned out, and I can now be comfortable with the uncertainty of my future rather than cringe when I think about it.

I had the amazing opportunity to be placed in Dr. Hurd’s lab in the Department of Psychology, where I have been examining the cerebral lateralization of cichlid fish. What scared me the most about starting the WISEST program were those exact words; “cerebral lateralization”, mainly because I had no idea what they meant and I was afraid that I would not be able to understand when their meaning was explained to me. This was not the case, as I quickly learned that it has to do with the way one hemisphere of the brain or the other is primarily used to perform simple tasks, and it was one of my jobs to determine the direction and strength of this division among the fish I was to examine. As soon as I began using these words in regular conversation, I was struck by how much I had learned in such a short time.

When I first found out about what my project would entail, I wondered how different each fish could really be, I mean they’re just fish, right? I was quickly proven wrong about this assumption, as I began noticing the personalities of certain fish, which ones were shy and which were aggressive. It was up to me to put these fish through certain tasks that were designed to examine both lateralization as

well as aggression, and this was done using a mirror octagon tank. I put krib cichlids through this task and found very few results. I then went on to put convict cichlids which had been exposed to different levels of developmental stress through the same task. I spent many hours not only putting the fish through these tasks, but also scoring the results and analyzing the data. These projects allowed me to appreciate the discipline and patience needed in research, as I experienced firsthand the frustration involved with research, as well as how rewarding it can be.

What amazed me the most about the WISEST program was how much there was to learn, not only within my lab but from the various Professional Development Seminars and Lunch ‘n’ Learn Sessions we attended. Every day I would come to work thinking of all the new things I could possibly learn that day, and by the end of the day I would leave with exceeded expectations and a wealth of knowledge in yet another field of science.

My experience this summer has had a tremendous impact on my life and my expectations for the future. It has opened my eyes to all of the opportunities and possibilities that are available to me as a woman in science. I would like to express my gratitude to my sponsor Edmonton Glenora Rotary Club, my supportive family, friends and teachers, as well as the WISEST program itself without which I would not have had such an opportunity. I would also like to thank Dr. Pete Hurd, Cheryl Seaver, Michele Moscicki, Zoe Francis, and all of the members of the Hurd lab for the help, support, and advice they readily provided me with over the summer.

## Makena Kigunda

Supervisor: Dr. Cynthia Paszkowski / Biological Sciences  
Sponsor: Service Canada (Canada Summer Jobs)

*“Every lab, amphibian habitat site, and event was amazing, but it was really the people I met through the WISEST program that made all the difference.”*



I could never forget the WISEST program because of three major reasons: the research, the special events, and the people.

First off, completing research at Canada’s fourth best research university, the University of Alberta, was a rare and exciting opportunity. However it was not just the place where I researched at that was incredible; it was also the research project I was involved in. Working under my principle investigator, Dr. Cynthia Paszkowski, was definitely enlightening as we investigated how human impacts, specifically the increase in climate temperature and noise pollution, affect wetland birds and amphibians—common indicator species of environmental degradation. From working in the field setting up recorders at various different wetlands to analyzing the data each recorder was able to record, every day was eventful. Working on this project, I have learned more about frogs and birds than I ever learned prior to coming to WISEST. One of the more difficult parts of the research was developing a trained ear to recognize different frog and bird species. This was a daily challenge but also a continual learning experience. Days where our team would go out to the field would be exciting as I was able to see the wetland sites and hold the frogs I had been listening to on the recorders. Overall, research was a mix of adventure and learning.

The learning and exploration did not stop at research though. The weekly Professional Development (PD) seminars and Lunch n’ Learn sessions presented further opportunities to learn and grow. Friday Lunch n’ Learns provided every WISEST student researcher with the opportunity to ask questions and learn about numerous topics from the University of Alberta to networking to creating an effective research poster. PD seminars, such as the ‘Networking Fair’, provided us with the opportunity to take what we had learned at the Lunch n’ Learns and apply it into real life situations. Along with

networking we were given a chance to hear about challenges and success from individuals working in nontraditional fields. In addition I was able to explore fields other than what I worked in, such as engineering and psychology. The WISEST events did not take away from the research and learning but rather enhanced both.

Although the WISEST research and events made for a memorable experience it was the people I was able to interact with that made my WISEST memories positive and special. Ranging from Dr. Paszkowski, Dr. Whiting, and my other colleagues who all patiently guided me and answered my endless questions with enthusiasm, to the role models I met during fieldwork and at WISEST events to the WISEST administration team who were always friendly and approachable—each person shaped my perspective of science from something out of a textbook into something very real and tangible. I’d like to thank Dr. Paszkowski and Dr. Whiting for your support and mentorship; deepest gratitude towards Canada Summer Jobs for your funds and generosity; and thank you to WISEST for this once-in-a-lifetime opportunity. My fellow student researchers bonded into friends with similar interests in science and various interests within it. Every lab, amphibian habitat site, and event was amazing, but it was really the people I met through the WISEST program that made all the difference.

I will never forget the big smile on my face as I walked to be picked up after the first day of work. I will never forget the thrill of working with amphibians and birds. I will never forget the amazing colleagues, students, role models and scientists I have met in these past six weeks. And although in late May I almost did, I will never forget the WISEST program and everything I have gained from it.



## Mellissa Gomez

Supervisor: Dr. Larry Unsworth / Chemical & Materials Engineering

Sponsor: Nexen Inc.



*"My favorite part of the WISEST component of the summer was definitely Dr. Margaret-Ann Armour's inspirational speech."*

I was not sure what to expect from the WISEST Summer Research Program. At first I believed that my summer days would be spent behind a desk processing paperwork. Instead, I got to work in the National Institute for Nanotechnology in Dr. Unsworth's laboratory where I studied protein adsorption. I was working under the supervision of Maryam Kabiri where we were studying the effects of the presence of salt on protein adsorption. We worked with the Isothermal Titration Calorimeter (ITC), a machine that would measure the heat signal given by reacting a protein with a nanoparticle. Our experiments usually consisted of putting a nanoparticle solution into the reaction cell and reacting it with a protein. There were three types of nanoparticles that we looked at, along with two different proteins, and the reactions had to be conducted at body temperature and at room temperature. We would usually run the same test a few times just to make sure the results were repeatable. Working in a professional environment was nerve-wracking in the beginning but as I learned what was expected of me I began to loosen up. It helped that everyone in the lab were so friendly; they had created such a warm and inviting atmosphere. I was told that if I had questions and concerns of any kind, I was not to hesitate to ask for help. This boosted my confidence knowing that they would not leave me high and dry, and that they trusted me to be honest with them.

Whether it was in the lab, on the tours, during the lunch 'n' learns, or the professional development seminars, the entire summer was a blast. My favorite part of the WISEST component of the summer was definitely Dr. Margaret-Ann Armour's inspirational speech. She really stressed the importance of having a dream, or several dreams, and how it was alright if you found that your dreams changed. Other events I also really enjoyed were touring the Gilead and the Syncrude facilities. They helped me see how all the knowledge I

was gaining could be used in a job setting. It was amazing to see how many career options were out there, that there were so many jobs that I didn't even know existed prior to this summer.

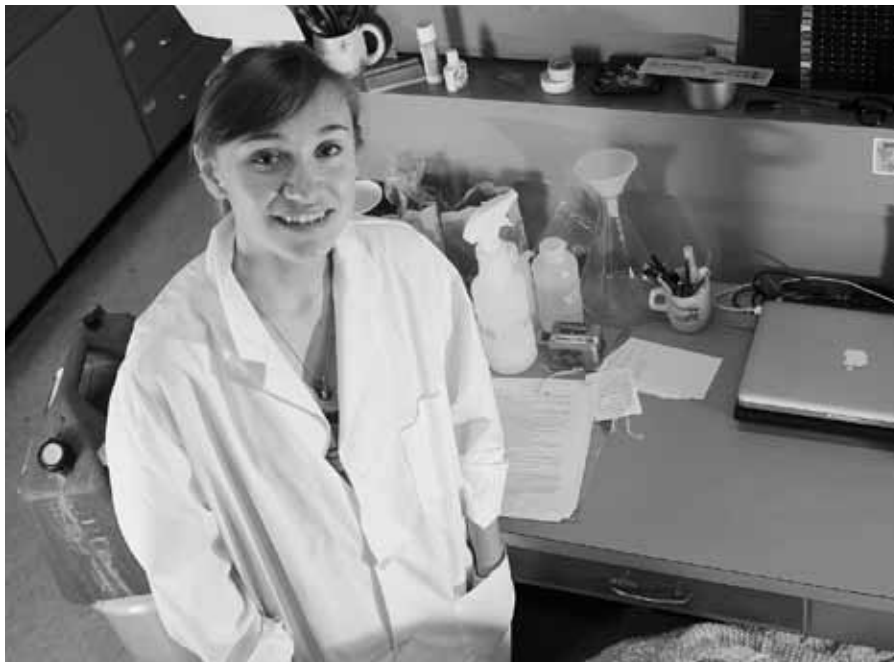
I loved how WISEST not only gave me an insight into the career I was interested in, but also provided me with the opportunity to learn about other areas of research. When I first started in the program, I thought it would help narrow down my career options. Was I ever wrong! I was exposed to so many different areas of research that all sound so incredible. It felt like everyday I would see or experience something new that would peak my interest. Not only did I gain a better awareness of all these different fields, but also I was given the knowledge to pursue them if I chose to do so. While I did learn a lot more about engineering, I also learned more about myself. I was able to find out what my preferences were; such as I enjoy a more structured job setting. Being part of the WISEST program also enabled me to work on my people skills. Because of this, I am further learning the importance of first impressions. WISEST also provided professional advice on presenting properly.

Though the internship lasted for only the summer, its effects on me will benefit me for much longer. I cannot thank enough all of the amazing people who made my summer so incredible and unforgettable. This has been a wonderful experience and I would recommend it to anyone who has the opportunity to participate. I am grateful for the generous donation from my sponsor, Nexen Inc., who made this experience possible.

## Meryn Severson

Supervisor: Dr. Bill Tonn / Biological Sciences  
Sponsor: Service Canada (Canada Summer Jobs)

*"I loved getting to be on campus all summer – it has made me excited for when I start university in a year or two."*



This summer, my job was to learn. After being placed in Dr. Bill Tonn's aquatic ecology lab, I knew I would have a steep learning curve as I knew next to nothing about fish. The research flew over my head too; with words like laser ablation inductively coupled mass spectrometry (LA-ICP-MS) and posterior of the neurocranium above tip of the opercle being used. I can proudly say though, that after my six week stay, I know that LA-ICP-MS is a tool used for analyzing the microchemistry of otoliths and that the posterior of the neurocranium above the tip of the opercle is a point on the back of the fish's head above the gill. Both of these terms have to do with lake trout, as the lab was studying this species in Arctic Canada in two different projects. One project was researching the life history of lake trout on the coast, looking at the bones of fish to determine migration habits. The other project was studying morphology of lake trout in Great Bear Lake and their eating habits. Lake trout are one of the most important fish in Canada and a main food source for Inuit people, as well as a main source of mercury in humans. This research is trying to find where lake trout with lower levels of mercury inhabit, which will lead to better Inuit health. I was involved in data analysis and sample weighing for these projects, as both projects are done their fieldwork. I was able to join Dr. Arthur Whiting's project for some fieldwork, which was a great experience.

I learned lots of technical skills in the lab, but this experience has also showed some insight into what academia, research and university are like. I loved getting to be on campus all summer – it has made me excited for when I start university in a year or two. Through the many conversations I was able to have with individuals in science, I have been able to think differently about science and engineering and what a career in those fields could look like. To say this summer has helped me to focus on a subject would be a lie though; rather I have been exposed to many more opportunities than I previously

knew existed.

The WISEST organized events have been great for showing a broad spectrum of research and industry, from the I.F. Morrison structural lab to the River Engineering lab to a tour of Intuit, the software developer. Dr. Margaret Ann Armour's lecture was a highlight, as she is a very well respected individual in science had many enlightening things to say. The Networking fair was also a great learning experience as I had the opportunity to speak with individuals who had faced and are still facing similar decisions as me regarding their future and careers. Conversations with the other WISEST student researchers were also great learning opportunities as they shared what they were doing in their labs and their thoughts for school.

The passion that I could see in everyone I met for what they do, whether they were researchers talking about minute details or industrial technicians at Maxxam Analytics was inspiring, and gave more me drive to find my own passion. Thank you to Dr. Bill Tonn, Dr. Heidi Swanson, Louise Chavarie, my sponsor Canada Summer Jobs, and to WISEST for an unforgettable summer experience.

## Michelle Hoang

Supervisor: Dr. David Pilgrim / Biological Sciences  
Sponsor: Service Canada (Canada Summer Jobs)



*“Having to put your best efforts into an experiment really forces you to appreciate your accomplishments.”*

For the summer, I was placed in Dr. Dave Pilgrim’s lab in the Biological Sciences Department. The genetics lab worked with the model organisms *Caenorhabditis Elegans* (*C. elegans*) and zebrafish. My supervisor, Amanda Pisis, was researching the role of two specific genes in the development of the gonads in *C. elegans*, a tiny worm. In order to determine a gene’s function, we used RNA interference (RNAi) to control gene expression and analysed its effect on the worm. In *C. elegans*, the three methods of RNAi include injecting, soaking and feeding.

My project involved looking at the soaking and feeding protocols and optimizing them for future use in the lab. These two protocols can be used for worms at even their youngest stage, which allowed us to analyze the effects of RNAi during the actual development of the worms. After running the protocols a few times, we realized that the soaking protocol was not worth the effort and focused more on the feeding protocol, which in the end, proved quite effective.

Each day began with anticipation and I was never once disappointed. Working in a lab taught me many practical things, such as organizing my time in order to maximize productivity, learning basic lab techniques and working with others in a team. However, it also taught me the true feeling of success. In high school, every experiment is prepared so that thousands of students can complete it. They’re expected to work every single time and they almost always do. However, in a lab, things don’t work as often as you’d like and you’re forced to take that as a learning experience for the next time. It takes a certain level of dedication, hard work and good luck to finally get things to work as planned. Having to put your best efforts into an experiment really forces you to appreciate your accomplishments. There isn’t a better feeling than seeing your hard work pay off and finally getting the results you were aiming for.

Throughout the WISEST Program, we went on tours, attended professional seminars and enjoyed lunch sessions with the other students. My favorite one of these activities had to be the Lunch ‘n’ Learns. I liked seeing all the WISEST Students gathered together, eager to learn. It reminded that even though we all came from different backgrounds and worked in different fields, we all shared common interests and were fortunate enough to pursue them. During the Lunch ‘n’ Learns, we also had amazing guest speakers such as Dr. Margaret-Ann Armour and Dr. Marilee Stephens who inspired us to no end. These two women were wonderful role models for all of us and I appreciate the time they took to come and talk to us.

None of this could’ve been possible without the WISEST Student Research Program, the University of Alberta and Canada Summer Jobs who kindly sponsored my time here. To them, I owe my deepest gratitude and appreciation. I would also like to extend my gratitude to Dr. Dave Pilgrim, who accepted three WISEST students into his lab, my supervisor, Amanda Pisis, who guided me throughout the program and the rest of the lab members who enriched the whole experience. I would also like to thank my family, friends and teachers who’ve helped me get to where I am today.

The WISEST Summer Research Program proved to be an amazing experience that I’ll never forget. Throughout the program, I was constantly learning new things, meeting new people and discovering new opportunities. My summer was full of excitement and I received a sense of fulfillment I hadn’t been expecting. It was an absolute honor to take part in such a wonderful program and I sincerely hope that those who come after me in the WISEST Program enjoy the experience as much as I did!

## Michelle Liu

Supervisor: Dr. Larry Unsworth / Chemical & Materials Engineering

Sponsor: Suncor Energy Foundation

*"The Professional Development Seminars were some of my favorite components provided by this program, especially the tours of research on campus."*



There is a difference between adsorption and absorption; it is simply not a spelling mistake. This began the six weeks that I have spent here in the WISEST program, a time that has provided me with an enriching experience and a better foundation of knowledge and skills. I came into this program believing that I would discover my future aspirations, gain practical experience in the non-traditional fields, and become familiar with the campus of the university that I would like to attend for my post-secondary studies. This program has not only met my expectations, but it has also exceeded them to an unimaginable degree.

This summer, I was placed in the Department of Chemical and Materials Engineering under the guidance of Dr. Larry D. Unsworth, working on a project in the National Institute for Nanotechnology. Something I learned from my mentors was that research was not just working in a lab doing experiments; it also requires taking the time to do background research by reading papers, books and articles. It took a while to be able to work in my lab since I needed specific training to work in a lab with blood pathogens and security clearance to work in the government owned facility. I spent this time reading and becoming more knowledgeable in the area of protein adsorption. I was clueless during those first few days of reading, having to look up every second word in the dictionary, but slowly and with patience, I was able to learn more about what I would be doing this summer.

My research project was to determine the hemocompatibility of modified nanocrystalline cellulose (NCC) by running a clotting assay. The NCC particles were modified with poly (carboxybetaine methacrylate) and various end-groups and then incubated with plasma and calcium chloride solution to promote clotting. Most of my work involved learning how to pipette solutions quickly and using the microplate reader, which was used to take absorbance readings to

study the hemocompatibility of these surfaces. These absorbance readings were based on the turbidity of the samples due to fibrin formation. By determining how hemocompatible modified NCCs are, we can determine a possibility of how it can be used in biomedicine.

Besides getting first-hand experience in a lab, there were many other activities that complimented and highlighted the WISEST summer program. The Lunch 'n' Learns were useful in building skills that would prepare us for university life, such as the session on making an effective research poster. It also provided another opportunity to meet and talk to other student researchers. The Professional Development Seminars were some of my favorite components provided by this program, especially the tours of research on campus. The research lab tours offered a glimpse in to other areas of research and the number of careers each had to offer. A highlight of these tours was the chance to learn about the Smart Condo research, something that I had never heard of until now and one that has sparked an interest for me. It was very exciting to learn about the technology they used to help assist seniors who want to live independently, but require assistance, without the use of cameras and video recorders. It was interesting to learn how this project involved interdisciplinary sciences, a collaboration between many different people. Overall, I enjoyed the extra learning opportunities that this program provided.

My experience here at WISEST would not have been made possible without these people and sponsors. I would like to thank Dr. Unsworth for his guidance and sharing his expertise, my supervisor, Theodore Ng, for taking the time to mentor me this summer and the Unsworth research team for their direction and advice. I would also like to extend my gratitude to the WISEST team who have worked very hard to make my summer an enjoyable one.



# Navjot Singh

Supervisor: Dr. Kevin Beach / Physics

Sponsor: Alberta Human Services (STEP)



*“Never did I imagine that I would be using my high-school linear algebra course to conduct research.”*

Six weeks ago I could only see a few dreams, and now I have dreamt different dreams and seen doors open before me, thanks to the WISEST Summer Research Program, the career possibilities I see myself pursuing have substantially grown. I was exposed to new and diverse fields of science, engineering, and technology, many of which have caught my interest.

During the past six weeks, I carried out numerical modeling regarding the dissipation of a nanomechanical oscillator, a silicon nitride nanostring, using the Maple15 programming environment and its LinearAlgebra package. Linear algebra was used to study the effects of different tension values within the nanostring and the aim was to acquire a high quality, ‘Q’, oscillator. First a code was written, capable of carrying out the necessary steps vital to attain the results we desired, such as creating matrices representing different aspects of the nanostring. Then using these and the mass, eigenvectors and eigenvalues were obtained. From this the energy of the system and energy dissipated were calculated, which we could then easily achieve the quality from. By studying the graphs of frequency versus tension and quality versus tension, we realized our model was not realistic. Therefore, we would go back and change a few values within the code to achieve a more realistic oscillator. A realistic model is crucial because it allows one to understand different aspects, such as understanding how the nanostring is excited, which can then lead to the understanding of how the energy dissipates and hopefully lead to oscillators with higher quality.

I learned about programming, the importance of always keeping in mind where things come from, and questioning the values retrieved. However, carrying out this study and learning to program was not all I did this summer. WISEST had ‘Professional Development Seminars’ and ‘Lunch ‘n’ Learn’ sessions. By far, my most

favorite seminar was ‘Exploring U of A Research’ where I got the amazing opportunity to wear a flattering ‘bunny suit’ and have the chance to enter the clean room in the Nanofabrication Laboratory, in addition to that I saw how and where the silicon nitride nanostring is made. This tour opened up doors and interests; perhaps, I too would be a regular in the clean room one-day working on a different nanotechnology device. The ‘Lunch ‘n’ Learn’ session I found most beneficial was Dr. Margaret-Ann Armour’s talk on ‘The Art of Networking’. Not only was she inspirational, but also I learned I could switch careers later in the future if I feel I am not pursuing what I ought to, thus addressing a major concern I had regarding career choices.

I was thrilled to be working in the Department of Physics. Never did I imagine that I would be using my high-school linear algebra course to conduct research. During the first week I was nervous, as any student would be, for I worried I lacked the essential knowledge required to carry out the work I was going to do. Luckily, this worry was short lived. Dr. Kevin Beach made sure I understood the theoretical work I was going to do. He answered all of my many questions and explained equations numerous times until I was positive I knew what aspects of the study were, and were not, taken into account. And I would like to thank him for all of his time he invested in helping me carry out my research project and for allowing me to contribute to a larger research project by carrying out my own study.

I would also like to thank my sponsor, AB Human Services (STEP), along with all the wonderful people behind the WISEST program, as they are truly amazing to devote their time and effort into inspiring young students, such as myself. Personally, I would recommend this program to future students, not only does one learn a lot, but I believe it allows one to grow as an individual.

## Nerissa Wong

Supervisor: Dr. Michael Lipsett / Mechanical Engineering

Sponsor: Allard Foundation

*“Each role model at the Networking Fair was extremely interesting, and as a whole, I came out of that seminar feeling motivated and inspired to pursue my goals.”*



Unexpected challenges are bound to come everyone's way. What can make or break an individual is the manner in which they face such challenges. Simply being chosen to be a student researcher in the WISEST program was surprising enough, and the new lifestyle I adopted at the university was a curveball I never saw coming. However, to say the least, my WISEST experience has changed my perspective on research, post-secondary, different career paths, and education. By meeting other student researchers, supervisors, and role models, I have become inspired to maximize and reach my potential for the future.

The months that led up to Orientation Day were inadequate for the shock to set in of my acceptance into the program. The whole dynamic of working as a student researcher was unforgettable. It resulted in meeting with several other researchers and professionals in the field. It was amazing to be granted the opportunity to meet these people and discuss my project with them.

Working in Dr. Michael Lipsett's Oilsands Technology lab in Mechanical Engineering taught me valuable lessons and allowed me to overcome challenges I never thought myself capable. Under the supervision of a graduate student, my project focused on trends and changes in pipeline systems similar to those used at the oilsands. This research would contribute to future developments in pipelines with more resistance to wear. Oilsands pipelines are currently a major problem since they are susceptible to breakage due to wear inside the pipe. Breakage and leaks in pipes are important to avoid because they are extremely costly and time consuming for companies, as well as harmful to the environment. This area of research was important and challenging since very little research had been done on it prior. The research was executed by using a pipe system with a mixture of water and sand flowing within. A clear segment of the

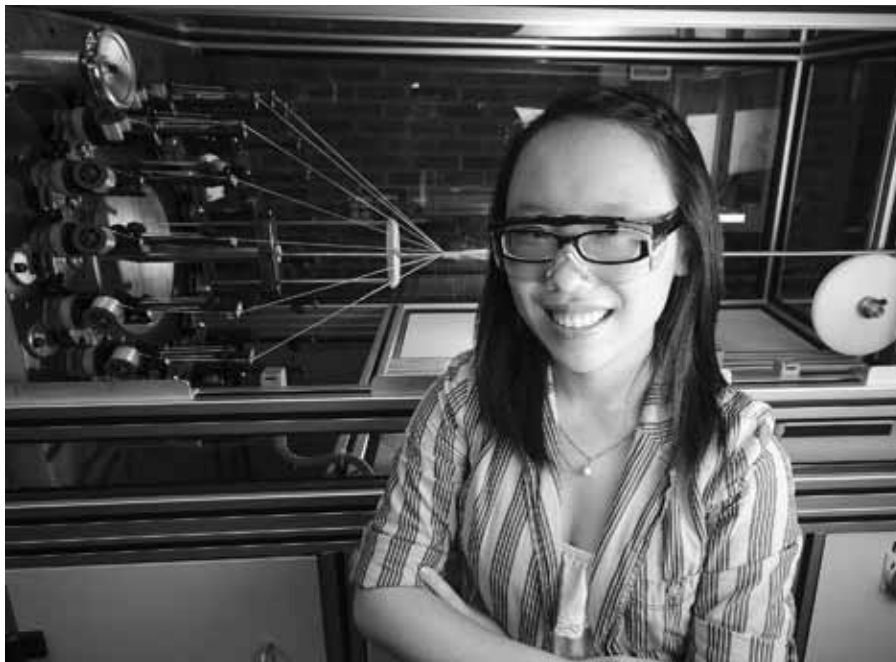
pipe had a light source and a high-speed camera opposite it, and by capturing and analyzing footage of the solids' shadows in the flow, behavior of the flow within the pipe could be analyzed. Not only did I learn concepts relevant to the project, but I also learned how to use the pipeline loop and high-speed camera and to process the captured footage using a program called DaVis. Looking at the results, it was observed that most results matched up with theory already associated with pipelines. I am extremely grateful for the experience working in the lab and for the independence I was given while doing so. For most parts of my project, enough guidance was offered to ensure I could execute my project, but enough freedom was given for me to learn to motivate myself as well.

Not only did I learn skills associated to my project, but I also learned valuable skills at Lunch 'n' Learns and Professional Development Seminars. Industry tours helped build a larger scope of future career options and showed me applications of math and science in real life. Each role model at the Networking Fair was extremely interesting, and as a whole, I came out of that seminar feeling motivated and inspired to pursue my goals. This lesson was emphasized even more during Dr. Margaret-Ann Armour's presentation on mentorship and dream chasing.

Coming out of the WISEST program, I am now one huge step closer to being successful in the future. I feel that I have grown immensely as a learner, a leader, and a dream chaser. On top of that, I have newly acquired skills that I likely would have otherwise not gained this summer. Reflecting upon my WISEST experience, I am so thankful for my teachers and peers of the past and present for guiding and motivating me, and am enormously grateful for the WISEST team, the Allard Foundation, and my research team for providing me with this remarkable opportunity.

## Nicole Wang

Supervisor: Dr. Jason Carey / Mechanical Engineering  
Sponsor: Alberta Human Services (STEP)



*“All these contributions allowed me to gain the confidence that I need to work towards a career in science and chase after my own future successes.”*

“Fundamentals are the building blocks of fun” (Mikhail Baryshnikov). At the beginning of this summer, I entered my biomedical and composite materials lab thinking that I had all the fundamentals that I needed to succeed in my research project. Now as my experience with WISEST draws to an end, I begin to appreciate just how much fun I have had. From working on my project to touring off-campus industries, every moment of my summer was filled with laughter and invaluable knowledge about scientific research.

As the daughter of two mechanical engineers, I was thrilled to be given the opportunity to follow their footsteps and work in the department of mechanical engineering. However, the similarities ended there. My summer project was to compare three different methods of measuring the braid angle of a braided composite tube. Among other things, they taught me that a braided composite tube is composed of bundles of fibers (tows) interlaced together to create a tubular structure and that the braid angle is the measurement between the braid’s longitudinal axis and its direction of tow deposition.

Formerly, the tracing-protractor and 2D photo measurement methods were used to determine the braid angle. The tracing-protractor method required the researcher to trace the braid surface onto a piece of paper and then measure the braid angle using a protractor. In 2D photo measurement, a digital image of the braid is imported into a photo editing program to measure the angle. Both methods suffered from inaccuracies because their 2D nature does not consider the braid’s curvature. To generate a more representative measurement for the braid, a 3D surface reconstruction method has been developed. In this method, two webcams were positioned at an angle to each other to achieve stereopsis—depth perception when an object is seen through two views. The pictures taken from the two

views were then converted into a 3D surface map by using a material surface imaging program. Because the surface map has 3D coordinates, the algorithm used to calculate the braid angle accounted for the braid’s curvature. The purpose of my research was to compare these three methods based on the accuracy and the consistency of their braid angle measurements. In context with the commercial applications of braided composites (ie. over-braided fuel lines, aircraft structures), the importance of precision in measurement becomes evident as the braid angle determines many of the braid’s properties, including its failure mode and failure strength.

In addition to working on my project, both my research team and the WISEST coordinators organized campus tours that taught me more than I could have conceived about the opportunities present in science. From watching two Master’s defenses to listening to Dr. Margaret-Ann Armour speak about the importance of dreaming big, my WISEST experience inspired me to continue to pursue my passion for science and consolidated my desire to become an engineer. Needless to say, WISEST made this an unforgettable summer through providing me with the chance to experience non-traditional careers first-hand as I begin to make important decisions concerning my own future. Of course, this learning opportunity would not have been the same without Dr. Jason Carey’s amazing research team. I would like to offer my gratitude to my supervisor, Cheequan Leung, who in spite of being extremely busy with his Master’s thesis, always took time to guide me through my project. I would also like to thank Garrett Melenka and Kaiser Leung for filling my days with excitement and education. Furthermore, none of this would have been possible without my sponsorship from the Alberta Human Services (STEP). All these contributions allowed me to gain the confidence that I need to work towards a career in science and chase after my own future successes.

## Payton Damer

Supervisor: Dr. Gerald Cliff / Mathematical and Statistical Sciences

Sponsor: NSERC PromoScience

*“Although it is a research program, that seems like it would be very serious, it turns out to be a lot more fun than it sounds.”*



When I first heard about the WISEST program, I thought that I had no chance of being accepted. It seemed so over my head. As time passed, I made plans for my summer and assumed that I had been rejected. When I got the call that said I was accepted, it was mind blowing. So much information was thrown at me and much of it I could not even understand. I had been told that I was accepted into a mathematical and statistics program but would also be doing some computer programming, that I understood, but what I did not understand is the actual name of the project, Combinatronics of Young Diagrams and Tableaux. That was completely overwhelming hearing all these words that I had no idea what they meant. Soon after I arrived, I quickly realized that many of the students here were in the same boat of anxiety, anticipation and utter confusion.

My project seemed to bring something new every day. When I first started, everything was extremely generalized and I learned a lot about permutations, taking a list of numbers and finding all the possible rearrangements. Next, there were Young Diagrams, boxes in certain patterns with numbers inside. I had to rearrange the boxes following certain rules and theories proved by other mathematicians. I had the chance to go to other professors' lectures and learn what they had to teach and was able to learn quite a bit about computer programming as well. We mainly used the program called Python to make formulas I could save and use later, which became quite handy. I used a few different programs to create my poster because it was different than regular science programs and we had to include equations and create diagrams, many of which I think will become handy for later use. I also learned that mathematicians do not have labs; instead they have offices and classrooms.

One of the many amazing experiences I received was staying in residence. You got to know everyone in residence extremely well

and there was often many exciting things to do. We went to Street Performers Festival, Capital Ex, formal nights, swimming pools and many other events. We also had many movie nights, card nights, and chances to enjoy the beautiful city and Whyte Avenue. Although it is a research program, that seems like it would be very serious, it turns out to be a lot more fun than it sounds. I have learned a lot, but also made a lot of friends.

On Mondays, there were Professional Development seminars where we were able to go on many tours. There were always so many choices of what tour we wanted, so even if one tour was not my taste, there were other options. I had the amazing opportunity of going to Syncrude Research and Development, Gilead, Nanofab Labs and networking fairs, where we received great advice. It may help us to realize that it is not something we want to pursue, which is completely fine. We also had Friday lunch and learns, where we were provided with opportunities to learn new skills and get to know fellow WISEST students. We were provided with opportunities to learn about networking, designing a research poster, writing a report and many great role models that we were allowed to email and ask any questions.

In that short, six week program, so much happened. Everyday brought something new and exciting. And let's face it; being paid to learn is pretty amazing. There were so many experiences to have, memories to create, labs to visit and people to meet. To my professor Dr. Cliff, the WISEST team, NSERC promo science for their sponsorship, and the amazing St. John's residence staff, I wanted to thank them all for everything that they made possible. It was an experience I will never forget.



## Prabhjot Punnia

Supervisor: Dr. John Vederas / Chemistry  
Sponsor: Service Canada (Canada Summer Jobs)



*“Overall, WISEST has been an incredible experience for me and I am sincerely glad that I was allowed this opportunity.”*

The day I heard about WISEST from my senior student, my ‘door of curiosity’ opened. After I researched and considered ‘WISEST’ until I had a strong feeling that it was a program that I wanted to dedicate my summer to. Obtaining teacher references, filling out the official application, and mailing the required documents, was all I had to do to unlock this wonderful six-week adventure. The ‘door of opportunity’ opened itself when I was accepted into the WISEST Summer Research Program. I remember feeling honoured and grateful that I was invited to be a part of this prodigious journey.

At first, the thought of working with highly qualified people frightened me, but once I stepped in the lab, I quickly realized that I was going to enjoy learning, exploring, and spending time with these keen individuals. This summer, I had a privilege to work in Dr. John Vederas’ lab under the direct supervision of Ms. Jing Li and Dr. Jennifer Chaytor. My project involved purifying and characterizing antimicrobial components of Leucidal Liquid. Leucidal Liquid is obtained by fermentation of *Raphanus sativus* (radish) roots by the organism *Leuconostoc kimchi*; it has been patented and commercialized as an antimicrobial ingredient in the cosmetics industry. It has been discovered that Leucidal Liquid provides an excellent preservative activity, particularly in hard to preserve compositions. The extract also has other beneficial properties such as anti-oxidant, anti-inflammatory, and anti-acneogenic activity. The crystal found during purifying the Leucidal Liquid was identified to be salicylic acid by infrared spectroscopy, carbon nuclear magnetic resonance spectroscopy, proton nuclear magnetic spectroscopy, and the high-resolution mass spectrometry. These are common techniques used universally to elucidate the structure of organic compound. Since salicylic acid is already known to have antimicrobial activity, series of extractions and base washes were performed, in order to eliminate it from the Leucidal Liquid. As it

is an ongoing project, the main objective in the future will be to find the structure of the other unknown antimicrobial components present in the Leucidal Liquid after the extraction.

Not only did WISEST provide me with hands-on experience, I was also exposed to numerous practical applications of science, engineering, and technology through diverse on-campus and industry field trips. Having the chance to attend Dr. Margaret-Ann Armour’s session, ‘The Art of Networking’, made me appreciate the efforts being applied to encourage both men and women into non-traditional careers. Moreover, ‘Networking Fair’ helped me to connect, communicate, and understand the significance of linking with others from both academia and industry in order to develop significant skills and gain invaluable knowledge. Overall, WISEST has been an incredible experience for me and I am sincerely glad that I was allowed this opportunity.

I would like to thank my principal investigator, Dr. John Vederas, my direct supervisors, Ms. Jing Li and Dr. Jennifer Chaytor, and the rest of my research team for being supportive, always willing to assist and for answering my various questions. I would like to acknowledge my kind sponsor, Canada Summer Jobs, for their generous support. Furthermore, I would not have had this remarkable opportunity without the vigorous commitment and enthusiasm of the WISEST team. I would like to recognize my teachers, Mr. Stephen Gallagher, Ms. Stacey Mabey, Ms. Baril Cooke, Ms. Tannis Morgan, Mr. Matichuk, and Mr. Clarke Dyer for their continuous encouragement and their ongoing support. To conclude, I wish to extend a huge thanks to my family and friends for encouraging me to apply and for assisting and accompanying me throughout this astonishing expedition.

## Rachael Nay

Supervisor: Dr. Colleen St. Clair / Biological Sciences

Sponsor: Service Canada (Canada Summer Jobs)

*"I did everything from literature searching articles about elk behaviour to finding coyote road crossings using GPS and Google maps."*



This summer I participated in the experiment of a lifetime. An experiment allows an individual to discover whether their thoughts or theories are correct and what the results of a particular course of action would be. This is exactly what the WISEST Summer Research Program allowed me to do by giving me the chance to explore my theories about what a career in science, engineering, or technology would be like and what opportunities there are out there for women in these areas. I have always wanted to enter into a career that involved science and my WISEST experience has definitely solidified this.

I was placed in the Department of Biological Sciences in the lab of Dr. Colleen St. Clair along with another fellow WISEST student, Emily Barlow-Bolch. Biology, ecology, and environmental science are all areas of science that I am interested in, so I was tremendously excited to learn that I would be working in a lab that focuses on wildlife ecology through conservation behaviour. There were three main projects that I got the opportunity to work on with the members of the lab research team this summer, the first being the Research on Avian Protection Project (RAPP). RAPP intends to find ways to increase the protection of all birds in the oil sands region of Alberta. I also got the chance to be a part of the Edmonton Urban Coyote Project that studies the movement, habitat, and diet of coyotes with the goal of gaining information that will allow for positive interaction between these animals and people. Lastly I also got to be a part of an elk behaviour project which looks at the behaviour and personalities of elk. There was a variety of different tasks to do in the lab and one day was never the same as the next. I did everything from literature searching articles about elk behaviour to finding coyote road crossings using GPS and Google maps. I got to visit a duck farm, go kayaking, and in general experience so much that I have never done before and would never have, if not for this

wonderful program.

Not only did I get the chance to experience so much in my lab, but I also got the chance to learn and gain insight about the multiple areas of science through Professional Development Seminars and to develop and learn new skills through Lunch 'n' Learn Sessions that were set-up weekly by WISEST. The Networking Fair was just one of these many events that I particularly enjoyed. It gave me the chance to meet people in successful science careers, learn about the different challenges and accomplishments they have faced, and connect with role models that I will be able to seek advice from in the future. These events also gave me the chance to become more acquainted with the university campus and to meet other WISEST students that share my passion for science.

My WISEST experience has surpassed my original expectations and has given me so much more. I started off this summer thinking that this would be a great opportunity to experience what a career in science would be like and it has done way more than that. It has opened my eyes to the many different career paths available in science, encouraged me to dream and strive for goals that no longer seem impossible, and so much more. This experience did not feel like a job to me at all and will be something that I will never forget.

I would like to thank my sponsor Canada Summer Jobs for giving me the opportunity to participate in this remarkable program. I would also like to thank Dr. Colleen St. Clair and all of the members of her research team for making this an enjoyable experience and one I will not forget. This summer truly was the experiment of a lifetime!

## Rachel Han

Supervisor: Dr. Csaba Szepesvari / Computing Science

Sponsor: Alberta Education



*“WISEST has been such a quick six weeks, filled with brand new experiences, amazing people, many challenges, and most of all, a ton of fun.”*

I remember standing in line on orientation day, both nervous and excited for the next six weeks of my summer. I began talking to a few other participants and in no time, they became friends I know I will have for a long while. Going into the WISEST program, I was expecting it to be a program that would help to narrow my future career choices, but in turn I was pleasantly surprised with the exact opposite result! I have learnt so much about the different sections of research that are possible through talking to my peers, the networking fairs, and the presentations given by mentors. This summer, I was able to do research in the reinforcement learning and artificial intelligence lab, placed there due to, primarily, my interests in mathematics.

The general faculty that I was placed in was computer sciences, where I worked under my principal investigator, Dr. Csaba Szepesvári and my main supervisor, David Szepesvári. In my lab, I worked with a student researcher from the HIP program, Goutam Venkatraman, who helped me a lot with programming and with the research project. Since I had basically no knowledge of programming with java, I spent the first few weeks learning by doing exercises by making simple programs. Soon, I was surprising myself, when I was able to take a problem suggested by David, and write a program starting from scratch.

My research program this summer has been to evaluate the effectiveness and efficiency of the Direct Policy Iteration (DPI) algorithm to test whether it may be applied to solve complex real-world problems. Basically, we took an algorithm and tried to use machine learning, to teach the program essentially to carry out the functions in SZ tetris. SZ tetris is the same game as tetris, using only the “S” and “Z” shapes. Unfortunately, since I had to spend the first few weeks learning how to use the java program itself, we did not have the sufficient

time to necessarily “complete” the project, since the problem itself is complex and takes much debugging and implementation.

However, I didn’t just learn in the computer lab, I learnt so much through the programs that were set up for us by the amazing WISEST team. On Mondays, we would have field trips to various locations. I participated in the INTUIT, Maxxam, nanotechnology, and the electrical and chemical engineering tours. From them, I have learnt so much, and they have really helped me to decide my interests! For example, I have realized that I have more of interest towards engineering, as opposed to biological sciences. This will definitely help me in deciding what I choose to study in university. We also had “Lunch ‘n Learns”, which were exciting events that have not only inspired me, but have taught me a lot, such as how to create an effective research poster and how to write this essay itself! As well, through these tours I was able to create many friendships with my fellow WISEST researchers. It was so great to meet such a fantastic group of people!

WISEST has been such a quick six weeks, filled with brand new experiences, amazing people, many challenges, and most of all, a ton of fun. I have learnt so much and I can only be grateful for this amazing opportunity. This program would not have been possible without the contributions from my supervisors Csaba and David Szepesvári who have taught me basically everything I have learnt in computer sciences this summer, my research partner Goutam Venkatraman who has helped me throughout this entire experience, AB Education who, without their sponsorships, this program would not have been possible, and of course, the amazing WISEST team and the WISEST researchers who have made this summer absolutely incredible. Everyone has made this an amazing experience for me that I will cherish for a long time.

## Rachel Rae

Supervisor: Dr. Jan Jung / Physics

Sponsor: Service Canada (Canada Summer Jobs)

*“Imagine being in an environment where everyone is enthusiastic about science and you are encouraged to learn as much as you possibly can about your favourite subject.”*



Although it is difficult for some to understand how learning about physics for six weeks of the summer could possibly be exciting, whenever I talk about being a part of WISEST I feel like I'm unintentionally bragging. Imagine being in an environment where everyone is enthusiastic about science and you are encouraged to learn as much as you possibly can about your favourite subject. This is all the while getting paid to be there. Awesome.

My research project involved measuring the magnetism of manganites that were combined with different amounts of Ruthenium. My research team was amazing in the way that they let me be involved in every step of the experiment. It gave me so much confidence to be in a room full of professors and PhD students and feel like a contributing member of a team. Throughout the entire program, my supervisor and my PIs made sure that I understood everything, which has taught me a lot about physics. My favourite thing about physics is that there is always a simple underlying explanation for seemingly complicated things. What amazes me is that the very simple machine we were using, which relies on really simple concepts, can tell us a great deal about the properties of a sample. Another thing that inspired me was that instead of looking at only the results of the experiment, I found that my research team always wanted to know the “how” and the “why” of an experiment and went way deeper. The lab and research skills that I learnt here will be incredibly valuable to my future.

Not only was WISEST educational and inspiring with the work that I got to do, it gave me many opportunities to learn through the Lunch 'n' Learns and the Profession Development Seminars it provided. Taking the tours around different labs was a fascinating experience for me because I was exposed to equally interesting areas of science that I was unaware about. For instance, did you know you can teach

a computer to understand music theory and to play jazzy chord progressions? That is crazy cool. The chance to meet mentors during the networking fair was also helpful to me because I met women in science that truly loved their jobs and had very comforting insight about university and future careers. Dr. Armour's talk on dreaming and mentoring was another encouragement because it is evident how much she believes in each student's abilities to be successful.

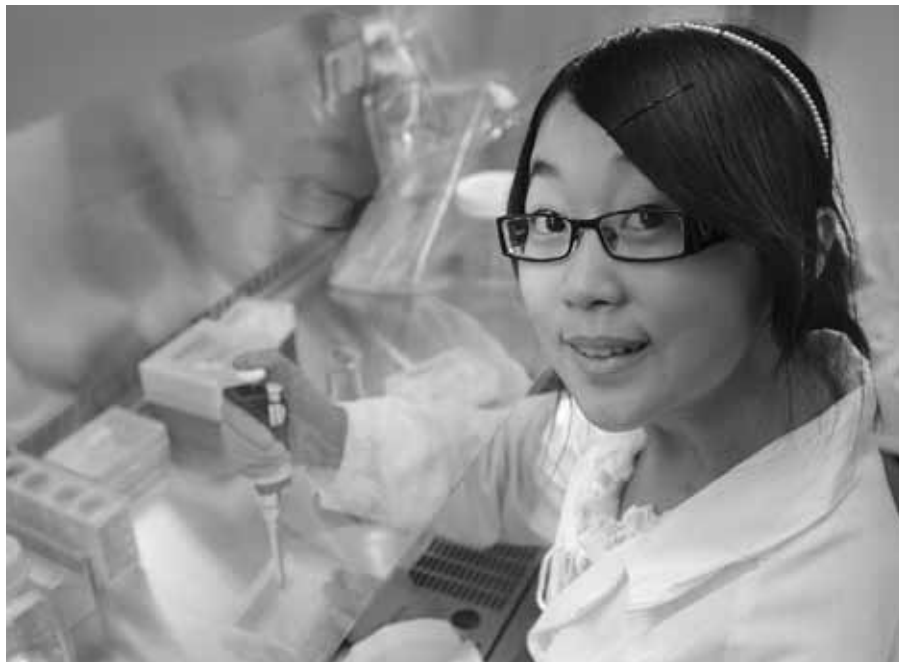
Every bit as encouraging, the people I met at WISEST made this experience even more enjoyable. I met a lot of other girls through the program that shared my passion for science. The adventures and the laughs that we had will stick with me for a long time! I was extremely fortunate to meet students and professors that gave me advice on how to survive the first year of university. The professors that I met were especially fantastic and it gave me a sense of not just what I want to do but the kind of person I want to be. Another perk that this opportunity gave me was to familiarize myself with the campus. With all this help I feel a lot more prepared for the leap to university.

Thank you very much to my sponsor, Canada Summer Jobs, for making this program a possibility and opening countless doors for me. I also would like to thank my supervisor, Mohamed Elsayed, my PIs, Dr. Jan Jung and Dr. Kim Chow, and the rest of the research team in Dr. Jung's lab. They taught me invaluable lessons about physics and about working together. I gained so much from this experience and I would do it again in a heartbeat. The only downfall to this program is that, as my first job, it will be almost impossible for my future high school jobs to measure anywhere near this experience.



## Rina Huo

Supervisor: Dr. Reena Talwar / Dentistry  
Sponsor: Service Canada (Canada Summer Jobs)



*“The lab study was just as innovative and marvelous as I expected.”*

Life is a roaring river, composed of hidden currents, winding meanders, and quite often, separating courses at unexpected times. From the very first day, this Summer Research Program has turned the whole current of my existence into a new channel, one filled with enchanting new knowledge, ingenious mentors and friends, and even more numerous options in the future.

Prior to the program, I held simplistic awes at the scientific researchers from merely watching science-fiction films. They always appeared to be wearing spotless white lab coats that flap behind them like outlandish wings as they walk briskly between shimmering beakers. This summer, I finally had the opportunity to walk behind their hazy veil by working in Dr. Liu and Dr. Talwar’s lab in the division of gastroenterology, department of medicine.

The lab study was just as innovative and marvelous as I expected. We focused on epithelial gaps, which are residual spaces in the intestinal lining after extrusion of cells. Because the intestinal epithelium functions as a barrier to the outside environment, therefore the gaps may contribute to the passing through of microbes and antigens. As a result, the density of epithelial gaps in the terminal ileum is increased in inflammatory bowel disease patients. Because the cell extrusion from the intestinal lining is being studied using mucosal biopsy samples, so my job consisted of processing and selecting the mice intestinal specimens with good orientation and well preserved morphology for further analysis.

My inadequate image of the researcher changed completely on the first week. Despite the big gap between a high school student and the university students and PhDs, my principle investigators and supervisors had all provided earnest help on every aspect possible, from specific lab practices and tricks, to university choices and future career planning. Once we even talked about what was the best hairstyle!

Beside research, I also enjoyed every single Lunch and Learn seminars and Professional Development day. The sessions provided the perfect chance for me to explore the captivating world of sciences with off-campus tours and presentations from outstanding speakers. The most memorable event was Dr. Margaret Ann Armour’s presentation, “the Art of Networking”. With touching sincerity, she taught us that if one has a courageous heart and an open mind, then networking would be an enriching gift that expands one’s horizon. Indeed, amid the fifty-nine bright fellow researchers, I had the intense pleasure of making new friends almost every day----- while walking to the various sessions, traveling on the school bus, touring the industries... wherever I went, the students coming from all over Alberta greeted me with open arms.

This ideal opportunity was founded on the work of many. I would like to extend my deep gratitude to Canada Summer Jobs for the kindness and generosity in sponsoring me to participate. Furthermore, I want to thank my Principle Investigator Dr. Liu and Dr. Talwar for their kindness in taking me into their lab; and my research team members Teresa Kay, Stephanie Mah, and Misah Alipour for their unbelievable patience with my endless curiosity, and unreserved sharing of their knowledge, passion, and energy. In the end, I thank the WISEST team for making this incredible feast of learning for everyone involved.

If I was ever a bit uncertain when I pushed all of my other summer plans aside and threw myself into the prospect of a summer of research, now gazing back at my footprints on the riverbed, I dare say that this is the most rewarding decision I have ever made!

## Robyn Murray

Supervisor: Dr. Eleni Stroulia / Computing Science

Sponsor: Dr. Eleni Stroulia

*"It introduced us to a variety of mentors, role models, and networking contacts who have the potential to be a huge leg up in the future."*



I'm not usually a nervous person. In fact, I hardly ever get more than just the odd butterflies before something really important. However, the first day of the WISEST Summer Research Program was definitely the exception to that rule; I was anxious, shaking, and honestly thought I was going to be sick. What if I wasn't smart enough? What if I didn't get along with my supervisors? What if I didn't make any friends? It didn't take long for those fears to evaporate when I walked into orientation; I could see immediately that none of them were going to be an issue. That room had one of the most open, friendly, and encouraging atmospheres I have ever experienced. It is incredible to look back and see how far we have all come from the nervous, unprepared individuals who first walked into orientation.

I was placed in Dr. Eleni Stroulia's lab in computer science, under the supervision of Victor Guana. The project I was working on involved the development of a series of tablet based assessments for a cognitive disorder called Unilateral Spatial Neglect (USN). USN is a common disorder in stroke victims where the patient is unable to process stimuli on the side of their body opposite to the lesion in their brain. The most common way to diagnose USN is to have the patient attempt to cross out targets on a page of distracters, and if they miss a greater number of targets on their left side than their right, they are diagnosed with USN. It was these simple cancellation tests that I spent the summer converting into tablet based assessments that could provide much more detailed feedback to a therapist.

However, the actual work we did in the lab was only a fraction of the new knowledge and experiences that every one of us gained this summer. Both the Professional Development Seminars and the Lunch 'n' Learn sessions provided us with numerous opportunities

to learn about University life and the huge variety of careers and potential fields in Science and Engineering. The Professional Development Seminars were extremely interesting and eye-opening, exposing us to everything from the methods they use to test new drugs at Gilead, a large scale bio-pharmaceutical company, to getting to play with lasers and learn about technology that could one day make nuclear fusion viable option. These Monday afternoons were always the highlight of the week, and I loved getting to talk to experts in the field and hearing their stories and successes. Friday's Lunch 'n' Learn sessions were also very valuable, giving us the chance to hear about different aspects of university life and our program from a variety of speakers, including an eye opening talk about mentors and dreaming from Dr. Margaret- Ann Armour.

In the end, the WISEST Summer Research Program was so much more than the sum of our experiences. It helped us grow and become so much more confident in ourselves and our abilities, both in and out of the lab. It introduced us to a variety of mentors, role models, and networking contacts who have the potential to be a huge leg up in the future. It has been a truly invaluable experience, and an amazing way to spend the summer.

I would like to give a huge thank you to the WISEST team for putting the summer together; it has been a fantastic experience. Also to Victor Guana, for allowing me to share his project for the summer. Finally, I want to thank Dr. Eleni Stroulia for sponsoring me, welcoming me into her lab, and erasing any doubts I had that a woman can be powerful and respected in any field she chooses, and Dr. Margaret-Ann Armour for inspiring me to dream.

## Rupam Arora

Supervisor: Dr. David Pilgrim / Biological Sciences

Sponsor: Service Canada (Canada Summer Jobs)



*“The tour I enjoyed the most was at Intuit, which is a software engineering company...”*

A well-known saying by Yogi Berra, “Life is a learning experience, only if you learn,” is the value that I had throughout my memorable experience in the WISEST Summer Research Program. Truly, I gained a treasure of knowledge and necessary skills while cruising through my given research project. Now speaking of my project, my research project involved characterizing the genes in nematode worm *C.briggsae* sex-determining pathway. I learned how to breed these worm species, identify mutants(those having a change in their genetic make-up) under the microscope, and performing protocols significant to research in the lab such as Polymerase Chain Reactions (PCR) as well as running agarose gels. However, throughout a few weeks, I discovered that working in a research lab is not just about following day-to-day protocols; it is about constantly questioning, learning from your failures, gaining a new skill every single day, and creating your own world of science!

There is a lot I have gained this summer from this rewarding research experience as it was such a unique, practical approach to the world of science. From the hands on experience with the lab equipment and common procedures, I was given a taste of what it is like to have a career in research. Not only that, I have received loads of knowledge and honestly, throughout the entire six weeks, I was constantly learning something every day. Besides from the learning aspect, I got a chance to acquire the necessary skills required for any career I may choose to go into, in the future such as public speaking, leadership, and teamwork skills.

And as far the program and its components itself are concerned, they helped develop my interpersonal skills outside the lab environment. We simply were not just in the lab for the whole six weeks; every Monday’s, professional development seminars took place and we went on tours to different scientific industries such as

Intuit, Maxxam Analytics as well as other labs in the university area. And the best thing is that we were given tour options to visit a lab or site of our preference, so we were not just forced to visit a certain company or lab! The tour I enjoyed the most was at Intuit, which is a software engineering company; we had a chance to observe the working environment and the types of tasks that software engineers are required to complete. Furthermore, I enjoyed the Friday Lunch’n’Learn sessions which taught me how to properly network and make effective research posters, and I cannot forget all the new people I met and got to know! It helped me expand my social network and meet all kinds of people involved in various types of careers.

However, this wonderful opportunity would not have been available to me without the support of the sponsors of this program, Canada Summer Jobs. Had they not kindly funded and supported this research program, I would not have been going on tours or learning how to make research posters. Next, I would like to express my gratitude to my supervisor, who kindly volunteered his time in making this experience a very positive and rewarding one. And lastly, I would like to express my sincere thanks to my principle investigator as well as the entire research team in making my six weeks very memorable as well as the selection committee for allowing me to be a part of this wonderful program. Really, there was a lot to learn from and be proud of, throughout the entire research! I have begun to admire science and its advances even more, thanks to the WISEST Summer Research program. I will always cherish this priceless and memorable experience in my life!

## Sara Jawdat

Supervisor: Dr. Marwan El-Rich / Civil & Environmental Engineering  
Sponsor: Suncor Energy Foundation

*"The program was the perfect opportunity to explore the life of a university grad, develop ideal work habits, and meet plenty of role models."*



*"Man cannot discover new oceans unless he has the courage to lose sight of the shore." -Andre Gide*

This quote fully summarizes my feelings for the WISEST program. I have never been a part of a research setting, let alone seen one. Coming into WISEST I had no idea what to expect, but now I have realized that there is nothing to expect but the best. The program was the perfect opportunity to explore the life of a university grad, develop ideal work habits, and meet plenty of role models. The program also involved many Lunch n Learns and Professional Development Seminars, which helped broaden my perspectives and learn many new things. A personal favorite is the Networking Fair, which allowed me the opportunity to discover mentors and illuminated plenty of possible career paths. This program has not only taught me more about research and careers I never even knew existed, but it has also allowed me to learn who I am and what I would like to be doing a few years from now. I believe it has far exceeded any expectations I could have had.

During this summer, I have had the wonderful opportunity to be able to work in the Department of Civil and Environmental Engineering in Dr. Adeeb and Dr. Marwan's bioengineering lab, along with my fellow WISEST student, Gabriella Peter. The six weeks were divided into three separate research projects. The first consisted of analyzing bilateral symmetry in the legs within sit-to-stand motion. We calculated the overall torque and joint moments required in the ankles, knees, and hips to stand up from a sitting position using a combination of Mathematica, a mathematical program, and Microsoft Excel. We looked for patterns and trends to indicate symmetry while comparing the two legs. The research indicated that most individuals do not rely equally upon both legs.

Our second project required us to investigate a new method to

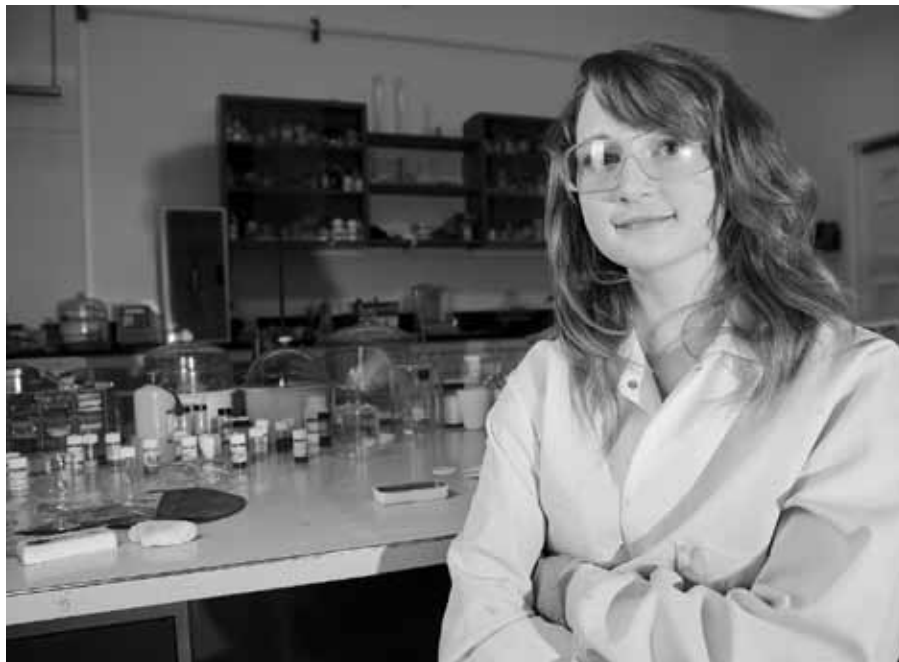
measure the severity of scoliosis, a condition where the spine curves into either a "c" or "s" shape, instead of the standard measurement of angles calculated from x-rays. We relied upon 3D camera scans of the backs of 50 subjects affected by scoliosis. We implemented the scans into a reverse engineering software called Geomagic, where we created and refined the surfaces of the backs for all of the subjects. We compared the initial scans to scans taken 1 year later of the same subjects. The comparison is shown using a standard color set, which differs based upon the standard deviation. Sections of the back which were changed drastically over time were darker in color. Yellow and green sections indicated sections with little change. We hypothesized that calculating the surface area of each color and comparing it to later scans could be used to calculate the severity.

Our final project involved analyzing the scalability of talus bones involved in the ankle joint and creating a set of talus implants. We used CT scans, implemented into the software MIMICS to create 3D models of the talus bone. Using these models, we refined and scaled them in Geomagic. We later compared them to the talus bones in the set of implants in order to select the most similar member of the set. We standardized a set of five talus bones that can be used as implants. I also had the opportunity to visit the Rehabilitation Robotics Lab when they tested on models of the human spine. Through all of these projects, I have learned how to manipulate programs, including a number of handy computer techniques. I would like to thank my amazing supervisors and inspiring teachers Jon Schofield, Amin Komeilli, and Kamrul Islam for their patience and guidance; as well as my principal investigators Dr. Marwan El-Rich and Dr. Samer Adeeb for allowing me to work in their lab. I would also like to thank WISEST for their generous sponsorship.



## Sarah Semeniuk

Supervisor: Dr. Jingli Luo / Chemical & Materials Engineering  
Sponsor: WISEST Annual Lectureship



*"I had always had an abstract image of what an engineer did but the Syncrude tour allowed me to truly realize what a career as an engineer would allow me to do."*

Ever since learning of my acceptance into the WISEST summer research program I had felt a combination of anxiety and excitement. It was an opportunity that promised to be very unique from what most high school students are able to experience but besides from that, it was difficult to envision what the six weeks would entail. As they unfolded though, my anxiety vanished while my excitement only grew. Whether fellow WISEST student, university student or supervisor, everyone seemed eager to share friendship, advice and a smile. The research project I was able to assist with as well as the WISEST planned events ensured I had an unforgettable summer.

I was assigned to the Chemical and Materials Engineering department researching alternative fuel cells with my supervisor, Ning Yan and my principal investigator, Dr. Jingli Luo. Obviously, researching a topic which reached beyond a high school curriculum required some reading but it only acted to further my understanding and add context to what we were doing in the lab. Fuel cells are similar to tiny engines in that if they receive a constant supply of fuel, typically hydrogen and constant supply of oxygen, they can produce energy. A great benefit of fuel cells when compared to combustion engines is that they convert chemical energy directly to electrical energy, skipping the heat energy and the costly loss of energy. Fuel cells are composed of an anode, electrolyte and cathode. The different types of fuel cells are classified according to the material of their electrolyte. The fuel cell which I researched was a solid oxide fuel cell, which typically has an electrolyte composed of ceramic. It offers extra benefits such as having great fuel flexibility, due to the high temperatures it functions at.

Of course these high temperatures cause other complications and so it is important to try to discover the most efficient solid oxide fuel cell design. This is what my research focused on. I manufactured

and tested an electrolyte supported fuel cell, an anode supported fuel cell without an anode functional layer and an anode supported fuel cell with an anode functional layer. My supervisor was always there to assist me but he also allowed me the freedom to try the many methods used in our lab. For each cell we tested, we needed to synthesis the material, turn the materials into a solution and then mix it. From here the solution was applied to the anode support disk using a spin coater, which disperses a solution by spinning rapidly. In the end we discovered that electrolyte supported fuel cells are the least efficient while anode supported fuel cells with anode functional layers are the most efficient. While the research alone was rewarding, it is even more satisfying knowing that in the future it can be utilized to create a more environmentally friendly world.

The WISEST summer research program did not only give the students opportunities to research but also, through Lunch and Learns and Professional Development Days, the opportunity to network and grow. While all the events offered something unique, my personal favorite was the tour of Syncrude Canada. I had always had an abstract image of what an engineer did but the Syncrude tour allowed me to truly realize what a career as an engineer would allow me to do. This is only one of the many great opportunities outside of research the program offered us students. The WISEST program has opened doors I did not even know were there and I believe it has begun to show me what doors I would like to go through. I would like to thank my supervisor, Ning Yan and my principal investigator, Dr. Jingli Luo for allowing me an opportunity to research in their lab. I would also like to thank my sponsor, WISEST for providing me with this great opportunity.

## Sarah Wettlaufer

Supervisor: Dr. Heather Bruce / Nutrition & Food Science  
Sponsor: Service Canada (Canada Summer Jobs)

*“Outside of the lab,  
the Summer Research  
program had so many  
opportunities for  
every participant to  
grow and to gain.”*



As graduation approaches and with that the life-impacting decisions regarding postsecondary and a future career must be made. It seems impossible for one to somehow determine their future's plan without first exploring the many options available. Personally, without any plan, the thought of grade 12 was a hardship to endure with one crucial decision. At the start of the summer, I had no idea that the WISEST Summer Research Program would be my helping hand; it was simply an extraordinary summer job that I was so honored to be given. But after finishing these six, life-impacting weeks of the program, WISEST is the sole reason that my plan is shaping, my passion is narrowing and I no longer have uncertainty towards the end of grade 12 – only excitement of a new world I have sampled this summer and cannot wait to experience again.

For my research summer, I had the opportunity to work in the department of Agriculture, Food and Nutrition Science in the meat lab of Dr. Heather Bruce. Our spectacular direct supervisor, PhD student, Astri Slinde guided Kerri– another WISEST Student Researcher – and I through six insightful and exciting weeks. Our primary project was on beef tenderization using plant enzymes that had been extracted from various fruit and spices. As brine, they were injected into meat samples to break down the connective tissue that gives the beef its toughness. Each beef sample was analyzed for their quantity of hydroxyproline. It is an amino acid that makes up approximately 14% of collagen, which is a major component of connective tissue; therefore, by determining how much hydroxyproline and in turn connective tissue is in the samples, we can infer the toughness or tenderness of each muscle and conclude the effectiveness of each enzyme at tenderizing beef. During this project, we had the chance to work with strong, hazardous chemicals such as concentrated perchloric acid, use high-tech equipments like centrifuges and a Rotovap, perform university level assays and sample

the life and knowledge of a lab researcher.

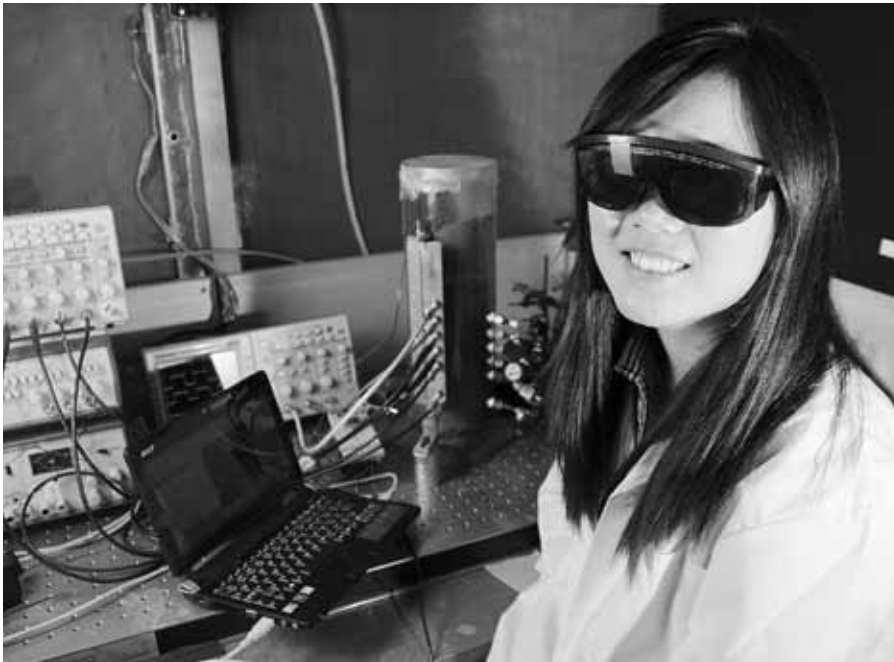
Outside of the lab, the Summer Research program had so many opportunities for every participant to grow and to gain. Every Lunch 'n' Learn and Professional Development Seminars was constructed so efficiently to offer so much in such a short time. Tours to science-related companies and to many research labs on campus persisted to broaden student's awareness of less common fields of science and engineering beyond their own labs. The chance to network with so many successful and outstanding individuals from an array of backgrounds heightened our knowledge regarding university life to specific careers to professional skills. As a whole, this program allowed each participant to experience academia life up close and hands on.

Throughout this program, I've gained so much knowledge pertaining to everyday life, post-secondary life, and future careers – no matter what field I chose. Overall, my experience of the WISEST Summer Research program has gone far and beyond any and every expectation I could have ever had.

Therefore, I cannot put enough emphasis on my gratitude and appreciation of everyone who contributed to this extraordinary program. I would like to thank my sponsors, Canada Summer Jobs, for making this experience possible; without such generosity, I as well as all the other student researchers you've sponsored would not have been able to enter grade 12 with such invaluable knowledge and experience gained by this year's Summer Research Program. Also, a big thank you to everyone in Dr. Heather Bruce's lab who's enthusiasm and patience, knowledge and eagerness to share heightened this experience to unreachable limits – and made a vegetarian appreciate working in a meat lab.

## Scarlett (Si Yao) Chen

Supervisor: Dr. Ying Tsui / Electrical & Computer Engineering  
Sponsor: Faculty of Engineering



*“Finally, I would like to thank the University of Alberta and WISEST for organizing this program and making this experience extraordinary.”*

Being able to explore various prospects of engineering and science in an intellectually stimulating environment as what WISEST provided me this summer was definitely one of the most memorable and rewarding experience of mine during this critical period of my life. Participating in WISEST and having the opportunity to work with outstanding role models in the field of engineering irrevocably played a significant role in maturing my understanding in the realm of science as well as future life goals.

This summer through WISEST, I had the amazing opportunity to partake in Dr.Tsui’s lab under the Department of Electrical Engineering working with laser and optics. My major project aimed to investigate solid content settling in oil sand tailings using laser technology. By shining laser light on the tailings sample and analyze the light scattering patterns of the solid particles, we were able to calculate the rate at which the solid content settles at different levels of the sample. The laser diode used in this experiment was driven by a boost converter, which steps-up voltage and provides a much higher output that lights up the laser diode. Another experiment that I performed along with this project was testing the boost converter circuit and obtaining the maximum gain from the circuit by varying the electrical components. Not only was I given the opportunity to learn about different fundamental physics principles behind light and laser, I was also able to build my own circuits and study the electronics aspect of electrical engineering. Furthermore, I was given private tours on various labs set-ups at our department and was introduced to numerous equipment and technology such as E-beam Lithology, Pulsed Laser Deposition, Label-free Cytometry, as well as how laser technology aids the development of fusion. Being exposed to this wide range of science applications has truly broadened my understanding on the most recent research work conducted in academic settings and extended

my passion towards science and research in my future studies. Also, big thanks to my supervisors and principal investigator for giving me constructive advices at my weekly presentations that not only helped me comprehending more about my research work, but also taught me many valuable skills that will be useful for future formal presentations.

Besides the research studies that I conducted, I also learnt many other aspects of science and engineering through weekly Professional Development Seminars and Lunch ‘n’ Learn sessions. One of the most memorable experiences through these seminars was the University of Alberta Research Lab Tours at the Nanofabrication Lab. Learning about experiments conducted on the Nano-scale and how these research works contribute to a wide range of modern technologies through collaborations between different departments strongly intrigued me and became one of the many components of WISEST that made my experience remarkable.

In conclusion, WISEST has provided me an incredible opportunity to enhance my learnings in the engineering field that I hold great interests in, as well as gaining a general outlook on a future science-based career of mine. Also, given the opportunity to live in residence and share my summer with other amazing WISEST fellow students highlighted my wonderful six weeks this summer. I would like to dedicate my sincerest appreciation to Dr. Manisha Gupta, Tim Ho, Debbie Ha, Gem Shoute, Dr. Douglas Barlage, Dr. Ying Tsui and everyone else who devoted their time helping me with my studies this summer. I would also like to thank the Department of Electrical Engineering for the generous sponsorship and for making my experience at WISEST possible. Finally, I would like to thank the University of Alberta and WISEST for organizing this program and making this experience extraordinary.

## Sharanya Reddy

Supervisor: Dr. James Harynuk / Chemistry  
Sponsor: Dow Chemical, Canada

*“Not only did the Networking Fair help me gain knowledge about career options it also helped me learn the values of a good speaker.”*



Little did I know a few months ago that I would be participating in such exciting research. I didn't even consider myself working in an actual research lab. However the call from the WISEST office in mid May changed my plans for the summer making it more exciting. I had been interested in sciences from childhood, but when asked about my career choice I couldn't decide between medicine and engineering. Before participating in WISEST I thought that the only career options in sciences were in either engineering or medicine. But WISEST changed my perspective and opened my eyes. Through WISEST I learnt there are more opportunities in sciences than just medicine and engineering. I really enjoyed the Question and Answer session and also the Networking Fair. I felt like it helped me understand more about the opportunities provided in university and the unique courses that the university provided. Meeting role models was a really fun event because I really learnt lots about the opportunities provided in the university. Not only did the Networking Fair help me gain knowledge about career options it also helped me learn the values of a good speaker.

This summer I got to be a gas chromatographer working with a gas chromatograph. Who would dream of working with such exciting equipment at the age of sixteen. My research was to help the oil companies remove contaminants from the oil, which not only contaminate the oil but also damage the machines. The oil companies are trying to find a method to remove the contaminants, which are actually alkyl-phosphates. However the problem is the companies don't know what the phosphates are. My research team created a model using standard phosphates. My job was to test different columns by running the compounds through the gas chromatograph and collect the retention data. Once I collect the data I tested the model to see if it worked by comparing the predicted values to the actual values. It was really fun collecting

data, however I had to wait for long periods of time waiting for the peaks.

Other than the exciting work I did this summer, WISEST made sure that we got a chance to tour companies and different laboratories at the university. One of my favorite tours was Intuit, because I never thought computer sciences could be so electrifying. I always thought computers weren't for me because of my lack of knowledge much about them. However I heard that computer science could be really fun without knowing much about computers. I also liked the Nano fabrication lab. From the past two years I had heard many people talk about Nano technology but I had no clue what it meant until the day of the tour. The tour was actually very thrilling and I also was able to understand what they actually did in the lab.

WISEST was definitely an eye opener for me about my future. Although it didn't help me make a decision about my future, it definitely did enlighten me about the various opportunities out there. I'm so thankful for my sponsors, DOW, for sponsoring me and providing with such a great experience. Also without the cooperation and patience of my research team I wouldn't have enjoyed my lab as much as I did this summer. Without my Principle Investigator Dr. James Harynuk and my Direct Supervisor Brandon Johnston I would have been really confused in my lab. They were really patient with me and explained things to me if I didn't understand. They made my work area more comfortable so I was able to ask more questions and engage myself more into the research. If I were given the opportunity I would do WISEST all over again just to experience the knowledge I gained through this program once again!



## Shelby Turner

Supervisor: Dr. Mariusz Klobukowski / Chemistry

Sponsor: Faculty of Science



*“Being from a small town, the WISEST Program has shown me endless possibilities in science that I never could have experienced if I had spent the summer in my town.”*

The WISEST Summer Research Program has given me the most valuable summer experience any high school student with a passion for science could have asked for. Being from a small town, the WISEST Program has shown me endless possibilities in science that I never could have experienced if I had spent the summer in my town. During these wonderful six weeks I've faced endless challenges and learned a lot about myself. At the beginning of the program I had never expected six weeks to fly by so quickly.

WISEST placed me in a theoretical chemistry lab, which really suited my interests when I applied for the program. The first few days of work in my lab were challenging but beyond rewarding. I have gained a tremendous amount of knowledge and valuable skills that I can use for post secondary and future jobs. The research I was a part of for the summer was not what you think typical chemistry research would be like. Everyday I would come in to the office, sit down at my computer, and begin the calculations that needed to be done that day. The word computer was strange to me at first because I thought chemistry research would be mixing substances together and looking at reactions. But what I spent my summer doing was much more different and exciting. Because my research studied the properties of compounds made by xenon and radon, it would be very dangerous to work with the molecules in a lab setting where mixing and stirring go on. Radon is radioactive which makes it a dangerous substance to study in person, but working on a computer allows us to be safe from the harmful effects of radioactivity.

Not only does WISEST place you in a research lab but they also provide many valuable experiences that students get to be a part of. To choose a favorite tour that I attended, or a Lunch 'n' Learn session I enjoyed the most is difficult because they were all useful. Reflecting on what I have learned from the Professional Development seminars

and Lunch 'n' Learn sessions, the one that stands out the most is the networking fair. This provided information that can't come from the Internet or an email. To actually talk to women who have chosen a career in science was very useful because I learned about the challenges and rewards they personally faced to get to where they are now. All of the sessions that WISEST made possible for the students to attend helped me learn new skills and gain valuable knowledge.

When I found out that I had been accepted into the WISEST Summer Research Program, I imagined endless possibilities would be waiting for me. After working in my lab and attending the tours and lunch sessions, I am walking away from this experience with more knowledge than I thought my brain could hold and countless memories. My summer with WISEST has been the best and most beneficial summer I have ever had.

I would like to give a very big thank you to Mariusz Klobukowski and Amelia Fitzsimmons for allowing me to be a part of their lab for the summer. I would also like to thank everyone else in my lab because they made my summer unforgettable. The lab field trips we had made this summer away from home wonderful. I would also like to thank WISEST because without them I would not have been able to have these experiences. Last but not least I would like to thank my sponsor, the Faculty of Science. Without their generosity I could not have been a part of this program.

## Stephanie Schneider

Supervisor: Dr. Maya Evenden / Biological Sciences  
Sponsor: NSERC PromoScience

*"I loved working in the field, I loved being outside, and everything had a more connected feel to it."*



From the moment I discovered I had been accepted into the WISEST program, I was ecstatic. I could hardly sit still while listening to Meagan, one of the coordinators, explain to me what my summer would be like. After I hung up, I was a little wary of the decision. Was I willing to give up some of my summer time, to take advantage of this awesome opportunity? I decided that yes, this was too good to pass up. Now all I had to do was wait to get started.

I was very lucky to get to work in Dr. Evenden's lab. Everyone was very nice and welcoming and helped me consistently throughout the entire program. Dr. Evenden was an entomologist, so yes, I worked with bugs. My primary project centered on minuscule insects that were hosted by willow trees. These insects, appropriately named willow leafblotch miners, infested trees as larvae that mined in between the layers of leaf and caused unsightly blotches. My job was to count all the leaves from the branches we collected and then check over them using the microscope to search for eggs.

My days in the lab were very busy and always entertaining. One day I would be sitting at the microscope working on my project, but the next I could be going on trips to home depot to pick up supplies, or dealing with bugs with diarrhea (it is as bad as it sounds) and even going on pretty spontaneous field work that would end up being a day in the car with occasional treks through canola fields. I could have even been searching for tiny larvae in cages filled with corn that I had helped make the week before. I loved waking up in the morning and not knowing what could have been in store for me. It was completely enthralling.

I was also lucky in the way that I was also assigned field work. Field day was my favorite day of the week. I loved working in the field, I loved being outside, and everything had a more connected feel to it. I saw the blotches on the trees, I saw the method behind our project,

and I saw the way the insects developed through the summer. My job was to collect the branch samples and to change the sticky traps, and it was always a little messy. No two days were the same when it came to field work!

The activities put on my WISEST were also fantastic. They had Lunch'n'Learns and Professional development seminars. I liked all of the Lunch n' Learns, they teach you everything you need to know to succeed in the program and later on in life. My favorites were the professional development seminars. I got to go to the observatory and look at the sun, go on tours at various scientific companies and best of all: I got to explore the U of A greenhouse. It was amazing what you could do on tours. You could touch things, play with the plants or the telescopes, ask any questions you like, and learn about day to day work. The best thing is that you always have a choice for what tour you get to go on, and if you're quick enough you can do all of your favorite things- or try something new!

I would like to thank Dr. Evenden for graciously opening up her lab for me during the summer. Also a big thanks to Caroline Whitehouse, who helped me in the lab, showed me what to do, and helped me revise my poster. I would also like to thank WISEST for this amazing opportunity and who have done an amazing job in organizing the summer. Lastly, without my sponsor I would not have gotten anywhere, so thank you NSERC PromoScience for helping me on the path to my future!

# Sydney Van Der Voort

Supervisor: Dr. Robert Driver / Civil & Environmental Engineering  
Sponsor: Dept. Civil/Environmental Engineering



*"I saw so many different, cool research projects and areas of research people are working in."*

I have always agreed with the idea of living every moment as if it is your last and enjoying everything you do because life is short and unpredictable. The past six weeks have shown me just how true that is; it feels like the orientation was just a week or two ago. Unfortunately, that is not the case. Looking back over the six weeks I have spent meeting and interacting with awesome and knowledgeable people makes me wish it could go on for longer. I have enjoyed myself immensely and the experience has opened my eyes to what life could look like not only in university, but also after schooling,

Working in a university research lab as a high school student is an experience very few people get; I am so fortunate that I was one of the ones that was given the opportunity. This summer I was working in the structural engineering lab with a number of exciting and wonderful people. The research project I was helping out with was based on testing the connections between steel beams. Although I was unaware at the beginning, there are actually a lot of different ways to connect steel beams. We were looking at one in particular: an extended shear tab. An extended shear tab consists of a steel plate (tab) that is welded to the center part (web) of a beam so that it sticks out in a perpendicular fashion. At the end of the tab, there are some bolt holes that are used to attach it to another beam. In the lab we were testing the how strong the tab is and how much force it can hold before breaking. The information we gathered will be used to help people in the construction business build more efficient connections and, therefore, cheaper buildings.

Not only did I learn a lot about steel, buildings, and structural engineering, but I also learned a lot about research; all the work that goes into preparing and getting ready for testing; and what it takes to put all the data together after testing in a way that makes

sense. I have seen how hard research can be and that the tedious parts are larger than I imagined. However, I have also seen how to have fun in all those situations and all the interesting stuff that can be done in and through research. I have learned so much about many different things that go on in the world around me that I never would have imagined where there. But, more importantly, I have had an awesome experience in the lab and learned so many great skills that I will be able to use in university and beyond.

Although I learned tons in the lab, other great experiences I had were on the industry tours and touring other labs around campus. They opened my mind even more to all there is to do after high school and all of the cool things other people are doing. I saw so many different, cool research projects and areas of research people are working in. Seeing these has really inspired me and made me appreciate my options so much more. The industry tours and networking fair have shown me many different paths I can take after university and the interesting aspects each one of them involve. Most of all, the tours have opened my eyes to the world beyond schooling. I now see what can be done with the schooling I will get.

Lastly I would really like to thank my sponsor, the Department of Civil and Environmental Engineering; they are the only reason I was able to get this incredible experience. I would also like to thank my supervisors Kristin Thomas and Smitha Koduru for being patient with all my questions, helping me learn, having fun with me and giving me such a great experience.

## Teresa Sokolowski

Supervisor: Dr. Al Meldrum / Physics

Sponsor: Faculty of Science

*“After working in a university lab, I’ve become more confident and I feel like I can do anything I set my mind to.”*



Spending six weeks of precious summer working in a lab may not be everyone’s ideal choice of vacation, but I am certain that there was no better way for me to spend mine. Going into the WISEST Summer Research Program I anticipated a summer full of learning opportunities and exposure to many sciences, although I didn’t fully know what to expect. I’d heard great things about WISEST and had high expectations for the summer ahead. I looked forward to networking and talking to people in diverse fields. I also hoped that I would figure out what program to take in university, which is exactly what happened.

Throughout the summer, I worked in Dr. Al Meldrum’s physics lab studying the light emission of quantum dots for gas sensing applications. A quantum dot (QD) is a crystal sphere composed of hundreds of atoms, in this case silicon (Si). Si-QDs can absorb and re-emit light, a process known as photoluminescence. In our experiments we shined a blue laser on a silicon chip with a coating of Si-QDs and measured the re-emission of light from the QDs.

In addition to my regular day-to-day work, I had the opportunity to help out at the University of Alberta Observatory on a weekly basis. My supervisor is the Teaching Assistant at the observatory, and I assisted him with public viewings during the program. In my time at the observatory I learned how to operate the telescopes, and I learned about the radiotelescopes. I also had the opportunity to meet several people studying astrophysics, who exposed me to that branch of physics and helped me realize that astrophysics is my true passion. It was great being exposed to not only condensed matter physics in my lab, but astrophysics as well, allowing me to explore the similarities and differences between the two physics disciplines.

Outside of our everyday lab work, we attended Professional Development Seminars and Lunch ‘n’ Learns held by WISEST, where we

got to explore possible career options, tour labs, and develop valuable skills. After visiting Syncrude and Gilead, and touring several on-campus labs, I have to say that my favourite event was the tour of the observatory. I’ve had a passion for everything space-related since I began to learn about astronomy when I was eight years old. Because I visited the Observatory many times, I was able to give a presentation on the formation of Northern Lights, which are caused by the sun. I showed the other WISEST students the telescopes and instruments that are used for research, and explained to them the different things they were seeing while looking through the telescopes. It was very fulfilling to be able to answer all the questions being asked.

Looking back on the past six weeks, I’ve realized that the summer went by too quickly. I’ve made many memories, amazing new friends, and gained valuable skills. After working in a university lab, I’ve become more confident and I feel like I can do anything I set my mind to.

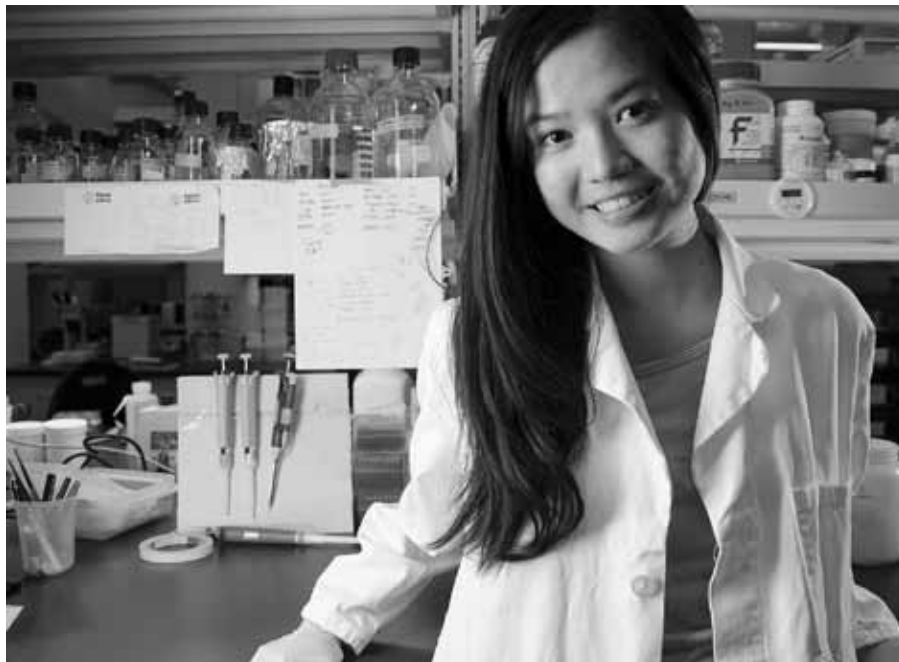
I’ve been extremely fortunate to have had the privilege to work with so many knowledgeable people. Everyone in my lab has helped me in one way or another, whether it was guiding me through work, or helping me figure out the classes I should be taking when I attend university. I learned something from each of them. My experience with the WISEST Summer Research Program has been fantastic. Needless to say, my expectations for the program were not only fulfilled, they were exceeded. I would strongly recommend the program to anyone with a curious mind and a thirst for knowledge. I would like to thank my supervisor, Ross Lockwood, for mentoring me throughout the summer, and my sponsor, the Faculty of Science, without whom I would never have been able to take part in this amazing opportunity.



## Ting Ju (Ruby) Yang

Supervisor: Dr. Michael Deyholos / Biological Sciences

Sponsor: Service Canada (Canada Summer Jobs)



*"I have gained the skills of working in a lab, drawing a map to my future and making incredible friends."*

At first, the feeling of being accepted to WISEST was a tremendously breathtaking feeling. To my surprise, I never really realized how unique the WISEST summer program was until I saw the many intelligent faces during the orientation day.

Entering Dr. Michael Deyholos' lab for the first time was extremely overwhelming. The lab was filled with many bright graduate students, as well as various science-related equipments. As a high school student, it was a bit intimidating and just a little too much to take in at one time. Honestly, it was a bit terrifying. Fortunately, this feeling did not last too long. It did not stop me from getting to know everyone in the lab and experiencing what it felt like to work in a "real" lab. With an interest in plants, I was put into a lab that focused mainly on mutations of flax plants and ways to improve the quality in flax fibers. In every experiment, every hands-on process, I always had a spirit of learning more. It was the determination and the dedication of each lab member that gave me the strength of mind. Through the guidance of my supervisor, I was able to gain much knowledge of various techniques in the lab.

Besides being in the lab, I really enjoyed being with other WISEST students during the various Professional Development days. It was a great way to share experiences in the lab with others and to make life-long friends. During the Professional Development days, I had the chance to visit various labs I have never ever considered or even thought had existed. It's these small experiences that have broadened my perspective in my future career choices.

I also really enjoyed attending the Lunch N' Learns. One of my favorites was the art of networking with Dr. Margaret-Ann Armour. It was amazing to hear her thoughts of the importance of getting to know people. "You can do it!" she said. I have never thought of the line as holding any significance or importance. It is through

her view that I realized the people around me do trust that I can succeed in what I do. This session taught me to give myself high expectations and to meet new challenges. It is about thriving and meeting others whom may broaden or change my perspectives. I learned that taking every opportunity is a decision of love over fear. Sometimes, it takes a risk to experience a door of opportunity that was always there but was always invisible.

From these short 6 weeks, I can truthfully say, my expectations were fulfilled. I have gained the skills of working in a lab, drawing a map to my future and making incredible friends. In the beginning, I joined the program to broaden my views of the many careers. Now, I can really see that it is way more that. Through Q&A sessions with university students, I can now slowly see where I want to be in the next 5 years.

Now that the WISEST program has come to an end, I realize that these few weeks have just flown by in a blink of an eye. I am terribly going to miss the many WISEST friends and the research team members.

I would like to thank my sponsor, Canada Summer Jobs for giving me an eye-opening opportunity. Without my sponsor I would not have experienced one of my favorite summers. Thanks also goes out to the WISEST team for organizing this program. Also, I would like to thank my principal investigator, Dr. Michael Deyholos for allowing me to be part of this research project. A big thanks to my direct supervisor Lai To, for making working in the lab absolutely memorable. Thank you for being so patient and friendly. With all these people, my summer experience in the WISEST program was truly a success.

## Tracey Tran

Supervisor: Dr. Monika KeelanKeelan / Laboratory Medicine and Pathology  
Sponsors: WISEST

***“Going into the program with an open mind definitely allowed me to take full advantage of the opportunity.”***



With the pressures of entering the last year of high school in the fall and with university quickly approaching, I told myself it was time to start thinking about the future. Therefore, I took a chance and applied for the WISEST Summer Research Program in hopes of work experience and new insight, and I am glad I did. Working in a lab sounded tedious, but I became engaged in the work and the time flew. For a student transitioning from performing small experiments in a regular high school lab to contributing to actual research in a hi-tech university lab facility, the learning curve was pretty high; I found myself asking numerous questions, trying to piece everything together, and eventually it clicked. Going into the program with an open mind definitely allowed me to take full advantage of the opportunity.

I was placed in the Department of Laboratory Medicine and Pathology, in the lab of Dr. Monika Keelan. Our study focused on *Helicobacter pylori*, a human pathogen that colonizes the stomach, which is prevalent in over half of the world's population. *H. pylori* causes inflammation and is linked to stomach ulcers and, in extreme cases, cancer. The aim of my research project was to determine whether certain genes in *H. pylori* strains from the community of Old Crow, YT were associated with the severity and chronicity of gastric infection and diseases, as the prevalence of this bacteria was alarmingly high in this particular community. Specifically, I focused on the *sabA* gene, which is believed to play a major role in colonization. It expresses the sialic acid-binding adhesin, *sabA*, that binds to receptors on the stomach epithelium in addition to neutrophils, resulting in persistent inflammation.

DNA from various strains of *H. pylori* were isolated after being cultured from gastric biopsies, and using the polymerase chain reaction (PCR), we amplified the *sabA* gene using specifically

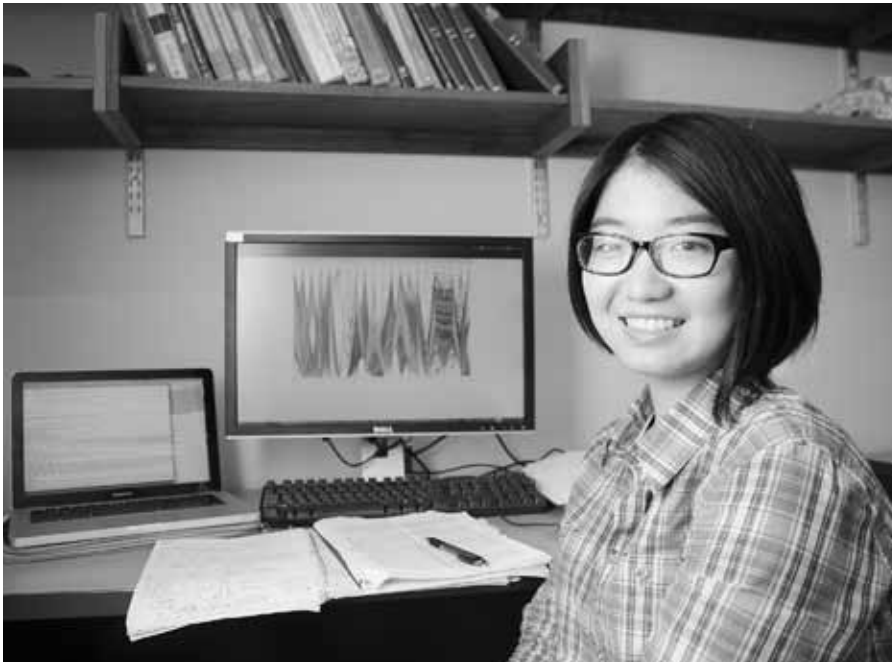
designed DNA primer pairs. Then, by performing gel electrophoresis, we were able to detect the presence of the gene under UV light. By comparing the results with the pathology reports, we determined whether there was a correlation between the presence of *sabA* and the severity of gastric diseases. Indeed, we found that there was a high prevalence of *sabA* in the *H. pylori* strains and there is a strong correlation between the gene and the severity of gastric diseases. After working in the lab, I have realized the struggles and rewards that come with research and will carry this experience and the skills I have gained with me in future endeavors.

I have definitely gained a lot through the WISEST program: knowledge, experience, and new honed skills. Through professional development seminars involving tours of hi-tech lab facilities, as well as lunch n' learns with guest speakers who shared their valuable knowledge and advice, I feel that I have a new perspective and insight in the field of science and research. I was exposed to so many different aspects of science and technology and I know that my participation in the program will open so many doors for me in the future. I am also grateful for all the people that I have met through the program. Everyone is extremely talented and intelligent, and I wish them all well.

I would like to thank WISEST for giving me this amazing opportunity, as well as for sponsoring me - for without their sponsorship I would not have been able to participate. I am also extremely grateful of all my teachers, who have taught me so well. In addition, I would like to extend my gratitude to my teacher references, for taking the time to write references for me and promoting my participation. I would also like to thank Dr. Monika Keelan and Jun Li for allowing me to take part in their research as well as for their patience and kindness.

# Tracy Xiang

Supervisor: Dr. Joerg Sander / Computing Science  
Sponsor: Process Solutions Canada



*“Simply being part of a research team is an amazing experience.”*

There’s nothing more accurate to describe my past six weeks at the WISEST Summer Research Program than a quote from Wernher von Braun: “Research is what I’m doing when I don’t know what I’m doing.” This summer, I worked with the data mining team consist of Lucia Cichella, Katharina, my supervisors Dr. Arthur Zimek and Dr. Jöerg Sander, who are currently working to perfect unsupervised data mining methods such as clustering and outlier detection. Outliers are objects that very different from the rest of the data based on certain measures, and they often contains useful information on abnormal behavior of a system represented by the data. I was put to the tasks of preparing data plots with gnuplot, a command-line driven graphing application, and analyzing data sets using different outlier detection algorithms or input parameters implemented in the data mining software ELKI. Like most of the participants of WISEST, prior to the start of the program, I was worried about the potential issue of not knowing enough—which came true. Data mining is a fascinating field at the intersection of computing science and statistics, and naturally, on my first day to work, I, a high school student who only have a math-30-level statistics background, felt intimidated by the very high dimensional datasets and the almost abstract conceptualization of multivariate data visualization. I did not mind that however, I enjoyed my project—because of the the superb people I worked with, because of the satisfaction you get when you finally understand a concept, because of the process of “generating” knowledge, which is what I think research is all about. WISEST offered me the perfect opportunity to experience what it is like to be a researcher. Aside from understanding various aspects of outlier detection, the most valuable knowledge I have gained from the research are the little things I picked up—little things that may seem irrelevant to my project as well as little things that I’d never stumble upon if I didn’t go looking—I learned about how to compile

java source code when I installed gnuplot, I learned about covariance matrices when I tried to figure out what Mahalanobis distance is, I learned how to effectively read a research paper when I had to make sense of a data plot. Simply being part of a research team is an amazing experience. Every member of the research team is my teacher, my colleague and my friend. Sometimes I even forgot that I’m still a high student because I was so involved with the research and the amount of responsibility and respect I have received.

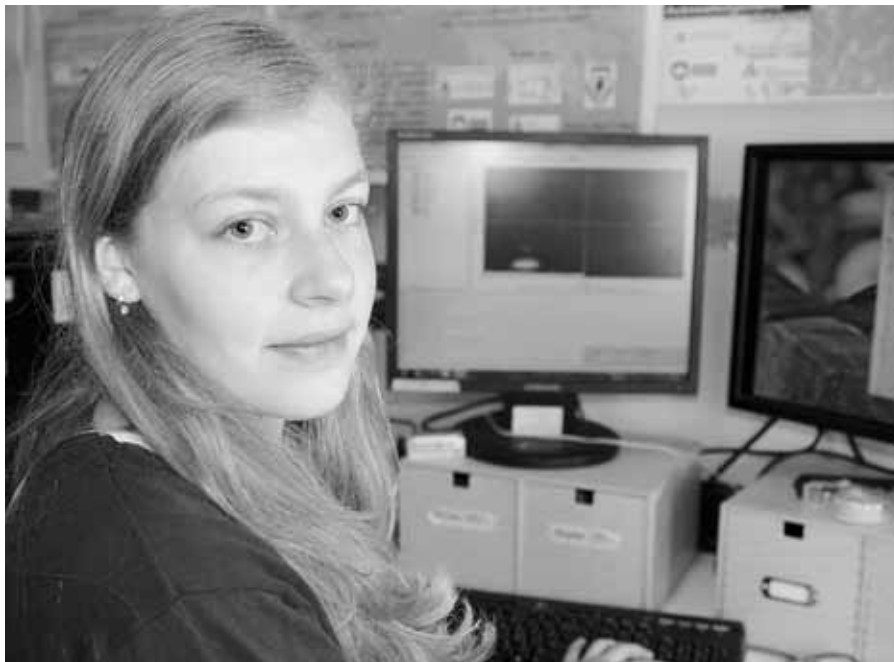
Other parts of the program such as the Professional Development days and Lunch n’Learn sessions gave me the chance to see what is like being in the field and to discover new areas of science and engineering that I never knew before. Valuable skills such as networking with people, public speaking and preparing a research poster were also aspects of the program that I enjoyed immensely, and I’m certain that these skills will greatly prepare me for pursuing a career in science.

I cannot say thank you enough to everyone who have made the WISEST Summer research program a unique and incredible learning experience. My thanks goes all the guest speakers, engineers and researchers who devoted their time to this program. Dr. Zimek and Dr. Sander, thank you for letting me participate in your research, I truly appreciate your patience and guidance. Lucia and Katharina, it’s a pleasure knowing you guys, thank you for your help and insight regarding the research concepts and studying computing science. Meagan, Kaitlyn and the rest of the WISEST team, thank you for organizing everything and answering all my questions. I would like to thank my teacher references and family for their support. Also, I am grateful to my sponsor Process Solutions Canada for making this summer possible.

## Victoria Wyring

Supervisor: Dr. Chris Sturdy / Psychology  
Sponsor: WISEST

*"I wasn't exactly sure where in science I wanted to pursue but I knew that I wanted science to be a part of my future."*



The WISEST Summer Research Program is a summer I will never forget. When I got the call that I was accepted into this amazing program I couldn't believe that I was actually going to be able to spend a summer researching science. I wasn't exactly sure where in science I wanted to pursue but I knew that I wanted science to be a part of my future. I figured that the WISEST Program would be perfect for me as it has many opportunities for exposure of different areas of sciences and careers. Before the program started I was not sure what to expect out of this summer but I knew that it would be a fantastic experience and I was so happy to see that I really enjoyed it.

I joined Dr. Sturdy's Psychology lab in studying songbirds. I worked mostly with raven vocalization and comparing raven calls from Sweden, Austria, and the Yukon. The other WISEST Student, Amanda Kryslar, and I worked together in the lab, me studying the ravens and she working with chickadees. We took the calls that had been collected by part of our research team and generated spectrograms so we could analyze and measure their qualities and characteristics. Although the analyzing of the calls was tedious work it never got boring because the calls were all different and it was amazing to see how you could take sound and turn it into something you can see. As well, we got a chance to feed chickadees and finches everyday which was a very cool experience. We also had the opportunity of helping one of the graduate students in our lab with researching how humans perceive and understand sound and music. It was interesting to be exposed to such a variety of different research that was available to us in Dr. Sturdy's lab and I really enjoyed it. Working in this lab allowed me to be exposed to new areas of research that I had never really known about before and meet great people who loved science and research.

As well as the lab experience, the WISEST Program provided lots of other exciting opportunities such as the industry and research tours. I got to see the lab environment of the companies INTUIT and Maxxam and how people work with science as a career. Also I got to visit other research labs on campus including the Biological Greenhouses and the Observatory, both of which I found really fascinating. Aside from these Professional Development Seminars, we also learned important and useful skills in the Lunch 'n' Learn sessions about how to network and how to create research posters and reports. The skills I learned from these sessions I will hopefully be able to use as I finish high school and begin university and will be useful even as I continue on in my life.

The WISEST Research Program has been a whirl-wind of knowledge and learning and I would like to thank all the people who made this chance available to me. I want to thank my research team: Dr. Sturdy, Marissa Hoeschele, Allison Hahn, Ann-Marie Pryzslupski, Lauren Guilette, Lee Vilinsky, Daniel Lee, and John Hoang for teaching me about research and providing a great environment to work and learn in. As well I would like to thank the WISEST Team: Kaitlyn Wall, Meagan McLavish, Denise Hemmings and Grace Ennis who made the WISEST opportunity possible for me and so many others. I would also like to thank all of the people and sponsors who generously donated to the WISEST Program as they have helped in creating an extraordinary program and without them this would not be as great a success.



## YiLin (Linda) Zhao

Supervisor: Dr. James Harynuk / Chemistry  
Sponsor: Service Canada (Canada Summer Jobs)



*"I learned that scientific research was not just about getting a solution of a problem."*

Before I participated in WISEST, scientific research was like an unfinished puzzle to me. It was not until this summer that I learned that the pieces can be put together and experienced the real world of scientific research.

This summer, I had the privilege of working in Dr. James Harynuk's lab under the direct supervision of Dr. Paulina de la Mata. I gained valuable experience with gas chromatography, a widely used technique for separating and analyzing components of a sample. Its applications are found from the oil industry to forensics. I also gained insight into the field of analytical chemistry and learned useful laboratory techniques by helping prepare samples for my supervisor's research. In meeting and interacting with new friends, I also expanded my network, finding important mentors.

I worked on two research projects during my six-weeks. The first project aimed to find the limit of quantification (LOQ), the minimum concentration to distinguish change. Multivariate detectors were investigated; they detect time, peak intensity, and an additional variable. For this project, I learned to simulate and analyze two-dimensional gas chromatography (GC x GC) data using the computer programs MATLAB and Leco.

My second project involved differentiating male and female human odours using worn socks by applying gas chromatography (GC) methods. In this investigation, five subjects, including myself, wore new socks during exercise, producing pungent odours. A 0.7cmx0.7cm piece was cut from the heel area and placed in a vile. The odour is then extracted using solid phase micro-extraction (SPME) methods, which uses a coated fibre to absorb odour. The fibre was exposed to the odour for 10 minutes at 30°C, retracted and removed from the vile, and then exposed to a heated GC for desorption. Using comprehensive two-dimensional gas chroma-

tography (GCxGC), the components were separated and identified. A similar process was used to investigate compounds in Lacoste perfumes for men and women. We found many fragrant chemicals. The perfume for women had more than double the number of compounds found in the perfume for men.

I learned that scientific research was not just about getting a solution of a problem. Sometimes, we need to take a few detours, walk through a garden, or climb a mountain. Although it might not be the most efficient way to reach the destination, we still find the exit to the maze through trial and error, discovering new things along the way.

The six-week program is not solely research. Every week, WISEST organized a Professional Development Seminar. WISEST students toured an on-campus laboratory or an off-campus facility. To me, the most interesting tour was visiting the Nanofabrication Lab and the Laser Technology lab. I had the chance to visit an engineering lab and see a number of interesting phenomena, such as the internal reflection of light. During the Networking Fair and the University of Alberta Q&A, there were plenty of chances to demystify university life and non-traditional careers.

I would like to thank everyone in my lab, especially my supervisor, Paulina de la Mata, for taking such good care of me, making my research experience unforgettable. Special thanks to my Principal Investigator, James Harynuk, for providing the experimentation equipment. Finally, I would like to thank Canada Summer Jobs for sponsoring me to attend the WISEST program this year. I believe this summer had a perennial influence on me. The skills I have gained through the WISEST program will accompany me throughout university, work, and the rest of my life.

# MAKE THE WISEST CHOICE

## Build a stronger, more diverse workforce in science, engineering and technology

*Help us encourage individuals to look beyond the traditional roles and learn more about diverse careers in science, engineering and technology. Build their enthusiasm. Empower them to advance in these fields. Promote a future of diverse voices in the workplace.*

### The Situation

Many young women are excelling in University of Alberta post-secondary programs, yet few women study in science, engineering and technology fields. Female students are scarcest in Physics (19.1%), Computer Sciences (12.5%), Electrical & Computer Engineering (17.7%) and Mechanical Engineering (13.1%). • The 'Women in Canada: A Gender-Based Statistical Report, 6th Edition, 2010-2011, Statistics Canada' reports 22.3% or less of the workforce are women in selected occupations of natural sciences, engineering, and mathematics. • Media reports have highlighted a similar under-representation of women in leadership positions within organizations. • Research by Catalyst, the global organization representing women in business, confirms the positive connection between gender diversity on corporate boards and financial performance.

### WISEST Solution

- Create interactive and engaging education experiences that broaden high-school students' awareness of diverse careers and build their enthusiasm for these fields.
- Connect early-career women in science, engineering and technology fields with each other and with the information, resources and professional development opportunities they require to advance in their careers.

### How Can You Help?

- WISEST Summer Research Program: \$3000 provides a six-week hands-on research experience in less-traditional fields for a high-school student. Multiply your Impact: Sponsor more than one student. Sponsor for more than one year.
- Networks for early-career women: \$600 supports a monthly network session for early-career women in science, engineering, technology and math.

### The Value to You

- Have your support recognized in WISEST events, materials, reports, website
- Demonstrate leadership within the professions, industry, and the general public
- Showcase your workplace by participating in network events for early-career women
- Your workplace benefits from gender diversity within science, engineering, technology careers

### Donate

Thank you for supporting the WISEST way.



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