

# WISEST

women in scholarship, engineering, science & technology



**JOURNAL OF  
STUDENT  
RESEARCH  
2011**



women in scholarship, engineering, science & technology

### **WISEST**

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### **Who is WISEST?**

WISEST (Women in Scholarship, Engineering, Science and Technology) is a unit within the Vice-President (Research) portfolio at the University of Alberta. It is an inclusive community for women to network, explore career opportunities and gain leadership experience in science, engineering and technology (SET).

### **Our Beginnings**

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, to take action to alter the situation, and to work to increase the percentage of women in decision-making roles in all fields of scholarship.

### **Where are we now?**

WISEST collaborates with industry, government, academia, and over 600 volunteers a year to deliver programs and networks that enhance the attraction, retention and advancement of women of all ages in science, engineering and technology, thus strengthening society by increasing gender diversity in the workplace.

### **How is WISEST advancing its goals?**

Recognizing that the number of women interested in science and engineering tends to decrease at each educational transition, WISEST programs and networks have been designed to engage and encourage girls and women at integral points in their education and career paths.

Our current programs deliver relevant and effective activities and experiences to primary and secondary students.

- Choices Conference: *a day of science activities for 600 grade 6 girls and their teachers*
- SET Conference: *a one-day experience for 200 female high-school students*
- Summer Research Program: *a paid, hands-on research experience for Grade 11 students*
- Meet-a-Mentor: *a live videoconferencing series designed for junior-high students, featuring science, engineering and technology role models and experiments*
- IlluminateIT: *Computer science and technology comes alive to girls and boys (10-15 years old) with hands-on activities*
- Tales from the Science Buffalo: *an initiative to stimulate interest in science for Grade 5-9 rural Aboriginal students.*

We also support networks for undergraduates, graduates and early-career female professionals in science and engineering.

- UA-WiSE (University of Alberta – Women in Science and Engineering) *a learning and support group for undergraduate women in the fields of science and engineering*
- WISER (Women in Science, Engineering, and Research) *connects early-career women in science, technology, engineering and mathematics (STEM) with each other and with the information, resources support, and professional development opportunities they require to advance in their careers.*



# WISEST

**SUMMER RESEARCH PROGRAM 2011**

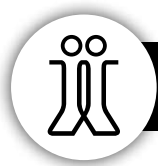


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**STUDENTS FROM THE 2011 WISEST SUMMER RESEARCH PROGRAM**





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# THE ANNUAL WISEST SUMMER RESEARCH PROGRAM

*By Denise Hemmings, Ph.D. (WISEST Chair)*

In early 1982, while attending a seminar on microprocessors, Dr. Gordin Kaplan (then the University of Alberta Vice-President, Research) noted that there was only one woman among the 150 people present. This triggered the creation of a new group to promote participation of women in the non-traditional careers – Women in Scholarship, Engineering, Science and Technology (WISEST). The group's primary job, as directed by Dr. Kaplan, was to try to understand why women are under-represented in the hard sciences and engineering, and then do something about it. WISEST began by investigating why relatively few young women choose and remain in careers in the sciences and engineering and then initiated several on-going programs to change the situation. Since women are still markedly under-represented in decision-making roles in the sciences and engineering, WISEST continues to concentrate its efforts on these fields.

One of the first major initiatives was the WISEST Summer Research Program, a valuable six-week research experience at the University of Alberta for high school students who are making decisions about their future fields of study and career paths. 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.

Under the supervision of their scientist mentors and fellow research team members, the WISEST students learn first-hand about cutting-edge research, the techniques and types of research being conducted, the research career opportunities available, and they gain an introduction to academic and university life. A variety of Professional Development sessions give students even more information about non-traditional areas 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. With each sponsorship WISEST can recruit one more student to join the program and gain valuable life experience. 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.





# AN OVERVIEW OF 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.

## 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.

## 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, Dow Chemical Canada, Gilead Alberta ULC, and Afexa Life Sciences. The students develop research-based and personal skills including scientific writing, networking, creating scientific reports, posters and giving presentations.

The summer ends with "Teacher Appreciation Day" and "Celebration of Research" which highlight 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.

## Based on the WISEST "3 R" Formula—Remarkable Role-Models & Researchers:

The WISEST programs are all about strong inspiration and solid coaching.

We rely on dozens of role-models – women and men working in applied sciences, technology industries and in all fields of engineering – to share in person their experiences and the challenges of pursuing professional careers and corporate excellence while still managing to live balanced, complete lives.

Complementing the inspiration we draw from our role-models is the dedicated coaching we gain from University of Alberta researchers, some ranking among the world's finest, who serve as volunteer summer supervisors for the WISEST students.

## The Results:

Surveys indicate that the top advantages for students participating in the 2011 Summer Research Program were: 1) preparation for university life; 2) learning more about a particular field of interest and a career in this field; 3) broadened awareness of different fields of study in science, engineering and technology; and 4) developing personal and professional skills

Our research shows that a student's hands-on experience in the lab is one of the key factors in developing and increasing their interest in a particular field.

85% of program alumni pursue studies in the Faculties of Science and Engineering.

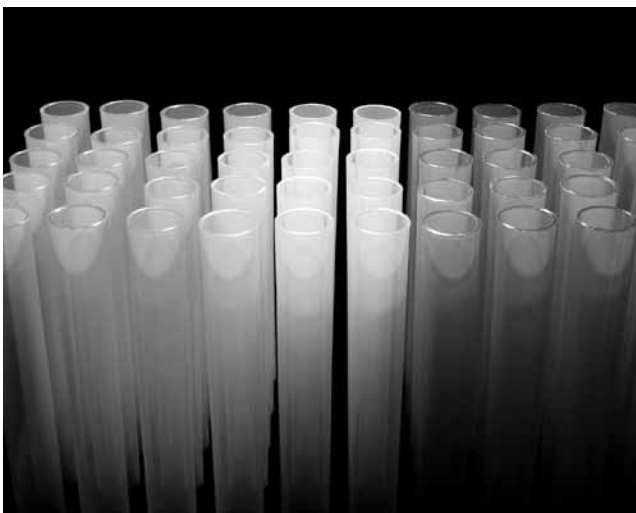
More than 1500 young women and men have participated in the WISEST Summer Research Program, thanks to the support of far-sighted sponsors and committed research supervisors.



L to R: Grace Ennis, Catherine Lee and Kerry Heberling

## WISEST 2011 PARTNERS AND CONTRIBUTORS

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### Partners

- Alberta Education
- Alberta Employment, Immigration and Industry (STEP)
- Alberta Innovates-Health Solutions
- Alberta Innovates-Technology Futures
- Alberta Women's Science Network (AWSN)
- Allard Foundation
- Canadian National Railways
- Dow Chemical Canada Inc.
- Edmonton Chapter Beta Sigma Phi
- Edmonton Glenora Rotary Club
- Eleni Stroulia, Ph.D., Dept. Computing Science
- Epsilon Chemicals Ltd.
- GlaxoSmithKline Foundation
- Merck
- Nexen Inc.
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- Syncrude Canada Ltd.
- Total E&P Canada
- University of Alberta
  - Faculty of Agricultural, Life and Environmental Sciences
  - Faculty of Engineering
  - Faculty of Nursing
  - Faculty of Science
  - Department of Civil and Environmental Engineering
- Weyerhaeuser
- WISEST Golf Tournament

### Contributors

- New Paradigm Engineering Ltd.
- PennWest Exploration
- University of Alberta - Faculty of Medicine and Dentistry

# MAKE THE WISEST CHOICE

## Empower women in science, engineering and technology

*Help us encourage women 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



## ORIENTATION TO THE WISEST SUMMER RESEARCH PROGRAM



By Jade Shandro

The day had finally come, one that we had anxiously been anticipating. After nearly six weeks of waiting the first day of the WISEST Summer Research Program, it was unfolding before our eyes. Slowly students trickled into the ETLC and sat in a room of unfamiliar faces. Everyone looked around at each other, taking everything in, and quiet murmurs of worries, nerves, and excitement filled the room.

Catherine Lee stood up and a hush fell over the room in a wave. She introduced herself and a couple of the other people who worked behind the scenes to make WISEST tick — Kerry Humphrey and Jen Duffy. Everyone was nearly vibrating in the chairs, eagerly awaiting the first instruction of the program. She began with an ice breaker — Four Corners. I used to play this game when I was in elementary school, so playing it the first day of WISEST was a fun shock. It allowed students to talk and introduce themselves and in the first minute we found out half of the students use Crest toothpaste in the mornings. After stumbling around laughing and sharing everything from our favourite books to our favourite sport, the instruction began.

We realized that this was not just 'some research summer job', but rather an extraordinary opportunity to get ahead and go one step further to develop ourselves. Denise Hemmings, WISEST chair, and Grace Ennis, WISEST coordinator, explained that WISEST was more than just a job, and how it's been employing women with a passion for science for 27 years. Not only did this make us realize how lucky we are to be chosen for this program, but also set a bar to be reached. Young women all over Alberta craved an opportunity like this, and we 60 were decided on. This was an undertaking for us to

strive and discover our full potential.

An alumna of the program, Jordan Fordyce was introduced and talked to us about her WISEST experience and how it has opened many doors for her. Everyone listened with apt attention as she told us that this summer would blow our minds, and it that was exactly what we wanted from the program. We were reassured that as long as we were willing to try, and go the extra mile, we would definitely reap the rewards of the WISEST program.

After the speeches were made we were sent on a scavenger hunt with a group of fellow WISEST students to get us acquainted with campus. Many of us were relieved for the chance to find our way around campus as a group rather than face the ominous task alone, and gladly, we were given maps. The reward for finishing the scavenger hunt was lunch! I wasn't surprised to find that our conversations over lunch weren't about boys and clothes, but rather about science and math. It was easy to tell that everyone else in the room was enthusiastic about working in a research lab for the next six weeks.

Following lunch we given a final presentation on what to expect from labs and how to be safe in them. After warning us that hair on fire is not a pretty sight (or smell) we were ushered out to meet our lab supervisors. They greeted us with friendly smiles before leading us away from our newfound friends and towards a daunting six weeks. Little did we know that the WISEST program really was like a game of Four Corners, but rather than four corners there were many. All we had to do was step towards a corner and say 'hi'.

## RESEARCH IN ACTION: **GILEAD ALBERTA ULC**

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By Esir Da'ar

One of the unique things WISEST provides to their summer researchers is that the students are able to get a firsthand look at different facilities to give us a preview of the different jobs that are available to us after university.

When picking one of the tour options for our Monday professional development, I was given the chance to either attend Gilead or The Dow Chemical plant. I know that Dow seemed more of what I wanted to get into when I had the chance to attend university. However as a WISEST recipient it is my duty to explore the different jobs that are offered to me and be exposed to new ideas. So having that in mind with Gilead being one of my choices, I was sold. I know going to Gilead would be a new experience that only this program could offer so I could not let the chance pass me by.

When entering Gilead they gave us a brief, but informative, view on the work that they put in to help people in need. The WISEST students and I learned that this research centre was not about making a pill but, they were there to create what the pill contained. Gilead produced things like Atripla for people diagnosed with HIV/Aids. Vi-read to aid people with liver diseases, Tamiflu for respiratory problems and much more. This obviously is very time consuming and requires many tedious steps. Although, to get the gist about this company the people at Gilead were able to reduce it to the three main steps.

The first step in this process was called the discovery stage. This step is when someone believes they identified something new that could help someone with a terminal disease. The research must go through many different tests to see if everything is functioning well. During this stage in the process I learned that the researcher developing these samples must document their work continuously. This way if there was a mistake in their process they are able to look back in their books and discover what the problem was. In this stage they used very interesting instruments such as an HPLC to separate the different compounds in the sample. Not many samples get passed to the second stage but when they do they enter the development stage. This was the area where everyone was required to wear hard helmets because there was a potential of objects falling on us. When we entered this area they were using massive reactors and other instruments to mass produce the different samples that passed stage one. This was very eye opening to see the different aspects that are put into the medicine one buys. The last step of this process is the commercial stage. This is when the synthesis of whatever sample they have created is validated and works. This way there product can be introduced to the media and people can pick up on it.

When learning about Gilead I was baffled by the different job opportunities they offer. Initially, I had the preconceived notion that everyone who worked there were either in the medical field or a chemist. However, Gilead hires people with experience in sales and marketing, public affairs, accounting, and so much more. This was the turning point of the way I saw facilities like these because, I re-



*“This (Professional Development Seminar) was the turning point of the way I saw facilities like these because I realized that not only do they need scientists and researchers there, but everyone plays a part in their success”*

alized that not only do they need scientists and researchers there but everyone plays a part in their success. Also something that was extremely beneficial to me was that I learned Gilead hires many students from the University of Alberta. So in the near future if I do choose to attend the University of Alberta then I will remember this place for their job opportunities.

I realized that day that this opportunity handed to me was a gift. Not many people are able to say that they toured a place like Gilead firsthand.



## RESEARCH IN ACTION: **THE DOW CHEMICAL COMPANY**

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*By: Bailey Sadowsky*

The Dow Company's Fort Saskatchewan site began manufacturing products for agriculture, pulp and paper, oil, and transportation industries in 1961. Currently, the 2128 acre Fort Saskatchewan site uses natural gas and salt to produce basic chemicals and plastic products. Fortunately, The Dow Chemical Company was one of the two tours available for the 2011 WISEST students to choose from on July 11th as part of the WISEST Research in Action.

At noon on July 11th, we anxiously boarded the bus for Fort Saskatchewan. Our knowledge regarding the Dow site was limited since some students only drove by the plant occasionally, while others never heard of the facility before. As a result, everyone had different interpretations and opinions of the site, and we all had different expectations of the tour. Regardless of our experiences with the site, we couldn't wait to begin our tour.

The moment we stepped out of our luxurious bright yellow bus, we were greeted by Marcella deJong, P.Eng., a friendly Dow employee who would act as our tour guide for the afternoon. However, before we were allowed inside the facility to begin our tour we all received identification tags and visitor passes to wear. Next, Marcella led the way through the hallways of the main office building on the Dow site to the meeting room where we watched a short safety video and PowerPoint presentation. But what's a video/movie without snacks? The answer is nothing. Luckily, our lovely tour guide prepared drinks, snacks and freebies for everyone to have and enjoy. During this presentation, Marcella deJong introduced herself and gave us some personal background information. In addition, she shared her university experience and the challenges that she encountered throughout her career. She also talked about the importance of having women work in the field and within the company.

One of the goals that The Dow Company strives for is to be the neighbor of choice for the people of Fort Saskatchewan. Therefore, not only does Dow participate in the community, but it takes steps towards protecting the environment and pleasing the growing population. On the Dow site, there is land set aside which acts as a nature conservatory. The Dow site has 74 acres of wetland and 145 acres of landscaped area. It is home to many species of animal, including 66 bird species. The Dow plant has evolved over time and has taken steps to protect the environment even before regulations were imposed.

The presentation was followed by a tour around the site. Unfortunately, the size of our bus limited our viewing options. Therefore, we did not have the opportunity to see any of the buildings up close. But, we made the best of the situation. Instead we spent more time at the nature conservatory (Dows Wildlife Greenbelt) and on the viewing platform.

Even though we didn't get to see the buildings that make the Dow products, we still learned countless facts about the Dow Company through the presentation and from asking questions. But more importantly, we had the opportunity to learn and observe engineering and science careers for women. It was inspiring and motivating to see women work for a major corporation, such as Dow. Despite the fact that the tour was cut short, everyone enjoyed their 'road trip' to Fort Saskatchewan. From all the WISEST students, we thank our Dow tour guides for the presentation and information they gave us about the Dow Company. We would also like to thank them for taking time out of their busy day to share their story and career choices with us. It was a great visit to the Fort Saskatchewan Dow site, and another addition to our WISEST memories.

## NETWORKING FAIR: TALKING WITH ROLE MODELS



*By Nicole Brisson*

In a world of rapidly advancing technology, where speaking to one another face to face seems as foreign as cassette tapes, networking with professionals and learning from their experiences are important skills for teenagers to learn as they enter the working world. Thankfully, WISEST gave us such an opportunity on Monday July 18th. Split up into groups of six WISEST student researchers and seven role models, we definitely had many different people to talk to. Many laughs were shared, stories were heard, and feelings were expressed during this one of a kind opportunity.

In my group, I had the chance to talk to four engineers, a chemist, and two graduate students attending the University of Alberta. It was very interesting to hear all of the engineers speak about the challenges they faced being women following male dominated career paths. However, it was good news to hear that with determination and perseverance, they made it through and attained their goals. By networking and talking with role models, they each found their separate ways to success. Thankfully, every year more and more girls entering university choose engineering, making the gender difference less obvious in large classes. Currently, though, still only 10-12% of graduating engineers are women. One of WISEST's main goals, through their many programs geared for young girls, is to eventually make an even amount of women and men in all fields; thus, increasing the diversity of ideas in the job. Through their many programs offered for girls of any age, they have succeeded in convincing many young women to follow the career path that they feel most passionate about.

One thing that the graduate students brought to life during the short networking session were the many career choices one can make while still in university. Many students decide to change directions as they go through their undergraduate degree, veering towards what they are most passionate about. As Denise Hemmings, chair of the WISEST program said, "each little wiggle on your career path is significant, because it leads you one step closer to finding what you love".

The most important aspect that the mentors all stressed is to take every opportunity that comes your way. Something you think you will hate could end up being the most exciting part of your job. Though you spend most of the day at your job, it is also crucial to find the balance between work and your social life. Finding time for yourself, to pursue any type of hobby, is essential as well.

As one of the graduate students put it, "a career path is like a set of stairs". Take things in small strides without worrying what lies at the top. Inevitably, what lies at the top of a personal staircase may change many times before you actually reach it. Through networking, one can be sure to make the most of every single opportunity and challenge that they take on. By asking many questions, one can learn a lot and easily avoid needless confrontations. Similar to the WISEST student research opportunity, the more one puts into their job, the more they will benefit from it. Finally, it is important to enjoy the ride that university takes you on, without stressing about where it will drop you off.



*By Anne McDonald*

*Afexa Life Sciences Inc.*, the evidenced-based natural medicines company famous for its product Cold-FX, comes from a background not unlike that of the freshly minted WISEST Student Researchers. It turns out, that like us, this now international company got its start in the University of Alberta's research labs. Spinning out of the U of A in 1992, *Afexa* would report its first profitable year in 2004. Over the next four years, under the leadership of CEO Jacqueline Shan, the company's revenue would increase to 49 million dollars. Eventually the enterprise that started out as a research project at the U of A would become the producer of the #1 selling cold and flu product in the world, beating out even Tylenol. That successful enterprise is the company that half of the 2011 WISEST students had the privilege to visit for our Alberta Innovations Tour.

To start off the afternoon, we were given a general presentation on the company and its history. Four of the accomplished women who work at *Afexa* were gracious enough to come forward and talk to the group about their journey both professionally and personally to where they are now in their lives. This group included such prestigious women as Dr. Carla Otto, the Senior Director of Scientific Operations, Dr. Sharla Sutherland from Regulatory Affairs, Dr. Erin Mackenzie of Clinical Research and Trials, and Dr. Sandip Bal from Research and Development. In the presentation, all four women detailed their career and educational paths and their current role in the company. These presentations gave us an example of what a path to success can look like and the careers that are available to us in a company like *Afexa*. By elaborating on their day-to-day jobs, the presenters took us through five steps of the *Afexa* drug development, starting with the process of discovery, where *Afexa* runs ChemBioPrint to determine if compounds are effective and

ensures standardization of the chemical compounds. Following that, they discussed pre-clinical work, in which quality control and in-vitro and in-vivo testing are carried out, and clinical trials, where the effectiveness and safety of the compounds are tested on human volunteers with and without the targeted affection. Finally, they covered the process of regulatory approval, the step in which the drug is submitted to Health Canada to gain approval to sell and market it, and post-launch, the stage that covers everything the company deals with after the drug is available to the public.

After the presentation, we were taken on a tour of the eight labs in the *Afexa* building. We were shown the equipment lab, where samples are tested to determine their chemical makeup. Then, we were taken to the biochemistry lab, where capsule strength and the shelf life of the product are tested. Following that, we went to the chemistry lab where samples are prepped. Then came the research lab where testing such as mass spectrometry occurs. Next came pharmacology, where commercial test kits are used to observe the effectiveness of drugs on things like lowering cholesterol. Finally we were taken to the electrophysiology lab, where a select few scientists utilize the Nobel Prize-winning "patch clamp" system to test ion channels on a cell's surface.

Ultimately, to finish off an amazing tour, we went back to the boardroom where we met up with the four women from earlier to ask them some one-on-one questions before we had to leave. As the bus took us back to the university, we realized that overall, the tour to *Afexa* not only did an amazing job of showing us what a day in the life at that company is like, it also did a stellar job of showing us what our futures could look like.

# ALBERTA INNOVATIONS: **SYNCRUDE CANADA**

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By Shannon Hill

There is no denying the importance of oil in today's fast paced, industrial and technologically driven lifestyle. This point was drilled home to approximately 30 WISEST summer research students during an off-campus professional development seminar. On the afternoon of July 25, students had the opportunity to tour *Syncrude's Research and Development Centre* which is part of the largest oil sands facility in the world.

After receiving visitor passes, the WISEST students gathered in a conference room and Jessica Vandenberghe, P.Eng., shared her knowledge of *Syncrude*.

*Syncrude* uses open-pit mining to retrieve oil sands – a combination of sand, bitumen (a black tar-like substance), clay and water. After mining, bitumen is extracted from the sand using water-based methods. The bitumen is then upgraded to make crude oil. Throughout these processes, many different machines, procedures and workers are required to make the oil, called the *Syncrude Sweet Blend*.

Workers from the Research and Development centre were invited to speak to the students about their educational backgrounds, which varied from chemical and mining engineering to ecology. There appears to be a position for any science fanatic who wants to be doing something new every day. After hearing about all the diverse backgrounds and the roles played by the different workers in the building, it became clear that *Syncrude* needs a wide array of educational qualifications from the people who apply for its range of career opportunities.

After splitting into smaller groups, the WISEST students were given a guided tour of the building, donning safety glasses and hard hats in order to enter some of the centre's more dynamic rooms. One section of the building lodged many small-scale versions (at least in relation to the machines currently used at the Mildred Lake and Aurora sites) of machines that are used for extracting and upgrading bitumen. These small-scale versions are used to alter, test and ultimately improve certain aspects of the process and equipment currently used in order to improve efficiency and reduce the environmental effects of the oil sands. In the setup created, it is possible to insert or change one small aspect of the extraction and upgrading processes to see how it affects the overall efficiency of the system.

In a different part of the building, students walked through a long hallway of research labs. These labs researched everything from recycling the water used during the oil sands procedure to discovering why a machine malfunctioned or broke. During this part of the tour, each student was given a jar containing oil sands and hot water. The students were instructed to separate as much bitumen as they could from the sand. Many competitive spirits came through as students shook their jars in order to separate more bitumen than the rest of the people in their group. After shaking the jar, the sand sank to the bottom and the bitumen floated to the top, leaving a cloudy layer of water between the two.

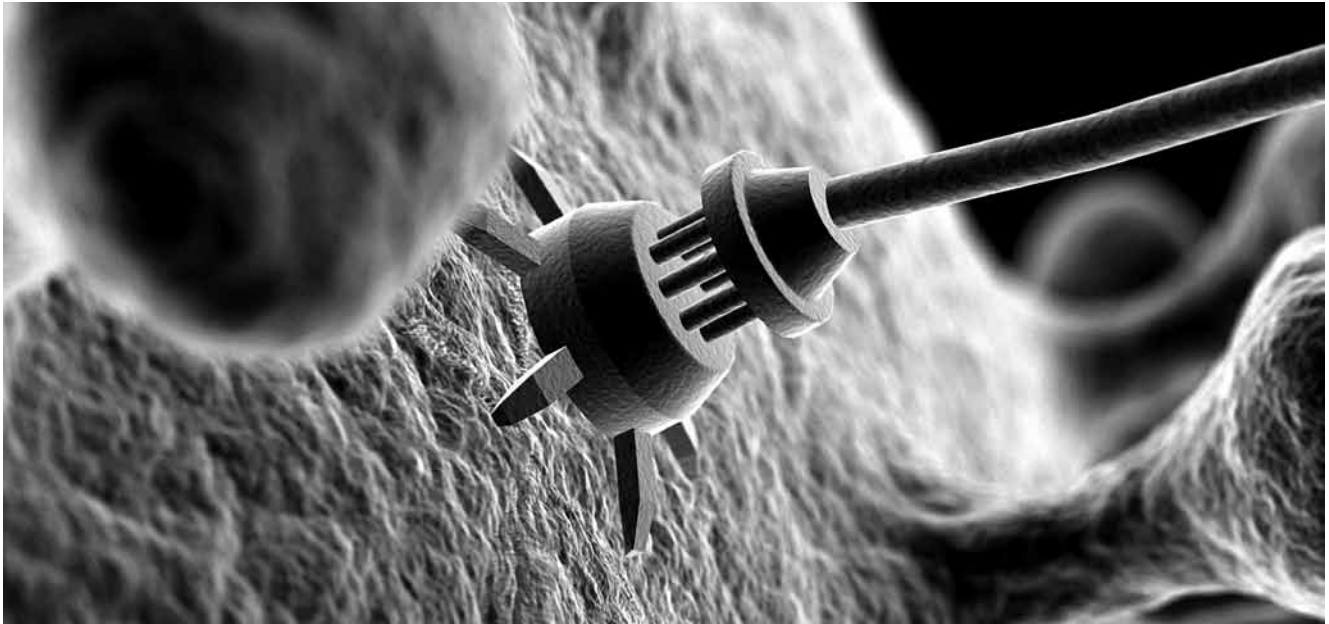
One major concern for *Syncrude* is making the oil sands less harmful to the environment. Through continual research, machine upgrades and improved procedures, the company is constantly lowering the amount of emissions it creates per unit of its *Syncrude Sweet Blend*. Other areas such as recycling water, reclaiming land and managing tailings are also of concern to *Syncrude*.

The tour of *Syncrude's Research and Development Centre* allowed students to see the variety of careers available with *Syncrude* and the many different educational paths that would qualify someone for a job there. It also provided students with a new way to view a common substance that has become a necessary and key part of everyone's lives.





## RESEARCH FACILITY TOURS ON CAMPUS: **NANOFAB, A MICRO AND NANOFABRICATION FACILITY**



*By Teela Strong*

The tour of the NanoFab lab on campus was quite a learning experience. We were able to walk through the lab and look at bugs under a microscope, see how electronic chips are created and learn just how small a nanometer really is.

The microscope we looked through was a special microscope called a scanning electron microscope (SEM) that links to a computer and generates an image of the subject onto the computer screen. The SEM creates an image by sending out pulses of electrons towards the subject and reading the ones that reflect back off the sample. Through the SEM we were able to see, in great detail, each individual part of a fly's eye and all the tiny hairs on a mosquito.

After looking at the bug samples under the microscope we had to put on booties to tour the rest of the lab. The booties were not for our protection however, but rather for the protection of the scientific experiments being carried out at that present time. The booties were required because some of the samples that are being measured and worked with in the lab were small enough that clumps of dirt and dust are large enough to completely change the weight and other data of the experiments, so to avoid disrupting the experiments we covered the dirt on our shoes with booties.

The first machine we looked at in the lab was a PVD, which is used to create electronic chips. The chips are created by placing a target, which is a circular disk usually made of various metals, and depositing the substrate (material used to make the chip) onto it. The target is then placed into the PVD and plasma is used to move the substrate and create a pattern in the substrate layer. This part of the tour was especially interesting because while this step was taking place the substrate was actually floating off the target and onto a plastic sheet almost like a magnet, and the plasma was glowing bright blue. Once the substrate is layered evenly onto the plastic square, the entire thing is exposed to UV light, and because the

patterned substrate doesn't let light shine through, the pattern becomes visible when the rest of the substrate allows the light to shine through. The PVD then uses this now visible pattern and etches (removes unwanted substrate) the pattern out. We are then left with the base for an electron chip. The process can then be repeated numerous times with different substrates to create a workable chip. This is only one of the ways the U of A NanoFab lab is equipped to make such electronic chips, and these chips can be used for anything from computer hardware to a chip that tells a machine how to create anything, depending on the pattern and substrates that the chip was made out of.

Dr. Flaim, the head of the NanoFab building, came to talk to us about the clean room and the nano scale. The clean room is where the scientists test all the most minute amount of substances, weigh them, and use tests such as UV light to test their properties on a nano scale. In order to keep such substances uncontaminated, anyone in the clean room has to wear a bunny suit, which is a full-body suit. The scientists also aren't allowed wearing any strong perfumes or lotions because, as Dr. Flaim informed us, if you can smell it, its molecules are large enough to contaminate the experiments. We learned that anything, even something as small as one single skin cell, or a particle from perfume, can drastically alter the weight of the substance, because the substances being used are so small, only measurable on the nano scale. Because of the sensitivity of the experiments being performed the clean room has been outfitted with a unique ventilation system that filters and recycles the air 60 times/hour. This means, that by comparison, the clean room has about 20 particles of dust per cubic foot, whereas your bedroom can have as many as 300-500 thousand particles of dust per cubic foot. The clean room at the university is the only one of its kind in Alberta, which makes the work being done there all the more remarkable.

# RESEARCH FACILITY TOURS ON CAMPUS: EDMONTON RESEARCH STATION EXPERIMENTAL FARMS

By Jayne Waldon

WISEST Professional Development Seminars are one of the many ways WISEST offers great opportunities for individuals who love science. We typically picked between different excursions; one such outing was a visit to the Edmonton Research Station on the University of Alberta's South Campus. We were warned beforehand that the station was home to livestock, and had an "organic smell." They needn't have mentioned it - after the first minute it didn't matter anyways because there was so much to see and hear!

Alex, our enthusiastic tour guide, described the basics of what the facility does and how they raise pigs to be used for scientific experiments. This may sound awful to a lot of people, but he described some of the protocols surrounding what the pigs are allowed to be used for and how they have to be treated in a way that doesn't cause excess undue stress to the pig. We got to look through windows to see the pigs as he talked about how they are treated, and how the staff has to be very careful with contamination issues. Apparently each worker has to shower on the way in and out of the lab spaces and wear communal clothes so that diseases (such as the 'swine flu') are kept as contained as possible.

Somebody watching the pigs through the window asked why they were in contained cells. He told us that right after the mother pigs give birth they are placed into barred stalls that keep them from "savaging" and killing the offspring. The cages are also designed so that lying down must be done in stages, which stops a pig from potentially flopping over and squishing her babies unintentionally. Following that, the mothers are moved into a large joint pen that also has individual stalls for safety and feeding.

From there we met up with another tour guide who encouraged us to ask a lot of questions as he showed us around a different portion

of the South Campus. He had us suit up in plastic booties to go over our shoes and ushered us into the building that deals specifically with cows. He first explained to us the milking system and how each year the cows must have a baby in order to produce sufficient milk. A cow is milked even when it is pregnant; each cow produces between nine and ten 4-litre jugs of milk per day. Every year there is a 2-month dry period of rest, but they are otherwise milked daily.

As we toured, one of the students pointed out a cow with a big plug on its side and our guide explained that essentially, these plugs lead directly into the stomach of the cow and researchers insert feed bags on strings into the stomach. After a sufficient amount of time, they remove these feed bags and can analyze what kinds of bacteria are at work inside the cow.

Wandering along a row of feeding cows, he pointed out a particular cow that was in the middle of birthing a calf! He explained that staff rarely sees, let alone helps a mother cow, especially since many of the cows give birth during the night. We saw the calves in a different room where he allowed us to touch them as he explained more about how the cows are used in research and how the building functions not only a research facility, but also as a production plant. Before leaving he showed us the milking machines and explained how they work. He willingly answered all the questions we had about storage and cleaning of the machines before concluding this informative tour.

I was fascinated at how much work goes on at the Edmonton Research Station, and how many diverse fields there are to consider. It was amazing how the discoveries they make are able to benefit so many people.



## EXPLORING UNIVERSITY OF ALBERTA RESEARCH

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By Danielle Schmidt

When I first read the list of the various labs that we had the opportunity to tour on campus, I was flabbergasted. How could I ever choose just one? With thirteen options, from Electrical and Computer Engineering to Human Neurophysiology, the available fields were endless.

Although they were all very intriguing, one field held a particularly strong attraction for me –Renewable Resources. The term brings to mind images of wind turbines producing electricity, or of solar panels diligently gathering the sun’s rays. I soon learned, however, that those images do not represent what research and work in the department of Renewable Resources entails at all. The field of Renewable Resources in fact has more to do with earth and environment rather than energy.

The lab that we toured in the renewable resources department focused on the study of soils. Charlotte Norris, a PhD candidate conducting research in the lab, was quick to set us straight. “The first thing people often think of when they hear the word soil is dirt. Dirt is the stuff on the bottom of your shoes,” she said. Indeed, as we proceeded on our tour we learnt how complex soil really is. By testing two different soil samples for properties such as color, texture, and the presence of carbonates, and comparing the results, I realized how much variances soil can have, even within Edmonton. I had no idea how enjoyable and interesting analyzing soil can be. Whether it was molding a sample in my hand in order to determine the texture classification to watching tiny microorganisms present in the soil –such as nematodes- under a specialized microscope, I had a great time. While in the lab, I also learned about the education path that one would need to embark on in order to pursue a career in renewable resources, as well as the general sub branches that exist in the field. Overall, the tour was an incredible experience, from which I gained knowledge that I never would have otherwise. It was yet

another example of how WISEST broadens the horizons of curious young adults like me.

Mine, however, was only one of thirteen amazing adventures to the various University of Alberta labs. Others included a Laboratory Medicine and Pathology tour to a lab that is focusing its research on how the desiccation and drying of blood cells affects cell function and structure. This research is connected to developing effective and cost efficient methods to preserve donated blood cells. Students on this tour were shown around the area where people’s blood was taken, and where the different components of blood were separated. They also had the amazing opportunity to view first hand red blood cells flowing under a microscope.

Another interesting lab that WISEST students were able to explore was an Electrical and Computer Engineering lab. This lab was all about lasers, and the various applications that these lasers have. Students on this tour experienced and participated in demonstrations such as one where they shone a laser through water, and were amazed when the laser beam took on the appearance of a wave. As well as learning about the applications and behavior of lasers, participants also learned about the use of lasers in a novel biomedical instrument.

These three tours are only a sampling of what the WISEST summer researchers experienced through the Exploring U of A research session. I can speak for us all when I say that if we had been able to attend every tour that day, none of us would have given it a second thought. When I think of the knowledge that I gained through just one tour, it is unimaginable what we learned as a whole. A sincere thank you goes out to everybody who so generously took the time to show us their labs during this session, and for making everyone’s lives a little brighter through what you taught us.





# STUDENT OPPORTUNITIES





## TEAM CHALLENGE: **PARALLEL PARKING LEGO-ROBOTS**

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*By Morgann Lynn*

One of my most memorable moments of the Summer Research Program was when we were heading over to CAB for the Team Challenge. A few of us all received the same text: "Hurry guys! I saved us seats in the back...LIKE A BOSS." This just goes to show you how easily you can make friends here, not even a week into the summer and we were receiving mass texts about meeting places from other WISEST Students.

As our first week neared to its end, whispers and rumours were spread about what to expect for our Team Challenge. Some of the WISEST students guessed it would be another scavenger hunt like we did during Orientation, while others predicted we would be listening to a guest speaker seems how we were meeting in a classroom. Boy, were we wrong.

After a short presentation from Jen Duffy about her career path, then some videos of terrible (and some amazing) car parking, we discovered that our goal was to make a Lego Mindstorms Robot parallel park between two army men. Excitement erupted from the room as we raced downstairs to where our stations were set up. Within our groups of three we had a laptop, two army figures taped to the table, and a robot equipped with a baggy of Lego to personalize it. Catherine encouraged everyone to come up with a name for their robot, which varied from Mr. Roboto to Reginald the Killer Robot That Parallel Parks. Some groups focused right away and their robots were parked with ease, while others customized

the robots with Lego people, or added custom hub caps to the wheels. Once the robot had successfully parallel parked we took it upon ourselves to see how fast the robot could go, or to make the most complicated path possible. We spent the next hour giggling and screaming with our new friends as our robots backed off the table or ran over the army figures.

We were given two goals to accomplish before it was time to go home. One was obviously to make the robot successfully parallel park between the two army figures. The other, and the most important, was to make new friends. The Team Challenge was a creative way to make friends while learning about different technology. The groups were randomly chosen, so you most likely were meeting someone that you've never really talked to before. Personally, I think in most situations meeting new people is a scary and nerve-racking undertaking, but at the Team Challenge everyone was energetic and outgoing and acted like we had been friends for years! Not only does this happen at the Team Challenge, it happens every day of the program! You make friends that you could keep for years that have similar career dreams as you. I found it almost easier to find things in common with the people here that I had known for six weeks than with people I have gone to school with my entire life.

The team challenge was a simple way to introduce us to the other students, as well as to allow us to get comfortable with the new setting that is the summer research program.



## DR. MARGARET-ANN ARMOUR'S INSIGHTS ON MENTORSHIP



*By Victoria Anne Rose Hessdorfer*

Dr. Margaret-Ann Armour is, to put it simply, an amazing woman. She grew up with simple dreams, which blossomed into a prestigious career with worldwide recognition for her work in chemistry. She has since served as the assistant chair in the Department of Chemistry for 21 years, was inducted as a Member of the Order of Canada in 2006, and is a founding member of WISEST. She was appointed to the board of the Pacific Basin Consortium and received the Alberta Environment Award due to her outstanding contributions to the field of hazardous waste. She has twice been selected by the Women's Executive Network as one of the top 100 most powerful women in Canada. Dr. Armour is an inspiring, strong and intelligent woman, and much more than I had expected at the July 15th Lunch and Learn session.

When I arrived at the lecture, I expected the hour to be filled with speeches on the importance of networking, mentorship, and joining communities. I figured there would be an informative Power-Point presentation, some helpful tips on talking to role models, and a couple of words of wisdom from the speaker. Dr. Margaret-Ann Armour's presentation, however, was beyond expectation. Dr. Armour spoke about the path her life has taken, the lessons she's learnt, and what she hopes we can achieve. Her speech started with school and work related tips: the importance of internships, making good networks in your community, and always putting your full effort into your endeavors. She emphasized that harder you work at your job; or school; or anything else you're involved in, the more you'll get out of it. She told us to "never just try for a passing grade", because in return, we'll only receive the bare minimum education. Her words reminded us of the opportunities we have in our life, the power that only we as individuals have to achieve great things

with our life, and how we cannot simply expect to achieve amazing things without putting hard work into it first.

As her presentation continued, she told us of how life isn't worth living without challenges, and how "we lose something human if we're only living to be comfortable". Dr. Armour urged us to take courses that aren't related to our program, join clubs, and search until we find something we're truly passionate about. She urged us to "give ourselves that opportunity", and to not settle for anything but our dreams. To achieve these dreams, thinking creatively was said to be one of our greatest tools. To emphasize her point, Dr. Armour used the metaphor of someone meeting an enormous brick wall. The brick wall symbolized the many barriers between us and our dreams, the hard decisions we'll be faced with, and the struggles we will encounter. She urged us to think creatively to surpass the brick wall, instead of simply banging our heads against it, because that would obviously do much more damage to our skulls than the bricks. This metaphor, though whimsical, underlines the importance of thinking creatively and not giving up on the path to our dreams.

Though her speech sounds like it was solely made up of gems of inspiration and advice, she did deliver many helpful tips on the subject of networking. She gave information on the different types of networking, the importance of mentors, what benefits communities gave her, and much more. However, the biggest focus of her speech was clear: dream big. Dr. Margaret-Ann Armour is a woman who received more than she ever expected out of life, and her life story itself is a proof that, as she says, "life has a way of surpassing your biggest dreams".



*By Bonnie Plican*

How could you possibly answer sixty high school students' questions about entering university? Well, WISEST very successfully accomplished this at a Friday Lunch'n'Learn.

Not only does the WISEST Summer Research Program allow us to work in research labs in science and engineering, but we also get to work at the University of Alberta. High school students do not get the chance to spend much time at university, but we were able to spend the summer on campus. As well as learning our way around and taking lunch breaks in many different buildings, we were able to ask questions to current university students.

On July 22, the WISEST students met for another Lunch'n'Learn. Everyone had questions about university life and this was the perfect time to ask. As a large group we discussed the myths about university. Torrey Dance, from the National Recruitment Office explained how class size may be quite large for first year courses but more advanced courses are smaller in size. We each received a business card from the office to contact if we had any questions.

Next it was time to chat with current university students. We split off into groups of six or seven and joined a university student in a different room. My group played an ice breaker game of evolution and all evolved from amoeba into chickens and eventually into science students. We then began bombarding him with questions, to which he gave helpful answers.

Some of the discussion revolved around the different types of degrees, including bachelors, masters and PhDs. He explained how major and minor programs work and gave us examples. We were also told about the Honors program and how it differs in material

and class size. Entrance scholarships are important when going into university, and it is a good idea to apply for all scholarships and funding possible. He gave us details about living on campus in residence. There are a few different buildings where students can live, each with its own characteristics and groups of people. We also learned about the bell curve and how we receive marks and grades for different assignments and courses. He explained that it is a good idea to go to the orientation before university starts and to wander around the campus beforehand so you know where to go on the first day. There are many student groups to join and be a part of, at the university. Our schedule is very important and he suggested that we plan it to suit our needs, by having classes when we want and in locations that are close together. We learned how class times work during the week, and about the four semesters throughout the year. He explained what Co-op is and how it is beneficial for students to get hands on work experience before finishing their degree. He gave us personal examples of how university works and how to make the best of it.

Being able to have my questions answered by someone who has firsthand experience was very helpful. I am sure many WISEST students feel less nervous about finishing high school and entering university now. It means a lot to me that these university students are willing to help high school students. Without this Lunch'n'Learn, I would not have gotten an opportunity like this to have my questions answered. Although we are still in high school, I feel as though I am already becoming part of the university because of the WISEST program, and I am excited to learn more and have new experiences in the future.

## PERFECTING RESEARCH POSTERS

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By Eberly MacLagan

At the very end of our Summer Research Program, each student is responsible for designing and writing their own scientific research poster. This is not like the pencil crayon-filled sketches that were designed for posters in high school, but is rather more extensive than that. These posters measure three by four feet and must be printed on a special printer. While there are some very specific tips and guidelines for making such a poster, they can also be a way to tell a story about the research that has been done.

One of our very informative Lunch n' Learns sessions, presented by Nicole Oro delved into this idea of making a research poster. Oro is an expert on poster making due to her experience making her own and viewing countless others at different conferences and seminars.

She presented a power point with information that covered an entire poster, from title to acknowledgements. While I am sure that many of us were daunted by the fact that we had to make such a large visual aid, I think that this presentation helped answer many questions and stifle any doubts.

A poster could include an introduction, methods, procedures, results, conclusion and acknowledgements; very similar to a lab report that one would write in science class. We discussed how to make each component and perfect them to a University standard. Our posters are to be fairly easy to understand for the general public and yet should still interest a member of the University academia.

Oro went over different fonts and backgrounds as well as graphs, images and color selections. We learnt about how to print the poster properly, which may seem like an easy task, but for a new student who has never had the experience, there are still so many questions. As many of the WISEST students will be using Power Point to create their display, Oro provided some useful tips on building a poster in that program.

We were also taught how to successfully present a research poster. Presentations are to be formal but meaningful, as any presentation should, and each student was recommended by Oro to have a five-minute verbal overview of their research to accompany their presentation. Most of all, we were told to understand everything that we put on the posters, so that we are able to answer any questions that may come up. The main tip that I took away from her presentation was to have fun presenting the poster and be confident in what you are doing.

After explaining methods and procedures, the results must be included somewhere in the presentation. Some lab projects may not be completed by the end of the summer and will still be ongoing. Oro informed us that this was absolutely fine, as long as it is reported as such on the poster. Nearing the end of the poster there should be included a list of any literature cited and acknowledgements made of sponsors and supervisors. Plagiarism is very much dissuaded and there are extensive consequences for it. This is the reason for citing any literature used, and not copying images from

the Internet.

A poster should be simple but well designed at the same time. It is to tell a story about what you researched, but in terms that people who are not in your area of research can still understand it. Our presenter, Nicole Oro, did an excellent job of describing and relaying all this information. I am sure that there will be many well made and presented posters at the Celebration of Research, built on the tips and ideas that we learnt at this Lunch n' Learn session.





## SHARING YOUR WISEST EXPERIENCE

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*By Michelle Mabuyo*

With six weeks already under our belts, the final Lunch 'n' Learn session of the program was guaranteed to be a good one. It was much the same as the previous ones in the sense that there were announcements, tips for next week's events and new stories to be shared. Even the level of excitement was on par. What couldn't be shaken off was the feeling of finality hovering around the room. To cover up our mixed feelings, chatter started from all corners of the group.

Of course, we did make sure to pay close attention to the details regarding next week's events. Professionalism and preparation would be key to handling poster presentations, especially when talking to well-respected people and the media. When specific names of important public figures attending the Celebration of Research were listed, the whole room seemed to quiet down and more than a few nervous looks were exchanged.

However, we were able to relax as we got tips and a clearer view of next week's plans, especially with the entertaining little hitch concerning computer and software updates. When we were given the ever-helpful tip of "Don't be late", someone ironically came into the room at that exact moment, and that set us off, back to the fun and casual mood we were all accustomed to from all the previous Fridays. We also had great fun participating in an activity that involved bright pink sheets of paper being thrown all across the room. These sheets contained a lesson we learned from the program and one of our favourite memories.

Having the chance to read through every single sheet, it's safe to say that all of us had grown considerably since that first day of ori-

entation. Yes, we had our expectations that first day, from learning how to network to being exposed to different career paths and obtaining lab research skills. All of those were accomplished, and some more. We learned the value of collaboration and teamwork, the benefits of a non-linear career path, the wonders of discovering yourself through a series of choices, and to never be afraid to ask questions, no matter how silly they may seem.

And oh, the memories everyone wrote. This summer was not just all monotonous work. There were adventures outside of work hours with Zumba classes, paper mache, tea, pranks and first impressions with lab members, getting delicious waffles from the Waffle Guy, meeting new people and being able to geek out, exploring campus and getting lost in the process, and lounge nights for the girls in residence. These memories were also a big part of the WISEST experience.

All in all, we were really lucky to have the help and guidance of a number of different mentors, role models and the WISEST coordinators. We have been encouraged to chase our dreams by following our own path, collaborating with other people and always asking questions and never being afraid to ask for help. We have been reassured that we have a lot more to offer than we give ourselves credit for, and that a passion in less-traditional fields should be treasured.

That final Lunch 'N' Learn was bittersweet when it ended, but we could all take pride in the fact that a great deal of lessons and memories had been shared between us, and the program had delivered more than we could ever have expected.



## LIVING IN MACEWAN RESIDENCE



*By: Danielle Schmidt, Janice Block, Kaylee Biggart, Melissa Wan, Michée-Ana Hamilton, Michelle Mabuyo, Nicole Hobbins, Samantha Brown*  
Eight teenage girls. Six weeks in residence. One amazing summer.

When you take eight girls from all around Alberta and put them in a room with Smarties and ice breaker questions, it doesn't always turn out well. However, after living together for six weeks without parents, we have grown into a tight-knit family.

Living alone in the big city was obviously going to cause some problems for us. We would have to buy our own groceries, cook our own food, wash our own dishes, and, in Kaylee's case, clean out the fridge. Thankfully, we were well-equipped with an amazing residence advisor, Amanda. On our first day, she took us on a tour to campus, the grocery store, and other essential places that we would need throughout the upcoming weeks. She continually offered up advice for cooking and planned numerous activities for us to do after work. As well as having Amanda around, the staff of the Grant MacEwan Residence kept us sane by fixing our broken fire alarms and unlocking our doors when we locked our keys inside.

Even though we mostly kept to ourselves, we were not the only ones in the Grant MacEwan Residence. Upstairs resided a number of noisy exchange students from Quebec. During the anime convention, the building was taken over by people in costume. And then there were the guys from HYRS, Robin and Ivan, who were entertaining, to say the least. They often joined us in the lounge, where they proved to be tough competitors in slaps (the card game), and

amused themselves by making fun of our choices in television shows ("Doctor Who" and "The Walking Dead"). But along with them came two more great friendships and endless inside jokes.

As keeping a six-week routine of going back and forth from work to residence would be incredibly tiring, we made sure to fill our spare time with activities. Amanda kept the lounge unlocked for us most of the time, so we always had the choice to play cards, watch TV and movies, and just "loungue" around. Of course we also ventured out to experience Edmonton. During the first week, Amanda planned activities on the University campus, such as volleyball and Frisbee, in order to acquaint us. From there on, we attended improv shows, took in the Street Performers Festival, experienced A Taste of Edmonton, and rocked out to the Marianas Trench concert at Capital Ex. On the lighter side of life, we shopped on Whyte Avenue, frolicked in the fountains at the Legislature, and simply explored what Edmonton had to offer. Regardless of what we had planned, card games ended up taking over most of our lives.

After a summer full of music, dancing, and everyday shuffling, we became a closer group than any of us could even imagine. Whenever any of us returned from outside, no matter how long we were gone, a chorus of voices shouted our names from the lounge. This was just a small example of the strength of our friendship.

Our experience was so incredibly amazing that words cannot begin to describe our gratitude. We hope that this glimpse into our growth as a family can inspire others just as it did for us.

# MAKE THE WISEST CHOICE

## Empower women in science, engineering and technology

*Help us encourage women 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.



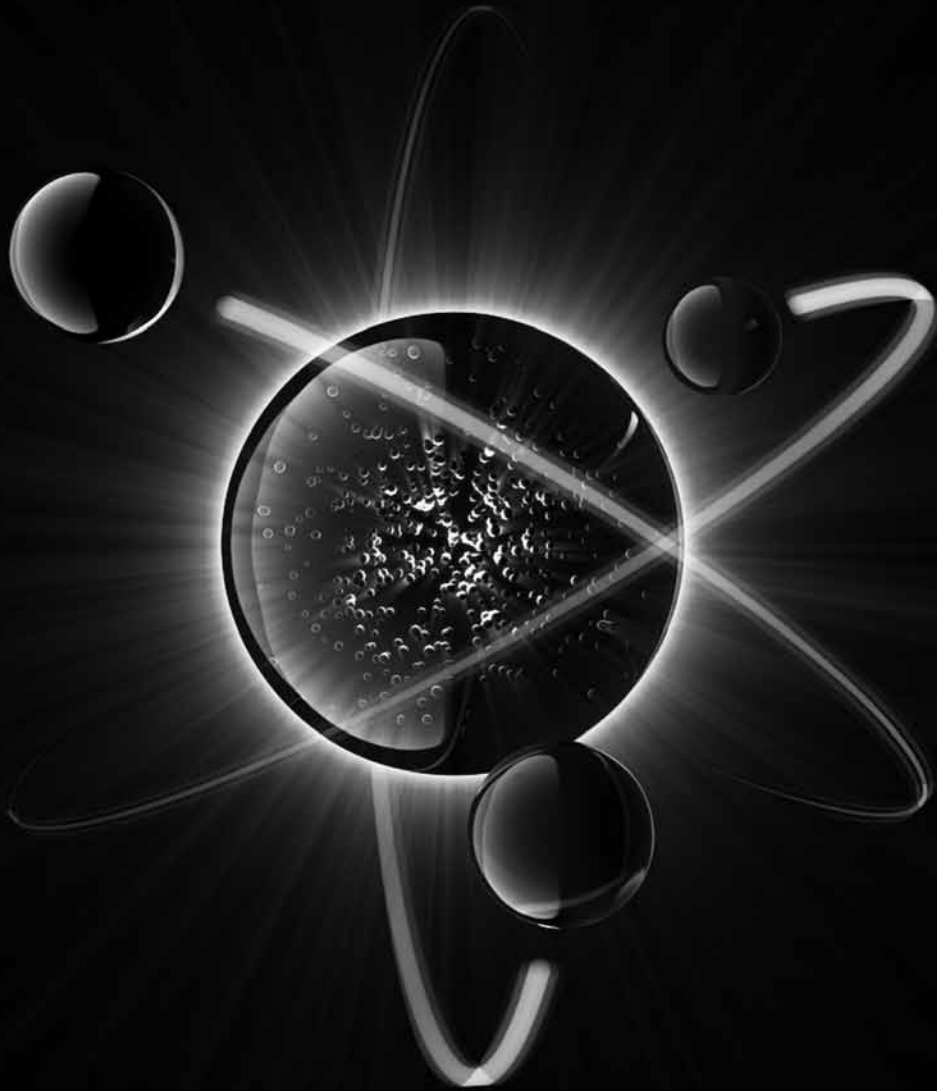
Contact WISEST at (780) 492-1842

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 Caitlin Guzzo*

I can confidently speak on behalf of all the WISEST students when I say that we are ever so grateful for the support and guidance that has been bestowed upon us by our teachers. By encouraging our talents and inspiring us to pursue non-traditional careers, we were able to take part in this amazing program that has opened a myriad of doors for us. From sharing their expertise and enthusiasm through their teaching to kindly writing our WISEST reference letters, our teachers have ignited within us a desire to shape our future into one that correlates to our passion in life, regardless of whether or not it is considered 'typical' or 'expected' of our gender. Our teachers have laid the foundation for our aspirations – a bedrock of both practical skills and ambitious goals. With these invaluable traits, we can stride with assurance into the future, in no doubt that we have the potential to accomplish great things in the world of science.

Teachers from across Alberta came to learn more about the University of Alberta and WISEST at the Teacher Appreciation Day sponsored by NSERC PromoScience. The 'Learn More Sessions' gave teachers hands-on exposure to trail-blazing research at the University of Alberta, a chance to learn new concepts to enhance the high-school classroom curriculum and the opportunity to see the research work the WISEST students had been engaged in during their six weeks. The 'Research and the Environment' forum with Dr. Xing-Fang Li and Dr. Sylvie Quideau gave the teachers an insight to initiatives the University researchers have taken regarding environmental issues and an opportunity to pose questions and interact with them in an informal setting.

In the Student Poster Presentation in the vibrant setting of the Centennial Centre for Interdisciplinary Sciences (CCIS), the teachers were invited to review our research posters and see the breadth of research work we were involved in this summer. Each of us meticulously aligned our posters and awaited the much-anticipated arrival

of our teachers. We had all been checking over our posters, reviewing our research, and somewhat nervously practicing our poster presentations for much longer beforehand. This was to be our first public display of our summer's work, and we all wanted nothing more than to make our teachers – our guidance, our mentors – proud of the dedicated students they have helped us become.

As the teachers began to peruse the posters, each of us waited excitedly – and, at least for me, very slightly anxiously – until someone inquired about our research. Surprisingly, I found that all of my careful rehearsing was for naught, as I had learned so much this summer that I did not need to rely on memorized phrases. As I eagerly elaborated on my research, it quickly dawned on me how invested I was in my project, and how much I appreciated the opportunity to be a part of it – none of which would be possible without the mentorship of my teachers. In talking with my fellow WISEST students, I knew they all felt that same profound sense of gratitude as they realized just how important the guidance of their teachers has been.

When we had the chance to read each other's posters, we began to understand the collaborative and interdisciplinary nature of research, and the necessity of cooperation in the sciences. In addition, it allowed us to begin to grasp the astounding amount of opportunities that are possible when considering non-traditional career paths.

The WISEST Teacher Appreciation Day not only provided us with practical poster-presentation skills (which we would utilize the following day, Celebration of Research) but also allowed us the opportunity to express our gratitude for all of the wisdom and leadership we were fortunate enough to experience from our teachers. We will be forever thankful for the opportunities they have shown us, and the knowledge of our potential that they have instilled in us. Thank you.

## RESEARCH TEAM APPRECIATION

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By Leah Goettler

The morning of August 16th this year was quite an exciting, nerve-racking time. It was Research Team Appreciation, when we were supposed to present everything we had learned and done to the people who taught us. We had our worries. What if we didn't understand something we were presenting? What if we stumbled over our words, or somehow made a fool of ourselves? Or, worse yet, what if we couldn't summarize all of the research we had done over the summer into a brief, interesting presentation that kept the audience's attention? It wasn't like each of us was going to go up in front of a mass audience and expect everyone to listen to us. We each had our own poster to stand by, and if someone didn't find our titles understandable or interesting, they just moved on.

Our fears were laid to rest when Kerry, one of the WISEST coordinators, held a short meeting beforehand and told us that if we were asked anything we did not know the answer to, we could just say that it was "an area for further research". It seemed like a great weight was lifted off our shoulders – we weren't expected to be perfect! We dissembled after that, put up our posters, and began our morning at 10 o'clock. It took a little while for traffic to start flowing, but once it did, someone was coming up to our posters every five minutes trying to understand what we spent our summers doing. Typically people either read our entire poster, or skipped our poster completely and asked us to summarize it. Either way, we were talking to people the entire time. People generally wanted to hear three things: what we did, how we did it, and how it fit into the big picture. I know it seems pretty basic, but when you have one minute to describe six weeks of work to someone, it can get a bit overwhelming.

It was slightly awkward at first, especially if we didn't rehearse our

speeches beforehand; but after a few runs through it we started to know what was relevant, and how to get straight to the point. Everyone we talked to was very friendly, and they were genuinely interested in what we did, whether we worked with them or not. They were patient and they asked great questions, too. Not only was the Research Team Appreciation a great way of developing our presentation skills, but it helped us to understand our own research better, as well. Personally, I was asked several questions which I did not know the answer to, but had always wondered. So I tried to make a point of remembering them and asking my Principal Investigator afterwards. As a bonus, this year WISEST got quite a bit of press coverage from both CBC Edmonton and City TV. It was a fascinating experience to be part of a program that was worthy of being publicized, and definitely made us feel like we were doing something worthwhile.

At 10:55 we shuffled into the lecture hall, where formal presentations were given by Catherine Lee and Grace Ennis, two WISEST coordinators, as well as one of the WISEST students. During the entire presentation, there was a slide show displaying sponsor logos and pictures of each WISEST student in the middle of their research. It was a lovely demonstration of our thanks to our sponsors and the WISEST coordinators. But mainly, it was to show our gratitude to the research teams for volunteering to take on WISEST students, and creating a knowledgeable, friendly, and remarkable atmosphere.

The Research Team Appreciation was not only an opportunity to improve our presentation skills, but an opportunity to learn and have fun. But above all, it was the most wonderful feeling ever to see the pride in our supervisor's eyes as they listened to us explain all that we had learned.



## CELEBRATION OF RESEARCH



By Eszter Szepesvari

“Butterflies in the stomach” is a phenomenon characterized by the physical sensation of a “fluttery” feeling in the stomach. Some believe that this is caused by the release of adrenaline when one is nervous, which pulls blood away from the stomach and sends it to the muscles. But unfortunately, even knowing the science behind butterflies in the stomach doesn’t make them stop misbehaving. And I’ve always been nervous when public speaking, so even after presenting my poster all morning as well as all afternoon, when the Dean of Science, Dr. Gregory Taylor, walked up to me and wished to see what I’d been working on, it felt like my stomach was performing a one-man gymnastics routine. But as I began my little presentation, I got so caught up in the excitement and routine of it that I forgot to be nervous altogether. And all around me, the participants of the WISEST Summer Program were, I suspect, feeling much the same.

We finally had results which we were keen to share and what an amazing opportunity the Celebration of Research was for that. For not only were there university representatives, politicians, and representatives from various companies, our families were also invited: All the people who have helped us from the beginning. And this was our chance to say thank you and to prove that their support produced something truly valuable, whether it was the development of a more accurate screen for mineral deficiencies in babies or a change of perspective in a young scientist’s mind. It was our chance to demonstrate how much we’ve learned, how far we’ve come in the mere six weeks, and our chance to make our parents proud.

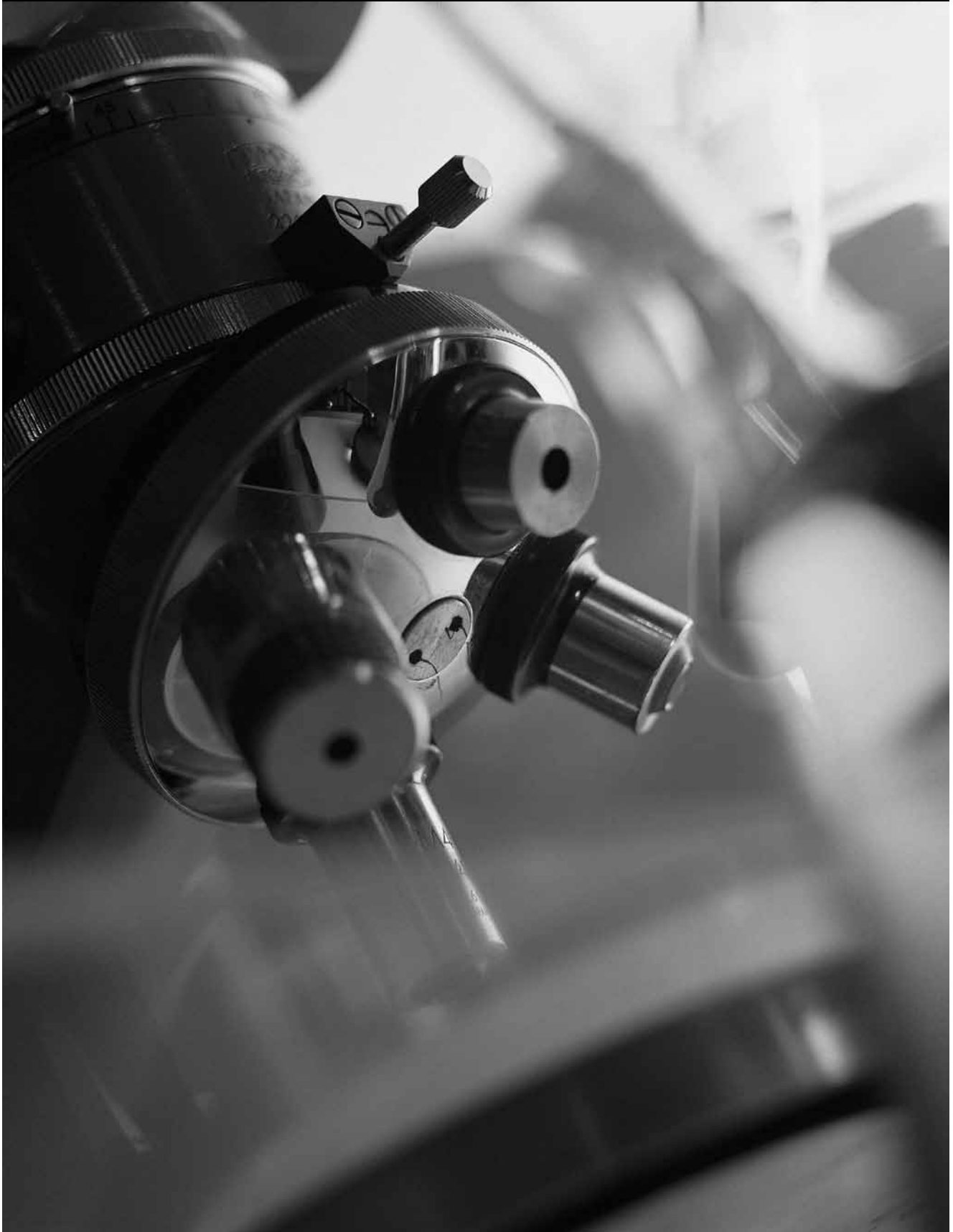
However, this event also offered us an opportunity to get some great advice from some great people. After our mini-presentations, we got the chance to listen to amazing speeches from the Asso-

ciate VP (Research) and Vice-Provost (Academic) at the University of Alberta and keynote speaker, Dr. Jacqueline Shan, Chief Scientific Officer of Afexa Life Sciences. The speeches gave us a chance to internalize all that we have learned, appreciate all the support we received and hear some great pointers on how to succeed as a researcher. But they passed on much more knowledge than this, though in a more subtle form. All the questions, all the comments they made helped us understand our projects more deeply and learn better presentation skills.

And with that the Celebration of Research concluded and so did the WISEST Summer Program. And what a bittersweet ending it was. There would be no more getting up at 7 o’clock in the summer, no more half an hour commute to work, but also no more eating pizza or playing soccer with lab groups, no more struggling for hours with different statistical analysis methods, and no more fish for me. We were leaving it all behind, and though we were excited and eager to enjoy the rest of our summers, it was impossible to ignore the melancholy and nostalgic atmosphere which settled over the CCIS Atrium. Everybody was scrambling for last minute pictures, last minute contact information and making last minute promises. We had gotten so much out of this program, so much knowledge, so much experience, so many skills, so many friendships, it was truly a wonder that we even got paid for it. But as the famous pop song says it “All good things come to an end” and so it was with the WISEST Program as well. It’s finished, but only for us; next year will see many more talented young scientists eagerly attempting to explain their discipline to anyone who will listen, which is the way it should be.

[http://en.wikipedia.org/wiki/Butterflies\\_in\\_the\\_stomach](http://en.wikipedia.org/wiki/Butterflies_in_the_stomach)

# STUDENT REPORTS





## Andrea McIntosh

Supervisor: Dr. Craig Heinke / Physics

Sponsors: Alberta Education / Alberta Employment and Immigration (STEP)

*"... this research really allowed me to sink my teeth into some less known, but still fascinating, astronomical phenomena."*



Looking back, I have no idea why I was so nervous to start WISEST. In the end, none of the potential issues I worried about – not knowing enough, a bad supervisor, no friends, having no fun on my summer vacation – came true. In fact, the entire program managed to exceed anything I could have hoped for.

The one worry that should never have even entered my mind was that I might have a bad supervisor. All three of my supervisors – Prof. Craig Heinke, Prof. Greg Sivakoff, and Dr. Jeanette Gladstone – were superb. I probably should have expected it, since they were gracious enough to allow me to work in their lab in the first place, but I still found it an incredibly pleasant surprise to be able to work with such kind and friendly people.

Being nervous about not knowing enough ended up being a worry on par with not having good supervisors. I spent the summer working in the astrophysics department studying accreting X-ray binary systems. On the surface, it would seem that worries about being too uniformed about what I would be researching were at least moderately legitimate – after all, who's heard of an accreting X-ray binary system – but my supervisors were prepared to take on a summer student whose only qualification was Physics 20, and they taught me everything I needed to know. A binary system is when two stars orbit each other, and accretion is the process by which the more massive object of the pair takes matter from its companion star. In an X-ray binary system, one of the stars is a compact object, such as a black hole, and when the accreted matter falls onto the compact object it heats up so much that it emits X-ray radiation. I used data from the new MAXI X-ray telescope on the International Space Station to model the emissions of various X-ray binary sources, to achieve greater insight into the behavior of these sources. I loved working on this project because I had been interested in as-

trophysics for a while, but this research really allowed me to sink my teeth into some less known, but still fascinating, astronomical phenomena.

I also shouldn't have worried about not making any friends; there were students attending the program from all over Alberta, and so everyone arrived hardly knowing anyone. Add to that the fact that we were all interested in many scientific disciplines, and the friend-making potential was great. From orientation until the end, you could just sit down next to anyone and start a conversation.

The program is full-time for six weeks during the summer, so it might seem as though by joining the program you would be forfeiting almost all of your hard-earned summer vacation, but it didn't feel like it at all; as one of my teachers said, "A change is as good as a break." First of all, the work was fun and interesting, and solving problems and finishing projects was way more fulfilling than just sitting around at home. Also, it wasn't all work; we also had weekly professional development seminars that always proved to be eye-opening chances to explore areas of science other than what we were working on in our labs. Probably my favourite was touring Gilead Sciences, which is a bio-pharmaceutical company with a research branch in Edmonton. We toured their Research and Development labs, the manufacturing plant where they made up small batches of drugs for testing, and the Quality Control lab. The tour not only exposed us to the diversity of career options just in drug manufacturing alone, but also provided insights into the long and complex process of how drugs are designed and manufactured.

The program was amazing, mainly thanks to my fantastic supervisors Prof. Craig Heinke, Prof. Greg Sivakoff, and Dr. Jeanette Gladstone, my sponsor Alberta Education, and also all the WISEST coordinators who arranged everything for this great program.

# Anju Eappen

Supervisor: Dr. Jillian Buriak / Chemistry

Sponsor: Epsilon Chemicals Ltd.



*“What makes WISEST so successful as a learning experience for summer students . . . is the fact that it does exactly that: it maintains itself as a learning experience.”*

I think it took a good ten minutes for my conscious mind to catch on that a single adjective alone could not take off the pressure of *beginning* to describe the WISEST Summer Research Program.

My love for the sciences began at an early age, with dedicated teachers. However, halfway through high school, I still couldn't offer a straight reply when asked of my career aspirations. And that was one of the defining points that drew me into the WISEST program. I went in hoping that this program would draw out the map of my post-secondary education with precision, and thankfully, WISEST did not do that. Rather, I was offered a subtler, perhaps rarer gift: a lesson that I will have to pave my own paths into a post-secondary education and a starting point on how.

Beyond the brief camera shots of media-acclaimed scientific breakthroughs, my prior knowledge of research consisted of short clips of researchers pipetting a solution from test tube 'A' to test tube 'B'. My simplistic perspective changed, however, with Dr. Jillian Buriak and her research at the National Institute for Nanotechnology, Department of Chemistry. My direct supervisor, Dr. Usama Al-Atar and I worked on the interfacial modifiers of solar cells. This layer, between the photoactive and anode layers, is crucial for initiating electron flow within the solar cell when light hits the photoactive layer. Our purpose was to replace these layers with organic polymers, with varying physical and chemical properties to measure whether they had the required properties of a standard interfacial modifier, such as conductivity, thickness, roughness, transmission of light and overall efficiency. The interfacial modifier was electropolymerized with a voltage created between the anode of the solar cell and two other electrodes in a three electrode cell. Atomic Force Microscopy and Scanning Electron Microscopy were among the techniques I was taught in my encounters within a research set-

ting to collect data on my solar samples. Our results showed that two of the polymers we tested, PAMPS and PHE 75%, showed promising results as potential replacements for the current model of solar cell, PSS 70k. The PSS 70k diffused into the photoactive layer over time, rendering the solar cell inactive.

Although WISEST is a program that focuses on science, engineering and technology for its researchers, the diversity within research that I was exposed to as a student researcher, augmented the program nicely. We were given numerous opportunities to explore and investigate other areas of research both on and off campus. One of my personal favorites was the trip to Edmonton Research Station, during a Professional Development Seminar, where researchers in the Department of Agriculture used cows and pigs to discover information on topics from the nutrient quality in milk, to embryological development. Although I enjoyed working within a lab, the complete change of environment was what made me appreciate this tour the most. The baby calf that kept trying to lick the girl next to me helped too.

What makes WISEST so successful as a learning experience for summer students, like myself is the fact that it does exactly that: it maintains itself as a learning experience. Within every new opportunity we were given, we were taught something new, from networking with career role models, to setting goals for our futures. I would like to thank Epsilon Chemicals Ltd. as I would not be here without their sponsorship. Now that I have completed WISEST, I realize that I have that much more to think about in terms of choices. The six weeks have passed with such speed that I can scarcely believe I learned all that I did in that time alone. But luckily for me, WISEST also taught me to believe in myself.

## Anne McDonald

Supervisor: Dr. Dimitre Karpuzov / Chemical and Materials Engineering

Sponsor: Alberta Innovates - Technology Futures

*"Reality is a rather appropriate word to associate with the WISEST Summer Research Program."*



On the first day of my six weeks as a WISEST Student Researcher, I thought I was going to be sick. I was so worried about every aspect of the summer, about fitting in at my lab, about making friends, about not knowing enough, that I felt vaguely faint. Every step of the way, however, my fears and uneasiness were soothed by the incredible kindness and welcome I received from everyone I met on campus. From my lab team to the other students working all around the university, every single person I encountered helped to make this the most exceptional and worthwhile thing I have ever done with a summer vacation.

For my actual project, I had the good fortune to be placed in two labs, one in the Chemical and Materials Engineering Building and the other in the Alberta Centre for Surface Engineering and Sciences. Between the two, I was working on optimizing a mineral ore processing technique called froth flotation, for the removal of iron pyrite. The effectiveness of this process is important, because the relatively worthless pyrite I was working with often associates with valuable resources like chalcopyrite, one of the main ores of copper. By preparing my samples in one lab and spectroscopically examining their surfaces in my other lab, I had an amazing chance to experience two very different aspects of university life.

Beyond these two labs, the WISEST program and the kindness of my direct supervisor allowed me to visit and experience many more projects on campus. One of my particular favourites was the Laboratory Medicine and Pathology tour. This trip was absolutely phenomenal. It was thorough, interesting, and definitely thought provoking. The other exciting activity I had the opportunity to experience was a froth flotation demo. This was really interesting because I had spent most of my summer reading about froth flotation. Getting to see the process in real life was a really special opportu-

nity that added a whole new level of applicability and reality to my research project.

Reality is a rather appropriate word to associate with the WISEST Summer Research Program. Afternoons like the U of A Q&A really help you get in touch with the reality of university life. By clearing away myths and replacing them with helpful truths, all of the Lunch 'n' Learns made university life seem more appealing and definitely less frightening than it was six weeks ago.

Among all of the amazing things that I have learned in my time here, the one piece of advice that I have been given again and again since the summer began, no matter who I asked or where I was, is to network, network, network. That is why, as this program draws to end, beyond the massive amounts of knowledge and insight I have gained into my potential future, beyond the incredible encouragement I have received to do what I love, I am grateful for the people. I have made friendships that will last me a lifetime, met mentors who will inspire my future, and in the process I've learned a little bit more about myself. All in all, not a bad outcome for a summer job.

For this incredible experience, I would like to thank Meijiao Deng, Dr. Anqiang He, Dr. Dimitre Karpuzov and the rest of the undergraduate and graduate students who helped make this summer the amazing learning experience that it was. I would also like to express my deep gratitude to all the researchers who were gracious enough to bring me into their labs and show me around, Emma McDonald, my inspiration and editor, and the organizers of the WISEST Summer Research Program. Finally, I would like to thank my sponsor, Alberta Innovates - Technology Futures, without whom I would not be here. In the end, I am nothing but grateful for this amazing opportunity and all of the people who got me to where I am today.

## Anson Dong

Supervisor: Dr. Gwen Rempel / Faculty of Nursing

Sponsor: Faculty of Nursing



*“One event that affected my outlook was the Networking Fair where we received the opportunity to speak to role models from diverse less-traditional fields in science.”*

In reflection of my participation in the WISEST program, I stumble upon the thought of one inescapable word, opportunity. People are often prone to envisioning opportunity as some satisfaction of their inner desire to accomplish their deliberate goals, yet to me opportunity illustrates a completely polar concept. I envision opportunity as allowing one to explore unknown domains. I discovered a consciousness that the opportunity that WISEST presented me was the same opportunity of my imagination, one where I could experience an unfamiliar and less-traditional career in nursing.

Over the course of the WISEST program, I was able to gain an enlightened understanding of research in the field of nursing through assisting Dr. Rempel with her systematic review on interventions for parents of children who have undergone life-saving surgical interventions within the first year of life. Possessing the mindset that most scientific research revolves around quantitative data or quantitative analysis of qualitative data through empirical means, I was intrigued by the degree of complexity that qualitative data and its analysis. Perhaps what I found most perplexing was the scientific research conducted by systematic searches of academic databases, a virtually alien concept to my scientific conscience. My WISEST experience allowed me to discover new facets of science that would never have been introduced in a typical education of the natural sciences, supplementing my initial elementary knowledge of nursing.

Learning new methods of science research possesses implication of superior illumination of the thinker's mind; however, what I felt was more significant to my academic outlook was the knowledge I gained from Dr. Rempel's systematic review. Though the systematic review is ongoing, I have realized the lack of interventions for parents of critically ill children who have undergone surgical intervention in the Canadian healthcare system. Out of all the research

articles screened by title, more than 80% of each list screened did not fit the criteria for parent interventions or did not match the desired population. In addition to knowledge from the results of the ongoing systematic review, I have gained an appreciation for different agreeability statistics while I explored them in the process of determining inter-rater reliability systematic review. Though insignificant in terms of magnitude, the work I have done in the WISEST program has potential to be serviceable in the future work of the research team, especially in systematic reviews.

Even with the focal point on the exploration of less-traditional science careers, WISEST augments the student researchers' learning experience with remarkable events such as various "Lunch 'N' Learn" Sessions and Professional Development Seminars. One event that affected my outlook was the Networking Fair where we received the opportunity to speak to role models from diverse less-traditional fields in science. I was intrigued by the role models' motivations in their selection of their careers, and I admired their courage in choosing careers that were less-traditional for their respective genders. Through events like this Networking Fair, WISEST was able to further expose my mind to various career opportunities available and spark my curiosity.

By presenting me with an opportunity, WISEST significantly impacted the direction of my future; however, one must realize that impacts are only conveyed with the foundation laid by great people and organizations. Therefore, I greatly express my gratitude towards Dr. Rempel and her research team for all their help and support in addition to their gracious offer of an opportunity to do research, the Faculty of Nursing for their sponsorship, and, most importantly, WISEST, for this chance of a lifetime to experience a less-traditional career.



## Ariel Greiner

Supervisor: Dr. Erin Bayne / Biological Sciences

Sponsors: Faculty of Science / Service Canada (Canada Summer Jobs)

*"While I was excited about the opportunity to experience a research lab, I never expected to do it alongside so many wonderful people..."*



The WISEST Summer Research Program was better than I could have ever hoped. I was placed in the field of Animal Ecology in the Department of Biological Sciences. While at the program, I did everything from trekking through the forests of Northern Alberta to racing worms in a laboratory. I also had the pleasure to get to know many wonderful people including (but not limited to) the other WISEST Researchers and my supervisors. While I was excited about the opportunity to experience a research lab, I never expected to do it alongside so many wonderful people -- people who shared my interests, and my same passion for science.

Apart from the actual research, I also attended many Lunch 'n' Learns and Professional Development Seminars. While all were enjoyable, for various reasons, my two favourites were the speech by Dr. Margaret-Ann Armour on networking, dreaming and the Team Challenge. Dr. Armour was living proof that one can have great success and still be humble, and the team challenge briefly introduced everyone to the world of robotics in a way that was fun and informative.

During the summer, Katarina (the other WISEST student in my lab) and I floated through a variety of different research projects, focusing on earthworms and birds. These involved very different skill sets and therefore made for a very varied, and interesting, summer.

The first and the last two weeks were almost entirely focused on earthworms, analyzing (on the ArcGIS program) the effects earthworm burrows had on two different types of plants -- one with narrow, constrained roots and the other with wide spreading roots. The results seem to indicate that earthworms are much better for the narrow-root plants than for the wide-root ones. This result will be very useful for all disciplines that involve plant growth, as it gives more information about whether earthworms are useful to have. We also did various other earth worm experiments, which had us

building contraptions with our hands.

The middle two weeks were spent at University of Alberta's Meanook research centre, up near Athabasca, working on a completely different project: distance sampling to help researchers better understand bird densities. This involved research that will hopefully help simplify the process of monitoring biodiversity. Every-day, we visited a different type of forest with our tripods, omnidirectional microphones and recorders to record the sounds produced by a speaker from different distances and from different directions, to determine how far this sound traveled. I am looking forward to visiting Meanook and engaging in field work again!

WISEST provided a wonderful opportunity to work at a full time position in a research lab at the university -- a very rare activity for a high school student. I worked in a research lab and so became acquainted with all who participate in them; as I hope that this will be my future, this in itself was a very eye-opening experience. I was also able to learn more about what it means to work on something that has never been done before, something that does not have a set procedure; this helped me gain a better understanding of the proper mindset for this type of challenge.

I want to thank Erin Cameron, Michelle Streckies, Justine Kummer, James Cameron, Dr. Bayne, and the WISEST Supervisors for all their instruction and advice! I'd also like to thank Brandon and the staff of the Meanook Research Station for making it such a nice place to live. Lastly, I'd like to thank Katarina Michalyshyn for being such a wonderful WISEST partner and all of the other lovely Summer Research participants for making this summer so memorable! This has been a wonderful, and incredibly productive experience, and I'd like to especially thank the University of Alberta's Faculty of Science and Service Canada (Canada Summer Jobs) for their sponsorship.

## Bailey Sadowsky

Supervisor: Dr. Jason Carey / Mechanical Engineering

Sponsors: NSERC PromoScience / Alberta Employment and Immigration (STEP)



*"In the end, the WISEST program is not all about having fun; it is also about what you learn and what you will take away from it."*

Confucius once said, "Choose a job you love, and you will never have to work a day in your life." After participating in the WISEST Summer Research Program, I now understand what Confucius meant. My experience in the WISEST program has made my summer incredibly enjoyable; so much so that I tell my friends and family that I get disappointed on Fridays because I cannot go into work on Saturday. But what makes WISEST pleasurable is not just the people you meet and the once-in-a-lifetime events you get to participate in, it is the fact that you are widening your awareness about potential careers and learning ideas and concepts that you may never have had the opportunity to hear about.

In high school, students do not have the opportunity to study engineering, so I was thrilled to be able to work in the biomedical mechanical engineering lab of Dr Jason Carey. For the past 6 weeks, I have been working with my supervisor, Katherine Evans, creating a braided composite sock. The idea of the overall project is to use the braided sock to aid the healing of fractures, instead of the use of traditional metal plating. Specifically, I have been altering the speed (Rotations per Minute) and the braid density (Picks per Inch) settings of the HS80-72 "IMC" Series braiding machine in our lab to determine the resulting braid angle. I have been doing this because a specific braiding angle must be used in order for the braid to have similar properties to that of the cortical bone.

Aside from my research work, my lab team organized tours of other labs so that I would have the opportunity to see other areas of research at the U of A. Furthermore, everyone in the lab openly talked about their projects and about university life. They did much more than just answer my questions; they made me feel like an important member of their team. Without a doubt, the people that I worked with every day and the other people I met along the way, certainly

made my summer enjoyable.

Not only did my research team organize tours, but the WISEST office did so as well. Every Monday all WISEST students participated in Professional Development Seminars, where we visited various industries and companies and learned about careers in engineering and science. Every Monday took me down a new career path and deepened by passion of science and engineering. Needless to say, Mondays were one of my favorite days of the week.

In the end, the WISEST program is not all about having fun; it is also about what you learn and what you will take away from it. For me, I always need to have a goal in mind and there is never any room for error. After one week in the lab, I no longer have those expectations. I learned that there will always be a bump in the road, and a problem to overcome. Thankfully, I had my lab team with me every step of the way. They showed me that the situation is not always as bad as it seems.

I would like to thank Dr Jason Carey for letting me be an active member of his lab and Katherine Evans for sharing with me her research project. I would also like to thank the people in my lab, Caroline Collins, Cheequeun Leung, and Garrett Melenka, who constantly helped and taught me throughout the summer. Additionally, I would like to give a special thanks to NSERC PromoScience and Alberta Employment and Immigration (STEP) for sponsoring me, and WISEST for organizing a fantastic summer program. It has been a privilege to be able to work with everyone in the lab, thanks for the great advice and life lessons. I couldn't imagine my summer any other way.

## Bonnie Plican

Supervisor: Dr. James Hoover / Computing Sciences

Sponsor: Process Solutions Canada

*"I really enjoyed Dr. Margaret Ann Armour's presentation, and the Question and Answer session about the University of Alberta was very helpful."*



I never would have imagined that I would be working with professors to help develop a university level course, while still in high school. I also never would have imagined that I would have such an amazing opportunity to learn about science, engineering and technology.

Any of the expectations I had of the WISEST Summer Research Program were exceeded within the first week. Walking into a room full of girls my age with similar interests to me, I knew that this summer would bring an unforgettable adventure. After playing some ice breaker games and meeting my supervisors at orientation, I knew our adventure had begun.

I spent six weeks working in the department of Computing Science with Dr. Jim Hoover and my supervisor Kaylee Bohaychuk. They were developing a new introductory Computing Science course for the fall that uses the Arduino platform. I was put to the task of working through the notes and assignments that will be given to the students. As I had no previous programming experience, I was able to point out what made sense or what was difficult to understand. In this way I learned a hands-on approach to computing and programming. I learned how to wire an Arduino board with LED lights, buttons and LCD screens. On the computer I was then able to write code that, once uploaded to the Arduino, flashed lights in sequence or displayed text on a small screen. I now have a good understanding of both Python and C programming languages. As I worked through the assignments, I sometimes ran into problems and was able to debug the code. I have also learned about binary numbers, hexadecimal numbers and how to encrypt and decrypt text.

A moment that stands out in my mind as a day to remember was the second day I worked in the lab. With my limited knowledge of programming I was able to get four LED lights flashing in sequence by writing the code myself. It then progressed into sending Morse

code, displaying binary numbers with lights, encrypting and decrypting text and sorting numbers. I was also able to create a small game with the LCD screen and joystick. A line was able to move around the screen and fire little dots to destroy pixels. It is amazing what can be accomplished in just a few short weeks in such a remarkable program.

Aside from being part of a research team and working in the lab, there were many other opportunities that made the experience that much better. Mondays were Professional Development days and one that was very beneficial to me was the Networking Fair. In small groups we were able to talk to role models and hear their experiences. I was also able to visit research labs both on and off campus, my favorite being the Biomedical Mechanical Engineering lab. At the end of each week came Lunch'n'Learns, providing information on posters, reports and networking. I really enjoyed Dr. Margaret Ann Armour's presentation, and the Question and Answer session about the University of Alberta was very helpful.

WISEST provided me with the opportunity to discover new careers and areas of science and engineering that I did not even know existed. Without the WISEST program I would not have been able to have the opportunities I was so fortunate to experience this summer.

I cannot say thank you enough to everyone who made this summer and the WISEST program possible. Dr. Hoover and Kaylee Bohaychuk, thank you for being patient and making my summer enjoyable. I am also grateful to my sponsor Process Solutions Canada for their generous donation. My sincere appreciation goes out to the WISEST Team who organized everything and answered all my questions. I would also like to thank my teacher references and family for their support. Finally, thank you to all of the other WISEST students who became good friends and made this summer memorable.

## Brett MacDonald

Supervisor: Dr. Cynthia Paszkowski / Biological Sciences

Sponsor: NSERC PromoScience



*“These experiences [Professional Development Seminars] worked on broadening our minds and making sure that every participant in the program realized how many career options there are.”*

When I first entered the WISEST program, I thought I knew what I wanted to be when I finished school. Everything I have done this summer has changed that. It has opened many doors to different opportunities and has made me aware of all the options that are available to a student who is open to new ideas and not afraid to explore their interests.

Orientation day was a blur. We were given the opportunity to meet new people who were also in the program and were allowed to explore the university campus before heading out in different directions with our supervisors. I was placed into a lab under the supervision of Cynthia Paszkowski, so she showed me around and we got to work right away.

Over the summer I studied the ecology of amphibians in the urban area of Edmonton. We monitored their ages, their movement, and the vegetation that surrounded them. There were two main parts of the jobs I was given, the lab work and the field work. Within the lab I worked on aging toe samples. The bones in the toes get age rings the same way that a tree trunk does, so if you count them you can find out how old the specimen you are working with is. The field work took me to all different ponds throughout the city of Edmonton and exposed me to two different methods of tracking. Radio tracking used a telemetry receiver that emits a beeping noise that gets louder as it gets closer to the transmitters that were secured around the frogs waist using a small diameter silicon tube tied to the frog. The second method of tracking is powder tracking. The frogs would be coated in a fluorescent powder that would fall on the ground and onto the grass as the frog moves throughout the night. You would then go out the following night and follow the paths using black lights to mark wherever the frog turned. The findings of the study will help city planners know what types of habitats

need to be included in constructed wetland and need to be preserved in natural wetlands. Each day of research held a completely new experience.

Through the WISEST program we were also given the opportunity to tour different facilities and research centers during Professional Development Seminars. These experiences worked on broadening our minds and making sure that every participant in the program realized how many career options there are. Lunch and Learns provided us with new learning methods and experiences. We were taught how to do everything from networking to creating a poster completely on the computer, to what to expect when we venture into the university as students in just one short year. We were also given some advice to make an easier transition from high school to the university life. WISEST provided us with so many resources and I am so thankful for them. I would also like to thank my sponsor, NSERC PromoScience. Without the very generous sponsorship I would not have been able to partake in this wonderful opportunity.

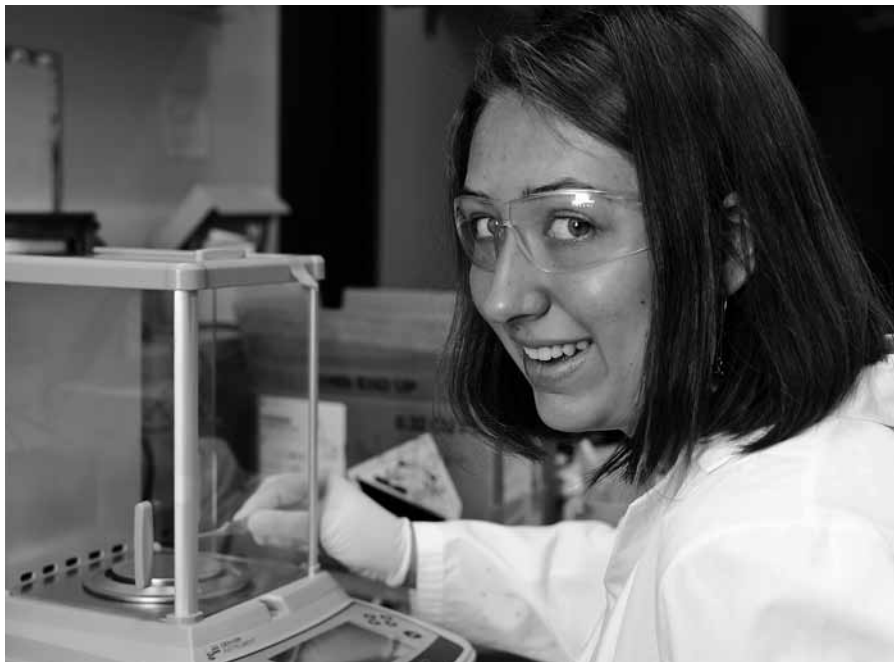
The WISEST Program is like nothing else I have ever done. It has shown me career paths that I never even knew existed and has provided me with a lot to think about. Hearing about all the paths that professionals in many careers have taken to get where they are now has really made me come to understand that the path that you take to get somewhere is really more important than the final destination, because you could end up doing something you never would have thought about. The WISEST program is a great opportunity and is something that I will never forget. For anyone who is up for a bit of a challenge and a few frustrating moments, the reward is greater than all of it, and I would strongly recommend the WISEST Summer Research Program.



## Caitlin Bullerkist

Supervisor: Dr. William Tonn / Biological Sciences  
Sponsor: Dow Chemical Canada Inc.

*"Even though I was only a WISEST student, my lab still trusted me with tasks that required the utmost care."*



When I think of WISEST, I do not think of it as a summer job; I think of it as an opportunity that changed my outlook completely. WISEST revolutionized my worldview from the moment Orientation started.

I was nervous coming to Orientation; not knowing what to expect or if I would meet anyone nice. But as soon as I entered the room, my fears evaporated. Fellow students were sitting together; chatting amongst each other. I soon joined a group and made fast friends. I could not believe how much I had in common with the people I met. We all loved science, technology and even math.

Soon I met my supervisors and was immersed in the ecology. Even though I was only a WISEST student, my lab still trusted me with tasks that required the utmost care. The project I was a part of studied the effects of stocked trout on boreal forest lakes. I dissected small forage fish for muscle samples, washed trout fins and organized bugs, before freeze drying these samples. I then ground up the samples and weighed them using an analytical balance. The samples were then sent to a mass spectrometer, which would determine their isotope concentrations. This information allows you to know where the organism lives and what it eats. I also had an opportunity to filter algae. Algae are collected to learn the productivity of a lake, river or stream. My task was to take vials of algae and filter using a filter tower.

For me, the opportunity was about much more than the fish. It was about all the things I learned along the way. I learned about scientific procedure, lab operation, networking, and much more. I now understand how ecological samples are taken and the amount of work that goes into analyzing them. The things I learned will help me throughout the rest of my life.

My time in the lab has really connected me to the research that was

being done. Whenever I hear news on ecology, I always tune in to hear more. I now understand what is going on and how it affects the environment, as well as how important this type of research is.

I also had the opportunity to work with Jessica Heupel, a fellow WISEST student in the lab. We were able to bond over the shared ecological projects and our love of science. This is just one example of all the friends I made at WISEST. On all the tours and Professional Development Seminars, I had the opportunity to bond with other WISEST students, and I quickly made friends. I know the friends I made this summer, I will have for life.

Every week during the summer, we had a Professional Development Seminar and Lunch 'n' Learn Session. These were of immense value allowing me to learn about many new career options and many new skills. The Lunch 'n' Learn that I enjoyed the most was the U of A question and answer. We were broken up into groups of six and were each assigned a current university student. For an over an hour, we had the opportunity to ask questions about anything to do with university life. I learned so much. A year from now, when I come to university, I know I will be ready.

If it was not for my sponsor Dow Chemical Canada, I never would have been able to participate in such a great opportunity. Thank you to everyone in the Fiesta and Icecap projects in Biosciences. You taught me so much and for your patience when I did not understand. I would also like to thank everyone at WISEST for all their hard work to make this experience so exceptional. WISEST was a once in a lifetime opportunity and I was so fortunate to be a part of it.

## Caitlin Guzzo

Supervisor: Dr. Ania Ulrich / Civil and Environmental Engineering

Sponsor: Total E&P Canada



*“Never before have I been more enthralled with the prospect of my future, or more infatuated with the notion of having a science-based career.”*

Prior to starting WISEST, I had been under the misconception that this program would simply reaffirm my decision to become an engineer. However, I had grossly underestimated the monumental impact that it would have upon my future – though only six weeks in duration, WISEST has irrevocably transformed my career path, broadened my choices and inspired me to pursue excellence.

Over the course of this summer, I had the amazing opportunity to take part in a research project in Dr. Ania Ulrich’s lab in the Department of Civil and Environmental Engineering. My project consisted of determining the feasibility of utilizing wood waste (chips and bark) as a means of bioremediation (using the sorption of wood to remove contaminants in addition to facilitating the growth of beneficial microorganisms) for oil sands process-affected waters. Due to the catastrophic impact of the Mountain Pine Beetle, there is an astounding amount of damaged wood, rendered useless for most uses of timber. By using this otherwise ineffectual wood, the damage to the environment by both the oil sands and the Mountain Pine Beetle can be mitigated. However, wood contains some potentially harmful compounds, which may be leached into the water, squandering any benefit the wood provides. My project focused on the characterization of the aforementioned leachate, analyzing and evaluating its potential environmental impact. Seeing as the rectification of our Earth’s abused environment is a passion of mine, I felt extremely fortunate to participate in such a valiant and valuable endeavor. Throughout the past six weeks, I have learned a vast array of crucial lab and research skills, which will no doubt aid me in my future graduate studies. Though these skills are practical and useful, they were by no means the most valuable component of the WISEST Program. Working alongside such inspiring women as Melissa Haveroen, Lisa Brown, and Elena Dlusskaya, I learned much more – a deepened love of science, a passion for igniting change

gender-balance of the sciences, and a relentless aspiration to share this enthusiasm with others.

Though the majority of my time in WISEST was spent in the research lab, a considerable amount of the program was dedicated to exposing the students to other careers and areas of study. Through weekly Professional Development Seminars and Lunch ‘n’ Learn sessions, my eyes were opened to the staggering amount of opportunities that I had been previously unaware of. Though each of these was an experience unto themselves, the one Professional Development activity I found most inspirational was the Networking Fair. I was given the opportunity to meet with eight amazing women in the fields of science and technology, and as they shared their stories, I was speechless as I realized how many career prospects were available to me. I was able to ask a plethora of questions, and with each one I grew ever more eager to enter in a field of science. Never before have I been more enthralled with the prospect of my future, or more infatuated with the notion of having a science-based career.

In summary, the WISEST Program has gone above and beyond anything I could have anticipated. I would like to extend my sincerest gratitude to everyone I worked with during my research this summer, and to Dr. Ulrich for allowing me to experience a truly amazing lab. In addition, I am also quite thankful to my sponsor, Total E & P, without whom I would be unable to participate in the program. Most importantly, I would like to thank the University of Alberta and the WISEST Program, for granting young women an incredible opportunity and a life-changing experience. Earlier, I had mentioned that I had anticipated that WISEST would set my career plans in stone. However, it did something much more amazing – it opened an innumerable amount of doors. Thank you!

## Corrine Rude

Supervisor: Dr. Michele Crites Battie / Physical Therapy  
Sponsor: Allard Foundation

*"I liked the Biomedical tour because I could see myself working in that field in the future."*



As grade twelve quickly approaches, so do the decisions that come with it. What do I want to do after graduation? What university courses will I take? For me, all those questions were unanswered. The WISEST Program gave me an opportunity to look beyond traditional fields and into less-traditional ones. I was able to work in a university lab alongside extraordinary people, observe a variety of research labs in and around Edmonton and gain professional skills I will use throughout my life. This summer made me realize that growing up is not so bad. Overall, the WISEST Program has allowed me the chance to meet new people, opened doors to greater possibilities and gave me six weeks I will not forget.

During the program I worked in the lab of Dr. Michele Crites Battié, in the Department of Physical Therapy. I had the privilege of working on The Twin Spine Study which began in 1991. The purpose of the study was to look at disc degeneration and lower back pain through magnetic resonance imaging (MRI). During the process of assessing hundreds of subject's spine images, great variability in the thickness of the soft tissue (posterior longitudinal ligament, fat, vessels) between the vertebral body and dural sack was observed. Whether this is a normal variant or reflects a degenerative change is unknown. The focal point of my research was to look at the variation in size of the soft tissue in relation to the age of the subjects. The results showed that age has negligible effects on the size of the soft tissue posterior to the vertebral body.

The research that I did over the six weeks just scratched the surface of the phenomenon regarding the thickness of the soft tissue and PLL. Further research can be done to see if there is a correlation between disc degeneration and the size of the PLL or if the increase is just a result of aging. Once additional research is completed we can see if the size increase results in lower back pain subsequently

determining a solution.

The WISEST Program was not only about the work I did in the research lab, it was also about expanding my knowledge of less traditional careers and allowing me the chance to gain valuable life skills. Every Monday and Friday we had Professional Development Seminars and Lunch 'n' Learn Sessions that provided me the opportunity to observe other research environments and fields of work. I cannot choose my favorite session but among the top would be the tour of the Mechanical Engineering (Biomedical) research lab and the Networking Fair. I liked the Biomedical tour because I could see myself working in that field in the future. The Networking Fair was an amazing opportunity to talk to phenomenal women who have careers in male dominant fields. They helped me realize that I would rather work in a technical area than in a business area. In addition, they showed me that there is no limit to learning and possibilities are endless.

This summer would not have been possible or as amazing if it were not for everyone involved in the program. I would like to thank my co-workers and supervisors, Drs. Tapio Videman, Yue Wang and Michele Crites Battié for the guidance over the six weeks. The WISEST Summer Research Program would not have been as organized and enjoyable if it were not for the WISEST Team, so thank you. Finally, I would like to thank my sponsor, the Allard Foundation, without you I would not have had the chance to be part of this remarkable program. I have learnt so much over the course of the six weeks and it has only strengthened my desire to have a career in a less-traditional field.

## DaEun Jeong

Supervisor: Dr. Samer Adeeb / Civil and Environmental Engineering

Sponsors: NSERC PromoScience / Alberta Employment and Immigration (STEP)



*“All the researchers of my lab and Principal Investigators were very kind and helpful.”*

The WISEST program isn't just about research work in your lab. We learn and gain knowledge, meet other students who share the same interests as you, and decide what you would like to pursue after high school. I didn't know that before I came to Orientation on the first day. I was very nervous to meet new people and work with professionals, but as soon as I went through the first day, all the worries were gone, only the excitement for the rest of the summer was left in my mind.

For the last six weeks, I was very fortunate to be placed in the Department of Civil and Environmental Engineering in Dr. Samer Adeeb's lab under the supervision of Jisoo Hur and Jonathon Schofield. I was also placed in the lab with one of the WISEST students, Radhika Kalra, who helped me a lot with various activities. My project was on the three-dimensional geometric analysis of the reconstruction of ulna coronoid process with fibula bone graft. I worked mostly with the computer software called Mimics, which builds three-dimensional models of the ulna and fibula from two-dimensional data, in our research, CT scans. For the first time, I had the experience of getting my bone scanned which was used in our research. This was a very unique and fun experience. I also assisted other student researchers in my lab and I had a chance to study many different parts of biomedical engineering.

Working in the lab might sound boring, but when you experience it, it is a totally different story. I never expected to learn so much from this program. I wasn't even sure if I would like to be a biomedical engineer, but after this program, I am confident with my career path. Six weeks is very short in terms of your whole life, even if you are only seventeen years old and so many things happened to me this summer that changed my life.

As I mentioned earlier, in WISEST, we experience more than just

research: Professional Development Seminars and Lunch 'n' Learn Sessions are a few of those experiences. We had many of these great sessions throughout the program. Out of all these sessions, I really enjoyed our first Lunch 'n' Learn session with Dr. Margaret-Ann Armour. Her speech was very effective and touching. I also really enjoyed speaking with her in a small group after the session. The very last Professional Development Seminar was one of my favorite tours this summer. We had twelve different choices of tours therefore everyone had a chance to choose something different that they wanted to explore. I had the great opportunity to be on a physiology tour and it was very informative, especially when we were in a small group of five. I really enjoyed these sessions, thanks to Kerry and Catherine for organizing these great learning experiences.

Thank you to NSERC PromoScience, and Alberta Employment and Immigration for their support, I wouldn't be able to experience this amazing summer without your help. Thank you to Mrs. Balding for encouraging me to apply for this opportunity. All the researchers of my lab and Principal Investigators were very kind and helpful. Without their advice and support, I wouldn't be able to enjoy my summer this much. Also, special thanks to Jon, our head supervisor, for organizing all the great lab tours and campus tours that were very helpful and fun, and for giving us work to do when we were done with our research. Lastly, thank you to all the WISEST coordinators, this summer was amazing. This is the most enjoyable and meaningful summer to me. I will never forget this life changing experience that opened my view on biomedical engineering, and memorable university experience with the most amazing peers!



## Danielle Pertschy

Supervisor: Dr. Nadeem Pervez / Oncology  
Sponsor: NSERC PromoScience

*"The most important thing that I learned this summer was that no one should be limited by what is considered to be 'gender traditional' by others."*



When I found out about the WISEST Summer Research Program, I knew it would be the perfect fit for me. The prospect of being able to work in the field of Science before even starting university was something I knew I had to take advantage of. Little did I realize how much I would learn not only about research and the pursuit of less-traditional careers, but how much I would learn about myself. Now that I have completed my research, I can confidently say that I thoroughly enjoyed every moment of it. It is only now, looking back on what I have accomplished, that I realize how grateful and appreciative I am to have participated in this unique experience.

I have always been a girl who has had an interest in Sciences, and now recently in Medicine. Coming into this program, I knew that Medicine was ultimately where my educational goals lied. But I was still very uncertain as to the specializations within Medicine or if it was a field that I could enjoy in reality. WISEST was able to give me a huge 'leg-up' on my university career, by allowing me rare insight to the field of Oncology. I can say that this summer definitely confirmed my interest in Science and in Medicine and now I can't wait to go to university and start experiencing more possibilities of what I know that I am interested in.

I spent my six weeks of WISEST working in the Department of Oncology at the Cross Cancer Institute, under the supervision of Dr. Nadeem Pervez. My project consisted of helping with data collection on the uncommon small cell cancer of the genitourinary tract (or reproductive and urinary systems). This meant reading through old patient files and attempting to understand their treatment and the reasoning behind it. Not only did I learn all about cancer and its treatment, I was able to meet and interact with some of Dr. Pervez's patients who were coming in for follow-ups. Never in my life have I felt closer to the field of Medicine than this. The ability to be able

to connect with patients and help them is one of the main reasons why I wanted to enter the field of Medicine in the first place. This is exactly what I had the chance to experience this summer.

The best part of these past six weeks was the feeling of being part of something bigger, participating in research that eventually may help make people's lives easier. The purpose of the study was to collect information in attempt to determine the most effective course of treatment for those diagnosed with small cell cancer, something that currently isn't well documented because of its rarity.

Yet WISEST goes beyond just research. From the multiple lab tours, to talking with inspiring role models, to being able to meet really great people with similar interests, WISEST allowed me to learn so much about "less-traditional" careers and about Science in general. The most important thing that I learned this summer was that no one should be limited by what is considered to be 'gender traditional' by others.

All in all, this experience is definitely one that I will never forget and that I am grateful to a lot of people for. I would like to thank Kerry, Catherine, Grace, and the rest of the WISEST team for approaching me about participating in WISEST for a second round and the opportunity to learn more about another area of research. As well, I would like to thank Nadeem Pervez, my supervisor, and everyone else at the Cross Cancer Institute for sharing your knowledge with me. I would also like to express my gratitude to NSERC PromoScience. Without the support of sponsors such as you, this experience wouldn't be possible. And finally, thank you to all the other members of WISEST 2011 with whom I was able to enjoy my summer with.

## Danielle Schmidt

Supervisor: Dr. Daryl McCartney / Civil and Environmental Engineering

Sponsor: Alberta Women's Science Network (AWSN)



*"It was truly an amazing experience to be a part of such groundbreaking research, and an honor to work with the remarkable people in my research team."*

Did I think, when I was accepted into the WISEST program, that I would be working closely with Salmonella or E. coli? Not in my wildest dreams, but then again, I learned quickly in the WISEST program to expect the unexpected. That's often what scientific research and development involves; being able to adapt and roll with the punches.

Working amongst Dr. Daryl McCartney's research team in the department of Civil and Environmental Engineering taught me so much, and over a very short period of time. To be honest, I expected that my work over the summer would involve small, menial tasks, and that I wouldn't be working directly with my research team. Was I ever wrong! My lab partner, Kaitlyn Visser, and I were closely involved in the research every step of the way. The goal of the project that I was placed in was to evaluate the effectiveness of current time-temperature regulations concerning the production of compost in full scale facilities.

I was mainly involved with preparations for an experiment to be conducted at the Edmonton Waste Management Centre. This experiment involved randomly dispersing self contained temperature probes, some of which held cryovials of pathogen/indicator organism inoculum, in a covered aerated static compost pile. By subjecting these temperature probes and cryovials to conditions experienced in a full scale compost pile, Dr. McCartney's research group aims to determine whether or not the compost in these piles routinely reach the required temperature for the specified length of time. They also hope to verify that these conditions are sufficient in order to reduce pathogens such as E. coli and Salmonella to levels safe for humans and the environment. It was truly an amazing experience to be a part of such groundbreaking research, and an honor to work with the remarkable people in my research team.

The lab, however, was only a taste of the extraordinary people that I would meet during the summer. My involvement in WISEST opened up an endless library of wisdom and advice to me, in the form of incredible people who were more than eager to share their experiences and knowledge. Although everyone had a unique story, there was a consistent theme, which was not to worry so much about where you start off after high school, because the path to your final destination is never straight, there are always twists and turns along the way. This one idea has given me the courage and mindset necessary to pursue my passions, wherever they may lead me.

The entire WISEST program was incredible, but one event that impacted me in particular was a lunchtime session in which we were fortunate enough to talk with Dr. Margaret-Ann Armour, a co-founder of WISEST, and one of the most inspiring women I have ever met. Ironically, while she was discussing the importance of mentors, Dr. Armour instantly became my mentor and role-model. Although it was only an hour, Dr. Armour's presentation was one of the most memorable hours of my life, and an experience that I will never forget.

Going into the WISEST program, I thought that my dream career would somehow materialize right in front of me over the course of the summer, but that's unrealistic. It would be impossible to discover all of the employment opportunities in science/engineering in a lifetime, much less six weeks. Instead, what I gained from my experiences in WISEST was a set of life lessons, confidence, and a wider understanding of the fields of studies that exist in science and engineering, which to me, is so much more valuable than anything else I could have asked for. Lastly, I would like to thank the Alberta Women's Science Network for sponsoring my participation in WISEST.

## Ebberly MacLagan

Supervisor: Dr. Kurt Konhauser / Earth and Atmospheric Science  
Sponsors: Faculty of Science / Service Canada (Canada Summer Jobs)

*“Throughout my entire summer, I gained so many new skills and information that will most definitely assist me in future education and workplace opportunities.”*



If you were to ask me if I had an enjoyable summer this year, I wouldn't hesitate to share my amazing WISEST experiences with you. Not only was it a chance to meet with and talk to role models and professionals, but an opportunity to work in a research lab. My days were filled with so many new tasks and ideas that I was never really sure what would come around the next bend.

My first expectations for the program were highly surpassed from the moment that I was shown my lab. I had thought that it would be a huge complex filled with many people, and I would only be a very small part of any action that occurred. Was I ever proven wrong.

I spent my summer working in Dr. Kurt Konhauser's lab in the Earth Sciences Building. We were studying banded iron formations (BIFs) to try and better understand how they were formed. Most of these formations are older than 1.8 billion years, and are formed during the Precambrian period.

There are three main hypotheses that explain the formation of BIFs. The first suggests that oxygen dissolved in the oceans directly precipitated, or solidified, the iron. The second is that photosynthesis was performed by microorganisms that released oxygen causing the iron to precipitate. The final hypothesis, and the one that I was helping in studying, is that ultra violet (UV) light from the sun caused the iron to precipitate in a process known as photo-oxidation.

My tasks assisted with the testing of UV light, specifically UV-C light which is very similar to that from the sun, that would have penetrated the Precambrian atmosphere and allowed BIFs to form. We have a special oven-like device that exposes two samples of ferrous seawater to the UV light for twenty-four hours. We cover one with tin foil so that it is not exposed to the light and can be used as a

constant. After the duration of a day, we remove both samples and test them in a spectrophotometer to read how much iron had been allowed, or prevented in the case of the constant, to precipitate.

Not only was I involved in the lab procedures, but also assisted in scanning and cutting a variety of samples. I also did a lot of work on the computer searching for research papers and transferring data into a spreadsheet. Another computer task was that of compiling images taken with the electron microprobe so they can be used to identify the composition of the BIFs.

WISEST also had all the students participate in two group sessions per week. I thoroughly enjoyed the tour of the Edmonton Research Station as it exposed me to a completely new type of career involving the study of pigs and dairy cows. Before the tour, that was not necessarily in my line of interest as a future workplace, but now that I have seen the facility, it has opened up a possible new career choice for me.

Throughout my entire summer, I gained so many new skills and information that will most definitely assist me in future education and workplace opportunities. I had a wonderful lab team and I would like to thank them all, especially my direct supervisor, Set Castro, for allowing me to participate in their research. Another thank you goes to my sponsors Service Canada and the Faculty of Science, without whom this program would not be possible. And most of all, I would like to thank WISEST and the awesome people who organize it, for giving me this amazing opportunity to explore and participate in University research. My experiences will be remembered for a very long time and I hope that many other girls in the future can enjoy it as much as I did.

## Emma Dodds

Supervisor: Dr. Murray Gray / Chemical and Materials Engineering

Sponsor: Total E&P Canada



*“Because I had a limited knowledge of the oil sands before I started, there was a steep learning curve, and of course many hours of reading to learn about current industry practices and procedures.”*

Before I started my six weeks at WISEST, I didn't know much about the program. I knew that I would have the opportunity to explore research in a less-traditional career and meet others with similar interests, but that was about the extent of my knowledge. As it turned out, throughout my six weeks in the program I learned that WISEST is so much more than just helping with research, I also learned about university life, met great people and explored many different career options.

For my six weeks in the program I was placed in the Department of Chemical and Materials Engineering, in the lab of Dr. Murray Gray. I was able to work on a project that is exploring the use of solvent to extract oil sands. The research is focused on using solvent instead of water, thereby eliminating the tailings ponds that are currently created by the industry. Because I had a limited knowledge of the oil sands before I started, there was a steep learning curve, and of course many hours of reading to learn about current industry practices and procedures. Although I hadn't expected to have to read as much as I did, it helped me understand more about the project, and exactly how I would be helping to change the industry.

In the lab my supervisor Lisa showed me around, and oriented and familiarized me with all the equipment. She also ensured I had the opportunity to help with all of the experiments. I helped with extractions, drying experiments, and I used a machine called the CHNS, which is used to measure a material's carbon content. The carbon content measurement is used to determine the bitumen recovery from an extraction. All of these experiments were done to determine if our chosen solvent, cyclohexane, had good performance rates. We confirmed through our tests that there was a high degree of bitumen recovery, and that cyclohexane dried well because of its high volatility.

In addition to working in the lab, every Monday there were Professional Development Seminars to attend, and each Friday we participated in Lunch 'n' Learn Sessions. During these sessions I had the opportunity to meet other WISEST students, learn more about the university and talk to role models about less-traditional career options. The Lunch 'n' Learns covered topics such as how to write an “elevator pitch”, making a research poster, and all about university life. These sessions provided an opportunity to meet and talk with other students. At the Professional Development seminars I had the opportunity to talk with role models at the Networking Fair, tour company facilities off-campus, and learn about all the different research that happens at the University of Alberta. These sessions gave me the chance to make new friends and learn about the projects and research that other students were assisting with.

My favourite session was during a Professional Development Seminar, when we were taken on a research facility tour. I had the opportunity to go to the swine research facility and the dairy unit at the south campus of the university. This tour presented me with an opportunity to learn about the work being done with pigs and cows, and opened my eyes to how varied the research is at the university. I really like animals, and I found that having the opportunity to learn about them, and the kind of research done on them was really interesting.

This summer has been an incredible experience and I would like to thank Dr. Murray Gray for allowing me to join his research team this summer. I would also like to thank my supervisor Lisa Vagi for allowing me the opportunity to work with her this summer. Without the entire WISEST team and my sponsor Total E&P Canada, this experience would not have been possible. Thank you all for giving me this wonderful summer experience.



## Esir Da'ar

Supervisor: Dr. Yunjie Xu / Chemistry  
Sponsor: Epsilon Chemicals Ltd.

*"Being a part of Dr. Yungie's group I had the privilege to attend presentations of other research every Friday."*



When faced with a challenge I am not frightened by it but face it head on. This was the major reason why I applied to the WISEST program. I knew that the next six weeks to come would be more difficult than anything I have ever encountered, which excited me all the more.

I was honored to work with my supervisor Fumie X. Sunahori and my Principle Investigator Yungie Xu in the Department of Chemistry. My project that I was researching both intrigued me and overwhelmed simultaneously. I was intrigued because the study of chiral molecules is an ongoing phenomenon to many researchers. These molecules have a mirror image, the left handed side and the right handed side, and they cannot superimposed on each other, like our own hands. No one knows how chiral molecules' binding mechanisms function. Some molecules that are considered chiral are our amino acids and sugars. In our body only left handed amino acids bind to other left handed amino acids to compose our protein, while right handed sugars bind to other right handed sugars to form our DNA. This is called homochirality where some left handed chiral molecules bind to right handed ones are called heterochirality. To understand why these molecules bond in this specific way one must be familiar with their structure. However, these molecules are too large to analyze, so as a researcher I studied a smaller left handed chiral molecule, methyl lactate. This summer I used spectroscopy, the use of laser light to study matter, to find the spectra of methyl lactate and methyl lactate combined with water. The purpose of this is for someone to be able to use the spectra to find the structure of this molecule. Therefore we can further our understanding of chiral molecules. Learning all of that was very overwhelming at first.

During the course of my research I learned valuable information

that I could have only have gotten through WISEST. Being a part of Dr. Yungie's group I had the privilege to attend presentations of other research every Friday. This gave me access to actual presentations researchers do. I was even fortunate enough to briefly meet Professor Mike Bowers from UCSB, a well renowned person in the field of Chemistry. He gave a presentation on his different research projects and one that fascinated me the most was his short talk on diabetes.

Not only was I introduced to projects I never heard of but, one of the perks of being accepted into this program was that I was given a tour every Monday to see the numerous types of careers in science and engineering. The most memorable tour was at the Edmonton Research Station. As a summer researcher I wanted to see all the possibilities and not constrict myself to one field but broaden my horizons. This way of thinking paid off tremendously because it dawned on me that the many things that they do there are for the betterment of society. In the swine area because piglet's intestines are similar to those of a human baby, with some piglets they remove their intestines to mimic a new born premature baby. The method they use that successfully keeps the piglets alive will then be preformed to a premature baby.

To sum up my WISEST experience in one word is an impossible task that I believe no one is able to achieve. I feel extremely blessed to be a part of this unique program because, I know not everyone is handed such an opportunity to gain the knowledge I received. For that I am forever grateful to my sponsor, Epsilon Chemicals Ltd, as well as the University of Alberta, my research team, and the WISEST staff because without them I would not have accomplished any of this.

## Eszter Szepesvari

Supervisor: Dr. Pete Hurd / Psychology

Sponsors: Faculty of Science / Service Canada (Canada Summer Jobs)



*“But what truly amazed me was how extremely self-rewarding research can be, especially when you’re having difficulty with it, but you persist and solve it.”*

Fact one: Eszter Szepesvari is terrified of fish. Fact two: Eszter Szepesvari worked in the lab of Dr. Pete Hurd, with fish. At first glance this pairing seems disastrous, for both Eszter and the fish, but if I learned anything during my participation in the WISEST Summer Program it is that passion is always the strongest ally – whether your opponent is frustration, expenses, or in my case: fear, passion always wins. And with that, my summer became an adventure.

Independence has always been a great desire of mine, especially with new challenges, so I was pleasantly surprised to find that my work involved a great deal of it. I was to add ten more fish pairs to the data of an experiment aimed at discovering any possible relationship between fight outcomes and lateralization in convict cichlid males. After introducing me to the apparatus, the fish and the rules, I was set free. I set my own goals, made my own schedules, conducted my experiments by myself. In the project, the fish were tested for strength and direction of cerebral lateralization using a detour task, where, because cichlids’ optic fields do not overlap each eye projects almost exclusively to the contra lateral hemisphere, asymmetries in eye use were assessed. Each fish was tested 10 times, and a laterality index was calculated for all. Then the fish were left in the aggression tank overnight, where they were separated by a solid barrier. This allowed them to develop a territorial claim to the tank, which they readily did and so when the barrier was lifted, the fish fought over the tank. The fights were taped and later scored by me. What we found is that fish with significantly stronger left hemispheres ended up winning more fights. Besides being very interesting, these results added important knowledge to our general understanding of the brain’s evolutionary origins and how it works.

But I feel I’ve discovered so much more than this. Among important

lab skills, fish handling techniques and the project-specific knowledge I picked up, I’ve also been able to get a good glimpse at the bigger picture of Psychology. But what truly amazed me was how extremely self-rewarding research can be, especially when you’re having difficulty with it, but you persist and solve it.

And although I spent the majority of my time in the lab, WISEST also includes Professional Development Seminars, as well as Lunch’n’Learn Sessions. Though all these sessions had an important theme, the most memorable for me was when we visited the Edmonton Research Station. We were introduced to the diverse research being conducted there, as well as some of the specific practices both the swine and dairy farms employed. It was great to see how relevant yet varied the research was, and it gave me a good idea of the kind of a setting I’d like to work in next summer.

To sum up my summer in a paragraph or two would be next to impossible, so what I will conclude with is that though I still fear fish, if given the chance, I wouldn’t change a thing about my summer. It was fascinating, fun and unforgettable. And it would not have been the same without my lab group: Michele Moscicki, Jasmine Mah, Veronica Lepp and Tristan Pasek, who helped and supported me every step of the way. I would also like to thank Service Canada, Dr. Pete Hurd, and Michele Moscicki for making this opportunity a reality.

## Fatima Hawa

Supervisor: Dr. John Vederas / Chemistry

Sponsor: Alberta Employment and Immigration (STEP)

*"I would like to thank Dr. John C. Vederas and his entire research group, including the summer students, for welcoming me into their lab and being my mentors."*



To search for a word, or compile a sentence worthy to suffice my WISEST experience this summer would be an exceedingly challenging task since it is something that has forever changed my life. WISEST is a lucrative opportunity where one must experience it to believe it: only then are you able to completely appreciate the unique qualities of the program. For now, I am forced to settle with one word: brilliant.

I originally discovered WISEST in grade 10, but with a school of over 2000 students, competition for these programs can be fierce. Being an inquisitive student, I investigated the program and instantly fell in love with their philosophy. The following year, I studied diligently to become a potential candidate. As a result, it was no surprise that on my first day in the program I was particularly excited to jump into my lab and initiate my research. During the orientation I met Dr. Jennifer Chaytor, my supervisor, and later, the rest of my research team. I was working in Dr. Vederas' lab in the Department of Chemistry and knew immediately that I was going to enjoy coming to work.

My project involved working on synthesizing analogues of Neopetrosiamide A, a natural 28 amino acid peptide that has demonstrated anti-cancer and anti-metastasis properties. I formed 2 peptides using very specific methods to produce and purify them, such as High Performance Liquid Chromatography (HPLC) and MALDI-TOF mass spectrometry. The nature of the peptide is very complex and, therefore, its synthesis involves the use of various steps to ensure its proper formation. Neopetrosiamide A must be produced synthetically because it is derived from a marine sponge, Neopetrosia, found on the coast of Papua New Guinea. Locale aside, Neopetrosia is also an endangered species, making it impractical to harvest. However, the natural form of Neopetrosiamide A has a methionine group as the 24th amino acid in its peptide sequence.

The methionine readily oxidizes and changes the stereochemistry of the peptide; the effects of these alterations have not yet been determined. In producing both of our peptides, we replaced one of the methionine-24s with a histidine group and the other with an alanine group as to avoid any potential complications the methionine may induce. Upon the successful syntheses of our peptides, we sent our samples to our collaborators at UBC where they will test for anti-metastasis activity.

Another great feature of WISEST is that they do not limit you to your lab work. They hold many seminars and events throughout the 6 weeks of the program so that you are consistently meeting new people and learning something new. One of my personal favorites was the Networking Fair. This was a chance for students and role models to gather in groups and discuss the successes and hardships of their education and careers, which are non-traditional to their gender. What's more is that we all received contact information of people who were willing to help us later on the future.

Ultimately, the program has really helped me broaden my horizons, providing a myriad of opportunities. They have only increased my curiosity about different career paths as I am left reassessing my interests. I would like to thank Dr. John C. Vederas and his entire research group, including the summer students, for welcoming me into their lab and being my mentors. A special thank you to Jennifer, who was always patient and never condescending, considering that I am only in high school—the trust and confidence you had in my abilities is truly meaningful. I would also like to thank Kerry, Catherine and Grace for being so helpful and passionate about the program. Lastly, a big thanks to my sponsor, Alberta Employment and Immigration, for making this summer possible. You have all paved the way for an amazing career in the making.

# Grace Schmuland

Supervisor: Dr. Rick Pelletier / Renewable Resources  
Sponsor: Suncor Energy Foundation



*“One of the things that I liked most about this program is the people you get to meet.”*

My summer with WISEST has been the most memorable one of my life. This is not only because of the amazing opportunity of doing actual research being given to me, but also the experiences I had and the people I've met.

When I heard that I'd been placed in the Department of Renewable Resources, I was both ecstatic and nervous. I've been very interested in ecology since elementary, so it seemed like the perfect match. However I was also nervous that I might not enjoy environmental sciences as much as I thought I did. The only way to find out was to plunge in headfirst and see what came of it.

The project that I worked on this summer is called the EMEND project, which stands for Ecosystem Management Emulating Natural Disturbance. In essence, the project is a collaborative effort of the University of Alberta, other research agencies, some Albertan forest companies and the provincial and federal governments. Its main purpose is to find out which harvesting and regeneration practices, in regards to forests, are best when it comes to maintaining the living species in the forest community.

Simply the name of the project was intimidating to me because I had never worked in a research environment before, so I was glad when I found out that my work would consist mostly of mapping and computer work. I've previously found cartography quite fascinating, and my research this summer allowed me to learn even more about the art. I now know how to work a mapping program called ArcGIS.

With ArcGIS, I learned how to take satellite images of a forest and manipulate them so that the coordinates of the image matches where it was really taken in the world. I compare my work to what Google Maps is like, in that I created a mosaic of satellite images that are basically a picture map of an area.

I've gained the basic skills and knowledge of terms when it comes to using a computer mapping program, but I feel that I've learned more than that. Many people believe that mapping is rather an ancient art, because the whole world has already been mapped and there aren't new places to discover. I used to believe that too. Now I understand more clearly how much our Earth changes. Things like earthquakes, tsunamis, forest fires and climate change have a large impact and can alter the face of our planet, so maps must be updated constantly.

I feel like a different person now than I was at the beginning of the program. My research and lab environment taught me many new things, but the people at WISEST and the new friends that I've made have also changed me. One of the things that I liked most about this program is the people you get to meet. Not only do your fellow student researchers have similar interests as you, they're going through the same research program and are often changing in a way that is comparable to you. I feel like I will be able to rely on this year's student researchers for advice and that they will open my eyes to other areas of research that I may not have considered thoroughly.

As for my fears about perhaps not being interested in environmental science, this summer I realized that ecology is what I want to dedicate my life and research to. Now when someone asks me, "What do you want to be when you grow up?" I can not only answer without hesitation, I feel as though I've already grown up.

Thank you to my Principal Investigator, Rick Pelletier, and the people from SISlab for helping me with my research, the WISEST Summer Research Program for opening my eyes and to Suncor Energy Foundation for sponsoring me and affording me such a wonderful opportunity.



## Grace Ting

Supervisor: Dr. Simon Landhäusser / Renewable Resources

Sponsors: Faculty of Agricultural, Life and Environmental Sciences / Service Canada (Canada Summer Jobs)

*"I was astonished and extremely honored to work in an environment that had so much trust placed on me."*



Before I participated in the WISEST Program, science was behind glass walls. Information was just given to the students in websites, lectures or textbooks; there was never really a chance for high school students to have their own "Eureka!" moment to find out what science was all about. Textbooks are great, however, having the actual tangible experience in the university is just amazing.

My research project this summer was to compare the carbon densities in the roots of two species, the aspen (*Populus tremuloides*) and balsam (*Populus balsamifera*) plants. The plants are under different conditions such as drought with defoliated or undefoliated leaves or well-irrigated plants with defoliation or undefoliation leaves. Using the Archimedes waster displacement principle, I can determine the volume needed in the calculation for density. The amount of water that is displaced is the volume of the root tested because one gram is equivalent to one centimeter cubed. Another component needed for the calculation of density is dry mass. The root samples are placed in an oven over three days and weighed. By dividing the dry mass by the volume, the root density can be calculated. Then, the roots will be grinded to powder which will be analyzed to find the percentage of carbon content in the root; therefore, using the percentage of carbon content in the root, the carbon density can be calculated. Unfortunately, the data for the carbon density and content was not available at the time the program ended, nonetheless, root density and dry weight were used as proxies to the variables mentioned previously.

In addition to my research project, I gained valuable experience from encountering several apparatuses that fascinated me. This includes the infrared gas analyzer (IRGA) and low pressure flow meter (LPFM). One thing I really enjoyed was to watch the devices measure values I would have never thought was possible. The IRGA

measures the amount of photosynthesis occurring in a leaf of a plant by calculating every atom of carbon used by the plant. Next, the LPFM is a complex apparatus involving multiple tubes that are used to measure the amount of damaged vascular vessels in plant stems.

Also, the best parts in the WISEST program are the weekly Professional Development Seminars. Every Monday, a company or research lab would allow WISEST students to tour their facilities as a group. This allows the exploration of different fields of study which is especially beneficial to grade elevens that are still pondering about their future.

Furthermore, the WISEST Program is also about gaining professional skills. The weekly Lunch n' Learn sessions broadened my awareness on the importance of networking and mentorship. These sessions are the perfect opportunities to make more friends who share the same interests. To add, I was astonished and extremely honored to work in an environment that had so much trust placed on me. I had the responsibility to process some data and, I had to double check every detail to make sure I made no mistakes. The skills I have developed through the WISEST Program will doubtlessly prepare me for the coming school year.

In conclusion, I would like to thank my supervisor, David Galvez, and also Dr. Simon Landhausser, my Principle Investigator, for their help and support. Also, I am thankful to all of the research team members in the Department of Renewable Resources for their help. Moreover, I am truly grateful to my generous sponsors including the Faculty of Agriculture, Life and Environmental Sciences and Service Canada. The WISEST Team did an amazing job organizing this program and, I would like to thank them. The WISEST Program is definitely a wonderful opportunity to explore and learn. For women or men interested in less-traditional careers in the fields of science, engineering or technology, this is the perfect program.

## Hamna Tariq

Supervisor: Dr. Karen Goodman / Medicine

Sponsor: GlaxoSmithKline



*"I've had my questions answered about university life, how to choose what you want to do in university, and just great life advice in general."*

Going into the WISEST Summer Research Program, I think that either you are quite certain about what path you want to take in life but are open to exploring your options, have somewhat of an idea, or have no clue at all. The wonderful thing about WISEST, is that it accommodates for all three. For those who are quite certain, it gives them the chance to network with those in their desired field, but at the same time to discover a whole other side to science they might not have considered. For those who have somewhat of an idea or have no clue whatsoever what they would like to do after high school, WISEST is fantastic program that provides students exposure to a wide variety of careers and fields. It's an incredible opportunity that I think anyone who is interested in science should jump at.

These past six weeks have taught me a great deal. Things I expected to learn, but also many things I never expected to. I was placed in the lab of Dr. Karen Goodman, under the supervision of Laura Ap- lin and Hsiu-Ju Chang working in the Department of Medicine. The team was working on a project of carrying out community based research in Northern Canadian communities to investigate the cause of high prevalence levels of the bacterium *Helicobacter pylori*. *H. pylori* resides in the stomach and causes mild to severe stomach problems, with a rare chance of contracting stomach cancer.

Over the summer, I learned about the project from the perspective of the different components involved, and participated in several steps of the research project. Since it is a community based research project, it is crucial to involve the community in every stage of the project, and to constantly be sending and receiving feedback on results, and how to improve the research process. As a result, my involvement in entering and cleaning data was directly useful, because the faster that data was entered, the faster results could

be sent back to the communities, and knowing I was helping in that process was rewarding. In addition, a large portion of my summer was spent creating science kits for junior high and high school students to educate them about the project in order that awareness of the issue of *H. pylori* is raised.

Apart from the actual position I was placed in to work this summer, another aspect of WISEST that I enjoyed immensely was the opportunity to network with people. These ranged from other WISEST participants, supervisors, lab team members, current students at the university, mentors, and many more. It's unbelievably important to learn how to network with other people, as it allows you to gain firsthand knowledge of events that you wish to experience. I've had my questions answered about university life, how to choose what you want to do in university, and just great life advice in general.

WISEST also holds Monday and Friday sessions each week to help us get to know each other better, and to teach us valuable skills needed for the future. Personally, I believe that the last Professional Development Seminar was the most enjoyable as there was a wide variety of lab tours available, so you could tour a lab that was focused on a specific area.

This summer has been truly unique and invaluable to me for my future. I am grateful for every skill I was taught, and for all the wonderful advice given to me. I will never forget it. Thank you so much to the WISEST team who has put so much effort and time into making this summer unforgettable, thank you to Dr. Karen Goodman and her lab for hosting me this summer, and thank you to my sponsor – GlaxoSmithKline – who without their sponsorship, all of this would not have been possible.

## Irina Simin

Supervisor: Dr. Colleen Cassady St Clair / Biological Sciences  
Sponsor: Alberta Employment and Immigration (STEP)

*"Every day, I came to work very excited knowing that I'd be learning lots of new things."*



I first came across the WISEST program when I was browsing through the University of Alberta website a couple years ago. Reading through the previous students' personal reports, I was sold. WISEST seemed to provide a perfect opportunity for young high school women interested in sciences to explore less-traditional fields of all sorts. I had already been planning to go into Sciences, but I had no clue what exact field I would be interested in. I applied for WISEST hoping it would give me an opportunity to explore multiple fields in science and programs provided by the University of Alberta. Looking back now, I realize that this decision was one of the best I've ever made.

I was placed in Dr. Colleen St. Clair's lab in the Biological Sciences Department. Dr. St. Clair's lab focuses on wildlife ecology through conservation behavior. I got the opportunity to work on three of her lab researchers' projects: an urban coyote diet and habitat selection study, a bird window-strike project and an elk behavior and lateralization project. Every day, I came to work very excited knowing that I'd be learning lots of new things. The majority of my time spent inside the lab was devoted to analyzing computer data (images and videos) of all three projects and inputting the results into spreadsheets. The purpose of the urban coyote project was to collect data on coyotes' preferences in their habitats by visiting and comparing their used sites and random sites. This task was done by tracking the signals given off by the coyotes' GPS collars on Google Earth. We also analyzed coyote scat to figure out the major components of an urban coyote's diet in order to find out how much they depend on human food, garbage and pets. It was found that coyotes rarely depend on human-related items or select habitats in human-populated areas unless they cannot avoid it, for example being injured or diseased and unable to hunt. By learning what specifications cause coyotes to adapt to human presence we can try

to limit these appeals, thus reducing the likelihood of conflict and need for lethal management. The bird-strike project was led mainly to see different birds' reactions to ultra-violet light, in the hopes that if it deters them the light can be used in front of windows – thus decreasing the likelihood of the birds flying into them.

The WISEST Program also had weekly components – Professional Development Seminars on Mondays and Lunch n' Learn Sessions on Fridays. These were meant to inspire us and allowed us to explore new opportunities and information outside of our own research labs. They gave us the chance to network and connect with professionals, current university students, as well as previous WISEST students. My favorite event out of these was the Networking Fair, where we got an opportunity to listen to the experiences of some women currently working in scientific fields. This Fair gave me an opportunity to talk to and ask lots of questions of these women in the various stages in their science careers. I managed to make some very valuable contacts and connections. The WISEST weekly components opened my eyes to new fields and careers I'd never have imagined existed.

I would like to thank Dr. St. Clair and her research team for allowing me to help out with their research projects and putting so much trust in me. Their mentorship and passion for research and science made this summer unforgettable. As well, I would like to thank the WISEST Summer Research Program for providing this once in a lifetime opportunity and Alberta Employment and Immigration, without whom this whole amazing experience wouldn't have been possible.

## Jade Shandro

Supervisor: Dr. Kim Chow / Physics

Sponsor: NSERC PromoScience



*"It gave me the opportunity to see myself in a way I never have before. I feel more confident in myself and I know that I can do anything I set my mind to."*

How many 17-year-olds can say they've been part of a research project that's never been done before? I've been lucky enough to measure samples that have never been made before and certainly not studied. The WISEST Summer Research Program gave me an opportunity to participate in research that may one day be in everyone's computers and cell phones. The six weeks that I spent working with Dr. Chow and Serhat Alagoz was unimaginable. Words really can't describe the experience. I'm walking away with so much more than I came with.

WISEST has been extremely helpful in terms of character building. It gave me the opportunity to see myself in a way I never have before. I feel more confident in myself and I know that I can do anything I set my mind to. Working in a Physics lab over the summer made me realize how much potential I have. The lab I worked in confronted me with different problems all the time. This helped develop my critical and analytical thinking, which is a lifelong skill. I worked with Ru (Ruthenium) doped manganese oxides. The research team and I measured the material to see their magnetic signal when warmed up from 77K to room temperature (296K).

I was ecstatic when I was able to understand what was going on in my lab. I worked with a lot of graphs and being able to interpret them just as the research team was really cool. My supervisor was extremely friendly and answered all of my (many!) questions. Because I asked so many questions and I was explained things so well, when things went wrong in my lab I was able to contribute just as much as the rest of the research team on what might be wrong. That made it feel like I really was part of the research team. The biggest compliment came from my supervisor when he said he believes I'll do really well in this line I work. I was astonished and pleased at the very same time. To have a PhD student say that gave me a boost of

confidence and pride in my work for the rest of the summer.

Additionally to placing us in a lab for the summer, WISEST held Professional Development Seminars and Lunch 'n Learn Sessions where we were given opportunities to expand our knowledge on careers relating to science and technology as well as learn valuable skills that we'd need to obtain a career that interested us. We went on many tours of different labs on campus and companies which gave us an idea where our schooling will lead us. The tours made me realize that if my plan doesn't work out, I have many other careers that interest me. The Lunch 'n Learns that we participated in every Friday taught us important skills like networking and how to make a poster (which definitely guided me in how to make one). Without these PD days and L'n'Ns I never would have realized how many options there really are. WISEST opened many doors and windows that I can't wait to explore.

This truly has been a great experience that I would encourage any Grade 11 students to pursue. It's been amazing to meet, and create such lasting friendships, with so many young women that, like myself, have a passion for science. Should an opportunity like this ever arise again, I'll be sure to jump at it immediately. My research team, sponsors (Alberta Employment and Immigration and NSERC PromoScience), and WISEST coordinators have my sincerest thanks for providing me with this amazing experience.



## Janice Block

Supervisor: Dr. Ania Ulrich / Civil and Environmental Engineering

Sponsor: Nexen Inc.

*“Before coming to WISEST I only had had a handful of opportunities to participate in labs, working with professional researchers has taught me so much, and improved my basic lab skills.”*



In the beginning we all entered Orientation alone and excited. At the end of the summer I left with countless new friends. Our conversations started with talking about the weather, but eventually we advance to discussing work and then we began to truly enjoy each other's company. There was always some to eat lunch with or talk to. I've made friendships that I think will truly last a lifetime.

I spent my summer working in Dr. Ania Ulrich's Civil Environmental Engineering lab which has a primary focus on bioremediation. The projects goal was to use unwanted wood as an absorbent in the oil sand's tailings pond. I conducted experiments that test the characteristics of water after softwood was soaked in it. By doing this we can see the effect the wood-produced chemicals had on the environment. I also got the opportunity to plate and grow fungi. If fungi can successfully break down the wood that has absorbed contaminated water, problems like tailings ponds could be eliminated. My days often consisted of doing pH tests, titrations and calculating phenolic concentration. Every day had its own twist and even though not every experiment worked out, it was a lot of fun. Before coming to WISEST I only had had a handful of opportunities to participate in labs, working with professional researchers has taught me so much, and improved my basic lab skills.

WISEST does a great job at organizing weekly activities that exposes the participants to new career options or people with jobs in less-traditional fields. One of the sessions that was a personal favorite was the Networking Fair. Each group contained five WISEST students and five mentors, which gave a good ratio to ask questions. Getting to talk to the women in less-traditional careers on a personal level was an enjoyable experience. It was nice to get advice from people who have achieved at things you aim to do yourself. The mentors were from a variety of fields and told us about their favorite parts of their jobs,

hardships they've gone through and how they got to where they are today. Even if the specific career doesn't interest you, there is always something to learn from everyone you meet.

This summer I stayed in McEwan Residence as I'm from a small town three hours away. I lived with seven other girls and our resident advisor Amanda. We all had so much fun exploring and getting to know Edmonton together. There was always someone to play a game of cards or go swimming in the fountains of the Legislature with. I feel that living in residence has helped to prepare me for living on my own in my first year of university. In the last six weeks I have become a more independent person who is excited for the years after high school. To make staying in residence more affordable I received bursary money from the Dr. Margaret-Ann Armour for Rural WISEST students fund. For this I am truly grateful and would like to say thank-you.

This summer has been a once in a life time opportunity. This six week job has helped prepare me for my future in science. When I came to the program I had no clue what I wanted to do when I 'grow up'. All I knew was I enjoy my math and science courses. My goal was to have decided by the end of this summer what career I would like to pursue but instead I discovered so many more options. Without WISEST there would be careers I would not know about. Now when people ask what I want to be I tell them how I'm considering a career in engineering or chemistry. I will never forget my time at the University of Alberta and would recommend it to anyone considering a career in science. Thank you to my sponsor Nexen Inc. for making this experience possible.

## Jayne Waldon

Supervisor: Dr. David Stuart / Biochemistry

Sponsors: Edmonton Glenora Rotary Club / Service Canada (Canada Summer Jobs)



*“So you can see, it’s not just the obvious opportunities WISEST hands you, but also things like learning the art of networking or presenting.”*

In my mind, I thought scientific discoveries took years of study far beyond the understanding of any high school student. Although it has always been a dream of mine to take part in research at the “forefront of science,” I was very close to accepting that it would never happen- until I actually got started in the WISEST Summer Research Program. You can imagine how thrilled I was when I found out my assumptions were wrong!

Early on Dr. David Stuart, my Direct Supervisor in his Biochemistry lab, sent me to work on a set of tasks. I had a feeling that the tests I was doing had already been done, since Dr. Stuart seemed to know what the results should be. I had been diluting solutions containing the yeast *Pichia stipitis* into higher concentrations of both butanol and ethanol, which continued everyday in the lab. If my cultures grew, I would take some cells and transfer them into a new solution containing either 0.1% higher butanol, or 0.5% higher ethanol concentrations. However, one morning when he seemed interested in my results showing that my cultures died off in 7% ethanol, I asked him if that was usually what happened. He said he wouldn’t know, because no one has ever done it. I left the lab smiling, and smiled all the way home.

My supervisor is working on finding a method to transform hemicelluloses into bio-fuels so we can use waste organic matter to create a sustainable alternative energy source. If you use enzymes to break down the bio-matter into sugars and feed this to yeast cells, they will ferment it into bio-alcohols. I focused on the yeast *Pichia stipitis*, which produce alcohol during fermentation, but are also poisoned by it at certain concentrations. One way I tried to increase resistance was by genetically modifying the yeast’s plasmids. I made copies of the gene segments URA3 and ARS from yeast cells I grew, and was able to ligate them into a ‘blank’ vector to create a

full plasmid. I used this to transform *Escherichia coli* cells, and plated them onto a selective medium where only the cells that had the plasmid I inserted would grow. It is remarkably satisfying to look back on what we have done, and see that I made progress.

During one of our Friday Lunch ‘n’ Learn Sessions, I not only had the chance to hear Dr. Margaret-Ann Armour speak but afterwards I was able to talk with her one-on-one. We discussed my project and career opportunities, and she inspired me even further.

So you can see, it’s not just the obvious opportunities WISEST hands you, but also things like learning the art of networking or presenting. I am glad I met the role models and students that I have; I know there will communication between us beyond the program.

There are a few people I would like to extend my gratitude to, firstly to my Principal Investigator Dr. David Stuart for being willing to allow a high school student into his lab. Thanks to the fantastic research team in the lab- Abele, Tom, Diana and Xiao Dong, as well as the WISEST team that made my summer extraordinary. I am grateful for the generous donations of, Canada Summer Jobs and the Edmonton Glenora Rotary Club who funded my participation in WISEST.

I am now proud to say that I have experienced the WISEST Summer Research Program, and that I took part in real-world research that is applicable to our daily lives. It may not be big but I feel like I will continue on with more confidence in my abilities. Who knows? Maybe I will pursue my initial dream after all. After all, if I can validate a life dream, prove a preconceived notion wrong, have fun and learn so much in one summer, imagine what I can do with the rest of my life!

## Jenna Ikebuchi

Supervisor: Dr. Monika Keelan / Laboratory Medicine and Pathology  
Sponsor: Merck

*"WISEST not only places you in a specific laboratory, you also have the opportunity to go on tours to various companies within Edmonton and research labs at the university."*



The WISEST Summer Research Program was more than I could have ever expected. At the end of grade 11 I knew my passions were in math and science; however, I never knew what I wanted to study in post secondary. After participating in the Summer Research Program I discovered many fantastic career options that relate to these strengths. They not only gave me many fields to look into, but also the resources and knowledge to pursue them.

During the summer, I was placed in the Department of Laboratory Medicine and Pathology. I worked in the Dr. Keelan's laboratory with a bacterium called *Helicobacter pylori* (*H. pylori*). This bacterium has been found to cause stomach ulcers and is associated with stomach cancer. *H. pylori* produces a particular enzyme called urease, this enzyme breaks down urea and causes the pH in the stomach to increase. This is the reason it is able to survive in the conditions of the stomach. I am trying to figure out how much urease is produced by a certain strain of *H. pylori*. If we figure this out we can try and investigate different methods of treatment other than antibiotics. This is mainly because some *H. pylori* have become antibiotic resistant. With this information we can also find out the effectiveness of the treatments.

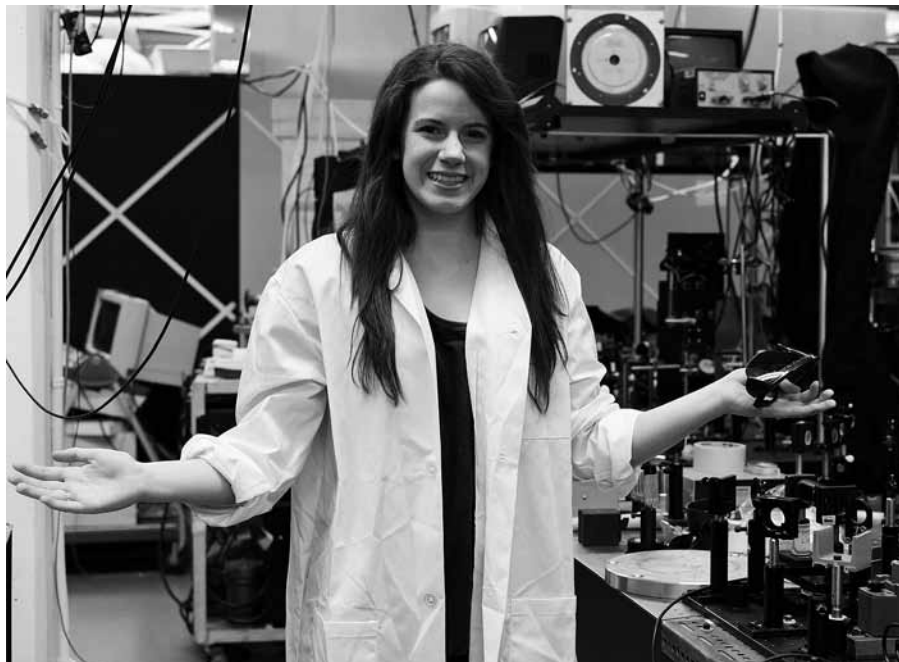
WISEST not only places you in a specific laboratory, you also have the opportunity to go on tours to various companies within Edmonton and research labs at the university. These tours showed you possible careers that may interest you. I was also given the opportunity to explore the various faculties in the university with my fellow WISEST researchers. The program also exposes you to new careers and fields that are less familiar or well-known. The sessions taught us different skills like networking with role models. It allows student researchers to talk and ask questions to current students and females in industry.

I would like to thank Dr. Monika Keelan, Megan Bulet, and Maysoun Mahmoud for all the guidance, knowledge and skills they have given me. They took the time to explain the project, like when and how it started and what I will be doing and why I will be testing the urease activity. They also helped me understand the basics, like what *H. pylori* is, what urease is and what type of new treatment that they are trying to investigate. The knowledge of lab and research techniques will be skills that I will be using in the new career that I have chosen. I would also like to thank them for treating me like one of the group and helping me get to the places around campus. Their lab was so welcoming that I looked forward to working with them each and every day of the project. I would like to thank them for giving me the opportunity to participate in this remarkable project, and I hope that they have success in the years to come. I would like to thank WISEST for letting me participate in this fantastic program, I would also like to thank Merck for sponsoring me.

During the program I gained first hand experience in the lab. I was trained to use machines like the sonicator and the spectrophotometer. My supervisors also taught me how to use a variety of pipettes. I was also trained how to make the different solutions, for example the culture that the bacterium grew in. All the training that I received will aid me in the years to come. This program not only prepares you for post-secondary, it also prepares you for the future and possible career options. I would recommend this program to anyone, it is a valuable resource. I have gained so much from the program, and it has been an experience of a lifetime.

## Jenna Luchak

Supervisor: Dr. Ying Tsui / Electrical and Computer Engineering  
Sponsor: Canadian National Railways



*"I was shocked to find out just how many applications lasers can be used for, from detecting cancerous cells in blood to generating high energy particles and grow element samples."*

Where can you find an opportunity that gives you a chance to work in a university lab, network with future professors, tour high-tech labs, meet new friends all with the same interests and passion as you while at the same time getting paid? No, the answers not a trick question, it's a six letter acronym, WISEST. Because of this experience I now feel more confident and certain in how I will strive for my goals in life. It was an amazing feeling walking into a university lab and being treated like an equal. Not only was I given an experience to learn from one research group, but I was also taken on private tours through different departments in the university, exposing me to a multitude of new and exciting projects and careers.

This summer I was fortunate enough to work in the lab under the supervision of Dr. Ying Tsui, my principal investigator in the Department of Electrical and Computer Engineering. Over the summer I was introduced to the numerous and different projects going on about lasers and optics. I was shocked to find out just how many applications lasers can be used for, from detecting cancerous cells in blood to generating high energy particles and grow element samples. My individual project was to characterise and compare two different lasers; one a collimated beam and the other diverging. Over my six weeks I learnt about and worked with a charged coupled device (CCD), spectrometer, photo detector, and computer software to define the properties existing within the beams.

I learnt firsthand, knowledge on how to focus a beam with a lens, and how manipulating the distance between the two can affect your results. In addition I learnt how to use the computer program ImageJ to measure the beam spot and obtain numbers which in return can be used to compare theoretical as well as actual predictions for both lasers. As a bonus I was taught how to present a proper presentation by giving weekly presentations on how my

research was going to my research team; a skill that will help me both in my future career and life in regards to communicating a point properly. The experiments gave me a lot of conceptual results which can be used by other researchers in their own projects; as they will be able to optimize their own designs by knowing how the beams behave under focus.

This program has taught me so much, but the main thing I will take away from it is a lesson I learnt during a speech by Dr. Margaret-Ann Armour in one of the Lunch and Learn sessions WISEST sets up for the students every Friday. Her speech taught me to go out myself and make connections with people from all walks of life because as you get older those past connections can be the stepping stones to bigger and brighter things.

It was an honour to be accepted into the program this summer, an honour that would not have been bestowed on me without the help and support of others. A special thanks to Dr. Ying Tsui, for letting me work in his lab and Dr. Manisha Gupta for being my supervisor as well as a great teacher and mentor. I would also like to thank the various Masters students who gave up time away from their thesis' to tour me somewhere or help me with my project. I am also very thankful for Canadian National Railways who sponsored my placement in this year's Summer Research Program, without them the program would have only housed 59 participants and I wouldn't have had such an amazing summer.

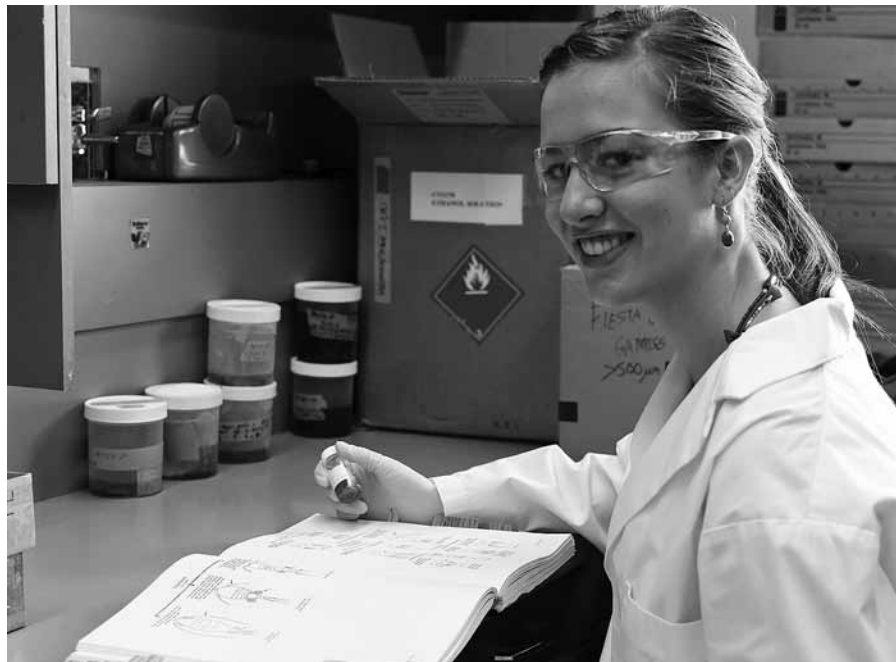


## Jessica Heupel

Supervisor: Dr. William Tonn / Biological Sciences

Sponsors: WISEST Golf Tournament / Service Canada (Canada Summer Jobs)

*"The University of Alberta Q&A was my favorite Lunch 'n' Learn in the program...It was wonderful to have so many questions answered personally, and I learned a lot within that one short hour."*



When my teacher first told me about WISEST, I didn't expect the program to change my perspective and focus my career interests to such an extent. Peter Simmons once said, "always be on the lookout for that spark of opportunity that could change your life...". The WISEST experience has definitely proven to be that spark of opportunity that changed my life.

This summer, I was able to work in the Biological Sciences Department with Caitlin Bullerkist. We worked on two separate research projects, both supervised by Dr. William Tonn. I was fortunate enough to work with Brianne Lunn, Mark Hulsmann and Justin Hanisch. I was specifically involved in the ICECAP project, which focuses on collecting data before major artificial changes are made to small Arctic streams in the Northwest Territories. These changes consist of making small streams deeper and more permanent. The Diavik Diamond Mine Company is in charge of these changes, to recreate fish habitat they destroyed with the mines. However, such changes may greatly affect the ecosystems already in place, so it is important to collect data before the channelization of the streams takes place, so one can compare them to future information collected.

My role in this research project was isolating macroinvertebrate from the organic matter in the filtered driftnet stream samples. For this task, I used a microscope. The macroinvertebrates I collected would later be counted and identified. As well, later in the WISEST program, I was able to filter algae samples from the arctic streams. The algae samples, in combination with the macroinvertebrate data would provide us with general information on the stream's ecosystem.

As of now, there are no results for the data we've collected for the project, however after the changes are finished, and data can be

compared, results may show a decrease of macroinvertebrate due to the predacious fish that may move into the streams. My prediction is that the more visible macroinvertebrate population will drop more significantly than the smaller, less-visible taxa.

However, WISEST doesn't just offer the experience of doing research work. Once a week, we would have Professional Development Seminars and Lunch 'n' Learn Sessions. The University of Alberta Question & Answer was my favorite Lunch 'n' Learn in the program. We were able to ask any question regarding the university in a small group, and it was a really beneficial experience for me. It was wonderful to have so many questions answered personally, and I learned a lot within that one short hour.

Overall, the WISEST Summer Research Program has helped me weigh my priorities, inspired me to follow my passion, strengthened my commitment to studying science and taught me valuable, transferrable, skills. WISEST has been a wonderful opportunity to both improve and challenge myself.

I would like to extend my thanks to my sponsors, Service Canada (Canada Summer Jobs) and the WISEST Golf Tournament, for making my summer experience possible. As well, I'd like to thank my Principal Investigator Dr. William Tonn, in addition to my supervisors - Brianne Lunn, Mark Hulsmann and Justin Hanisch - and other ICECAP team members for their help and for including me in their research. I would like to extend my gratitude to the WISEST Team as well, for organizing such a great program. Thank you.

## Juliana Dobbie

Supervisor: Dr. Jason Carey / Mechanical Engineering  
Sponsor: Edmonton Chapter Beta Sigma Phi



*“Our supervisors provided us with a great balance of hands-on lab work, learning practical skills, and theoretical knowledge.”*

Heading out of grade eleven I knew one thing with complete certainty - that “certain” was not a word I would use to describe my plans for the future. In fact, a better word to describe my plans after high school would be “nonexistent”. I knew that I enjoyed learning about science and math in school and I wanted to continue learning after school, but considering Math and Sciences were approximately 75% of my courses; I was not left with a clear sense of direction. I was desperately hoping that I would just wake up one day knowing exactly what I was truly passionate about and what career would make me happy and excited to go to work every day.

That epiphany (unsurprisingly) never came, so when I had the chance to be a part of the WISEST Summer Research Program, I did not hesitate. I knew it would be a unique and amazing opportunity to explore the infinite careers that are available to people who are genuinely fascinated with science. It is part of the WISEST program’s goal to help people in my dilemma investigate their interests and find fields of study that are less common or less-traditional.

This summer I was placed in Dr. Jason Carey’s Biomedical-Mechanical Engineering lab with another WISEST Summer Researcher. It was a world apart from anything I had experienced in high school. I was primarily working with a researcher who was looking into the effects that twisting a wire in an orthodontic bracket (torquing) has on the bracket. The project goal is to develop a strain imaging system which can measure the three-dimensional distortion of an orthodontic bracket undergoing stress caused by the arch wire twisting within the bracket slot. Using Digital Image Correlation (DIC), strain in an object can be measured by tracking the movement of random dots on its surface. Because orthodontic brackets are such small objects, a correspondingly small speckle pattern must be produced to measure strain. We used an airbrush to pro-

duce the speckle pattern; and one of my projects was to determine which settings produced the best result for DIC.

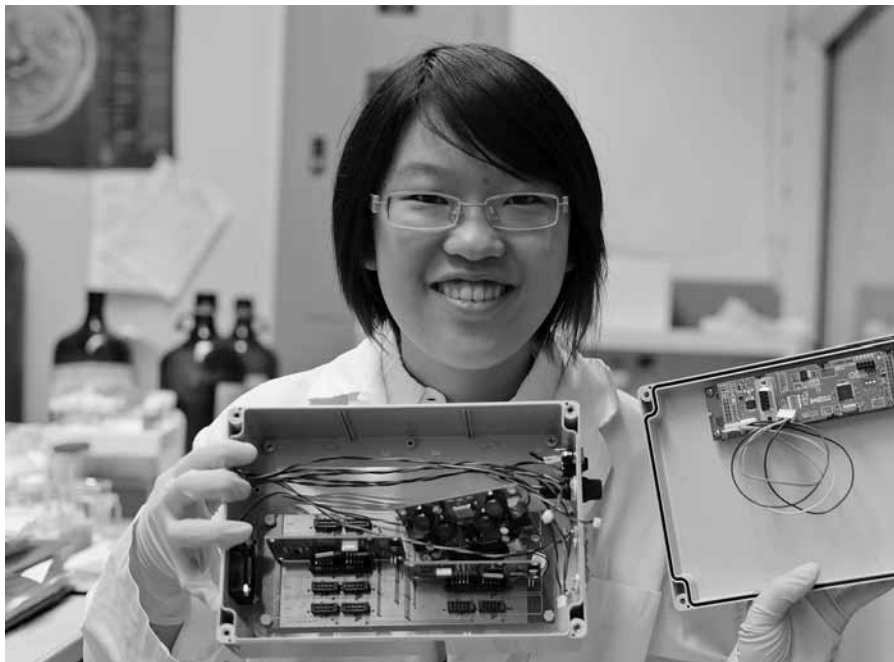
I particularly enjoyed the fact that the lab I was placed in had so many diverse projects being worked on at the same time. I was able to participate in research that was on the cutting edge of medicine and technology. These projects were unique, exciting and inspiring. Our supervisors provided us with a great balance of hands-on lab work, learning practical skills, and theoretical knowledge. Our lab also treated us to a multitude of tours to many labs in all different engineering departments so we could explore the vast possibilities available within the field of engineering. These tours, combined with the tours provided by the WISEST program on some of our weekly Professional Development days gave me a huge appreciation for the career options that available in the science and technology fields. Learning about areas of research that I had never considered or even knew about before entering the program was a distinct highlight.

I want to extend my thanks to my sponsor Edmonton Chapter Beta Sigma Phi; without their support I would not have been able to have this amazing experience. Thank you to Dr. Jason Carey for allowing me to be a part of his work this summer. I cannot express the gratitude I feel to the research team, Garrett Melenka, Cheequn Leung, Katherine Evans and Caroline Collins, who made my WISEST experience so extraordinary. My time at the University of Alberta this summer has honed my passion for science and research. I entered this program hoping that I would find myself deciding on one career, one future. The exploration I have done during the WISEST program has, in fact, opened me up to more possibilities. I do not know for certain what my future holds, but I am looking forward to seeing where the road I have started this summer will take me.

## Julianne Mak

Supervisor: Dr. Jie Chen / Electrical and Computer Engineering  
Sponsors: Faculty of Engineering / Service Canada (Canada Summer Jobs)

*"I have taken away so much from the past six weeks: new networks, great advice, and research experience."*



The name "WISEST Summer Research Program" may be a little misleading. In fact, the WISEST Summer Research Program is much more than simply 6 weeks of research. To me, "WISEST" is synonymous with "opportunities". I met so many new people and opened so many new doors. WISEST really exposed me to new things: material I didn't expect to learn in high school, and career options I never even knew existed. I have taken away so much from the past six weeks: new networks, great advice, and research experience. Everyone in my research team was fun to be around and pleasant to work with, and they all made me feel like a part of their group. The space that I've been working in has really become like a second home. The people around me were always willing to answer questions, and all I needed to do was ask and I was flooded with guidance and suggestions. Although this program was only six weeks long, I know the benefits will last much longer. The ties you create with the university staff and students are invaluable, and there will always be someone that I can ask for advice, whether about university life, course selection, or course material. After this program I'll always have a place to volunteer, and if I need research experience I'll always be able to ask for a research position. The weekly events like Professional Development Seminars and Lunch 'n' Learn Sessions were wonderful. I got the chance to see unique work environments, like the chemistry labs at Syncrude, and the chance to learn helpful new skills, like making a research poster.

My principal investigator, Dr. Jie Chen, has two labs and many different projects going on. It was nice to be exposed to diverse types of research, and it was interesting to see how work from different disciplines fit together. The group of electrical engineers I worked with designed an ultrasound device for proliferating stem cells and monoclonal antibodies. This device will benefit not only research, but could potentially benefit the commercial production

of antibodies and medicines as well. Over the summer I have been working with the electronics of the ultrasound device. The device uses several circuit boards in conjunction to produce ultrasound waves. I have been using EAGLE PCB software to create board layouts for three types of circuit boards: the motherboard, power supply board, and transducer board. Besides that, I have also been soldering, testing, troubleshooting, calibrating the intensity of the ultrasound, and I even created a user manual for the device.

In the end, WISEST has been really fulfilling, living up to all my expectations and more. Not only did I gain essential skills like how to interact appropriately with professors and mentors, I also learnt so much about EAGLE PCB software. This is a unique advantage to me if I decide to go into electrical engineering, as I'll already be familiar with the process of designing a circuit board. I've genuinely enjoyed my work and I'd like to maintain the networks I've made. All in all, WISEST has shown me that the opportunities open to me are endless. The benefits of participating in this program really made all the work I put in worth it.

I'd like to sincerely thank my sponsors, the Faculty of Engineering and Canada Summer Jobs, the WISEST Team, Dr. Jie Chen, Woon Tiong Ang, and the rest of my research group. Without all of you this learning opportunity would not have been possible. WISEST has meant so much to me and I truly appreciate all of you for the contribution you have made to this program.

## Kaitlyn Visser

Supervisor: Dr. Daryl McCartney / Civil and Environmental Engineering

Sponsors: Department of Civil and Environmental Engineering / Service Canada (Canada Summer Jobs)



*"I got to meet Dr. Margaret-Ann Armour who to me was not only an example of the influence a woman can have in today's society, but also how a woman of faith can affect so many lives."*

Before the WISEST summer research program the thought of entering the complex field of the sciences was a daunting and intimidating prospect, but now thanks to WISEST I can hardly wait to start University. From new friendships to plating microorganisms, WISEST was so much more than I ever expected it to be and was an amazing experience.

This summer along with Danielle Schmidt I had the opportunity to work in the Department of Civil and Environmental Engineering at the University of Alberta. Our project focused on what happened to harmful microorganisms in biowaste when they are exposed to high temperatures over long periods of time in a composting setting. We were trying to see whether the composting facilities in Canada are effective in destroying microorganisms that are harmful to humans. The first part of our project focused on the microbial aspect of the project and we got to grow Salmonella, E.coli and phage 1A. I learned so much during this time about how microorganisms are grown and it was really interesting. Once we had determined the concentrations, these organisms were put in a small cryovials at the bottom of temperature probes which we put into a compost pile at the Waste Management Research Center. After that we did physical and chemical analyses on compost collected from our pile.

This experience has affected me in many ways, not only have I gained invaluable knowledge about how to work in a lab but I am also more prepared to start University and not be scared to pursue my dreams. I have also met many amazing people from other WISEST students to women in less-traditional professions who are perusing their dreams. I know that the friendships that I have formed through this program will stay with me for years to come. Through the WISEST program I have found that I have matured in my understanding of University life and am more motivated now

to work hard in high school now that I have a goal of a career in Engineering in mind.

One part of the WISEST program that I really enjoyed was the Networking Fair. I got to meet amazing women who have all pursued careers in less-traditional fields. I got to meet Dr. Margaret-Ann Armour who to me was not only an example of the influence a woman can have in today's society, but also how a woman of faith can affect so many lives. It was great to see that even though our dreams may seem frightening and unachievable, there are many who are there to support us and encourage us along the way.

I would like to thank many people for helping me to have this wonderful experience. I would like to thank my parents for encouraging me to follow my heart and believing in me no matter what. I would like to thank my teachers at school who always expected me to do my best and pushed me to be the best person that I can be. These people also helped to develop my character into the person I am today. I would like to thank the WISEST coordinators for making such an amazing experience available to me. I would like to thank my sponsors, Canada Summer Jobs for also making this experience happen through their funding. I would like to thank Kristine Wichuk and Pulat Isobaev for letting me participate in their research and helping me to understand their work. Once again I would like to thank all the extraordinary people who helped to make this the best summer of my life, one that will stay with me for as long as I live.



# Kalyna Zydek

Supervisor: Dr. Ban Tsui / Anesthesiology and Pain Medicine

Sponsors: Faculty of Medicine and Dentistry / Service Canada (Canada Summer Jobs)

*“By far the most thrilling experience presented to me this summer was the opportunity to watch not one, but two total knee arthroplasties.”*



As my high school career nears its close, and I approach the not so distant world of post-secondary, the anxiety of that which is completely unknown, that of the future, overwhelms me. Or, rather, it did, until I became acquainted with the WISEST Program. The most valuable lesson I have learned this summer involves the careful planning of one's intended path through post-secondary. I have learned that to possess such a plan, especially while still in high school, is due cause for trepidation in itself. The numerous mentors that my peers and I have had the privilege to hear speak over the summer, regardless of their educational affiliations and backgrounds, can be said to have agreed on one point: that very little in regards to the road one takes to reach their goals while in school is ever set in stone. That concept has offered me immeasurable relief, and I now marvel at the idea that in only one year, I will be able to return to the University of Alberta as a full-time undergraduate student.

My project this summer involved conducting clinical research for Dr. Ban Tsui in the Department of Anaesthesiology and Pain Medicine. Working with a HYRS student, the first half of our time within the University of Alberta Hospital (UAH) was spent organizing and entering data sheets for patients who had been admitted to the Adult Acute Pain Service (APS) within UAH. Through the time contributed toward this project, the information from approximately fifteen hundred patients was recorded in the APS's patient database. By the end of those first three weeks, the two of us were deemed professional enterers of data, and our organizational skills were at their prime.

The latter half of my fellow researcher's and my time in our Summer Research Programs was spent conducting research on four objectives: pain, pain disability, procedural complications, and patient satisfaction in patients receiving a nerve block for hand surgery. A

nerve block is a form of local anaesthetic meant to offer relief patients experiencing pain. For this study, we did a telephone follow-up survey in which we phoned over one thousand patients who had received a nerve block for a hand surgery at the UAH in the past five years and asked them questions about chronic post-surgical pain and about the nerve block they received.

Using a standardized interview tool, we were able to assess the four objectives for the study. The information was collected in a database for analysis; as of now, further sub-analysis and research is necessary for the information collected to be most reliable.

By far the most thrilling experience presented to me this summer was the opportunity to watch not one, but two total knee arthroplasties. To get the chance to stand in the operating theatre, and be in such close proximity to the surgery itself so to be able to observe with ease all of the processes involved in surgery is an experience beyond words. The sheer joy I possessed that day was indescribable. My sincere gratitude goes to my supervisor, Brandy Love, for arranging for us this opportunity.

As was intended, I gained from this research an understanding of the effects that acute and chronic pain have on people, and have gained an appreciation for the work that the staff of the APS and the Department of Anaesthesiology and Pain Medicine do to help give relief to those suffering from pain.

My gratitude also extends to my sponsors Service Canada and the Faculty of Medicine and Dentistry for making it possible for me to be a part of this eye-opening program, and to WISEST for offering my fellow researchers and I so many unique and useful opportunities.

## Kamal Farhat

Supervisor: Dr. Catherine Chan / Agricultural, Food and Nutritional Science

Sponsors: Faculty of Agricultural, Life and Environmental Sciences / Service Canada (Canada Summer Jobs)



*“The first thing she made sure I understood was that this program was not for women only, but rather for both genders looking for opportunities to explore career paths in less-traditional fields.”*

Usually accidents are events that will negatively impact you, and this is why a negative connotation is associated with the word. Luckily for me, my situation is the exact opposite. I learned about the WISEST Summer Research Program by accident as I was arguing with a friend that we do not need to write an essay for a summer camp that was 5 days long. He then clearly stated that WISEST was a 6 week Summer Research Program, not a camp, that a few fortunate students get to participate in each summer. I then went to my teacher and she further informed me on this wonderful opportunity and gave me the application form. The first thing she made sure I understood was that this program was not for women only, but rather for both genders looking for opportunities to explore career paths in less-traditional fields. I later realized how important that was since almost everyone, including teachers, thought that it was for women.

Thankfully I did get accepted into this great program, and was put into a field that I truly felt passionate about; The Department of Physiology and the Department of Food and Nutritional Science in the lab of Dr. Catherine Chan.

Upon getting accepted I felt that I was going to be just a set of eyes as I didn't think that I would be directly involved in university research. I felt that I would only be doing the easy things in the lab, but the exact opposite proved to be the case instantly as I was almost overwhelmed by all this new and complex information along with procedures that I was doing in the lab. I got to learn about Type 2 diabetes and the effect it has on glucose metabolism in the body, since it was the base of my research question: What is the effect of pea seed coat containing diets on glucose metabolism?

Pea seed coats contain dietary fibre and antioxidants, with coloured pea seed coats containing more antioxidants than the non-coloured. We also know that these are both beneficial in treating dia-

betics. Therefore, by supplementing these to diabetic rats, we can observe and record the effects of dietary fibre and antioxidants on diabetics. We observed the effects by performing intraperitoneal glucose tolerance tests in which we inject glucose into the abdominal cavity and record blood glucose levels through many different time periods. We also observed the effect of fat metabolism by Western Blotting for a gene called GPD2, which creates an enzyme called Glycerol-3-Phosphate Dehydrogenase which is important in the glycerol phosphate shuttle in order to metabolize fats.

As part of the larger project, I took part in helping with the tissue collection of Liver, Colon, Jejunum, epididymal fat, soleus muscle, and the epitrochlearis (EPI) muscle. I also took part in doing Intraperitoneal Glucose Tolerance Tests with the rats in which I tested blood glucose levels, took blood from the rat, and recorded the information that we have observed. Western blots were also used in which we used a gel and a continuous electric current to separate proteins that were then transferred to a nitrocellulose membrane. After incubation in antibodies overnight, we used a computer programmed scanner to see the amount of GPD2 in each liver sample. No significant evidence was obtained, however we did see a trend in the amounts of GPD2.

Overall, this was an amazing experience in which I did not imagine I would take part and learn so much about. My knowledge has broadened by an amazing amount due to the WISEST Summer Research Program. I would like to thank WISEST, my sponsors (Service Canada and the Faculty of Agriculture, Life and Environmental Sciences), my teachers and the Chan Lab for being so supportive throughout this summer. Thanks to all of these great people and their contributions, I am now confident in pursuing a career in a field that I want; Even if it means that it is less-traditional.

# Katarina Michalyshyn

Supervisor: Dr. Erin Bayne / Biological Sciences

Sponsors: WISEST Golf Tournament / Service Canada (Canada Summer Jobs)

*"The mentors that I have worked with have all been extremely approachable and supportive."*



My WISEST Summer Research Program application involved getting two teacher references, filling out a form and writing an essay. In reality, my WISEST Summer Research Program experience involved almost losing my boot in a bog, racing worms, learning how to read a bear's thoughts and getting Dr. Margaret-Ann Armour's autograph. Needless to say, I learned a lot, and not just about scientific research.

I was placed in the Department of Biological Sciences and worked on two projects over the summer. The first project involved earthworms, which I learned are not native to most of Canada. I helped study how earthworm burrows affect plant growth. An experiment had been performed in which four treatments of soil and plants, some including earthworms and some not, had been photographed monthly. Using a computer program, I traced the roots while another lab employee traced the outlines of the burrows. It was predicted that since earthworms deposit nutrients while making burrows, there would be more roots near burrows than in the rest of the soil. In reality, this was not the case. However, there were more roots near openings in the soil, which include roots and natural cracks, than in the rest of it. Tracing roots did not seem very exciting at first, but it was a lot more interesting than I had expected.

The second project tested whether sound recording devices could detect the location of a bird based on the volume of its call. For two weeks I was out at the Meanook Biological Research Station, near Athabasca. We went to a variety of environments, such as an aspen forest or an open field. In each environment, a speaker played recorded bird calls. We would go to various distances along three transects to record what was audible. Lugging a backpack of recording equipment through dense forest, armed with bear spray, was not what I had expected from my WISEST experience, but it

was definitely rewarding and adventurous

The best part of the WISEST experience was the people. It has been amazing to meet other students who are as interested in science and willing to try new things as I am. It has also been very nice to have a fellow WISEST student, Ariel Greiner, in my lab. Quirky experiences are more fun when shared with someone else. The mentors that I have worked with have all been extremely approachable and supportive. Hearing about how their careers have unfolded has helped me "take off my blinders". I used to wish that my career would follow a narrow path, but now I realize that there are so many different options and opportunities. Only considering one path would cause me to miss out on so much personal and professional growth. Because of the Summer Research Program I now have a better idea of what I would like to go into after High School. I am definitely open to doing more research – as a summer job or as a project someday.

For this eye-opening experience, I would like to thank my Principle Investigator, Dr. Erin Bayne; my Direct Supervisor, Erin Cameron and lab team members Michelle Strekies, Justine Kummer and James Campbell. Thanks also go out to my sponsors, Canada Summer Jobs and the WISEST Golf Tournament, for making my participation in this program possible.

Participating in the WISEST Summer Research Program was an excellent choice for me. I encourage all Grade 11 students to apply for the program. Even if you are not sure if the subject area matches your interests perfectly, you will learn so much from the tasks, the opportunities for networking and the science-loving yet relaxed environment. I leave WISEST with a broadened perspective of the world, a better developed character and experiences I will never forget.

# Kaylee Biggart

Supervisor: Dr. Jan Jung / Physics

Sponsors: NSERC PromoScience / Alberta Employment and Immigration (STEP)



*“Fortunately, on my first day in the lab, my worry melted away because my supervisor made sure to explain everything so that I could understand it and avoid struggling with the concepts throughout the program.”*

When school resumes and everyone asks “What did you do this summer?” I’ll have the best story to tell. Why? Because I was a student researcher in the 2011 WISEST Summer Research Program. I had the amazing opportunity to work in an actual science lab on an actual, ongoing research project, meet some remarkable people, and forge friendships that will last a lifetime.

I worked in the Department of Physics under Dr. Jan Jung, working on measuring the resistivity (the rate at which a current can flow) of iron doped Samarium Strontium Manganese Oxide samples, to see if the samples were good candidates for use in memory storage devices. My supervisor was terrific at teaching me how to use the measurement system, and by the last week, I was using the measurement system myself (under supervision, of course).

When I found out that I was going to be working in the Department of Physics, I was having mixed emotions. I was extremely excited, because I loved Physics 20 but nervous because that was the only background in physics that I had. Fortunately, on my first day in the lab, my worry melted away because my supervisor made sure to explain everything so that I could understand it and avoid struggling with the concepts throughout the program.

One thing I definitely was not expecting was how much I enjoyed the Professional Development Seminars and the Lunch and Learn Sessions. I enjoyed them so much because they gave us all a chance to learn and expand on previous knowledge. My favourite session in particular was the “U of A Q&A” Lunch and Learn session, because it gave us a chance to put some of our fears about university to rest and learn more about what to expect when we walk onto campus for our first day of university.

I also had the special opportunity to stay in the Grant MacEwan

residence for the duration of the program. Living on residence was especially remarkable because it gave me the extra opportunity to discuss my research with other people, and learn more about other people’s research as well, and make friends that will unquestionably last forever.

There are many people that have helped me with this incredible experience, so I would like to thank my teachers, because if it weren’t for their remarkable teaching and fantastic reference letters, I wouldn’t have been able to participate in this life altering experience. I would also like to thank the WISEST office for all of the hard work that they do on a day to day basis to make this program possible. A special thank you goes out to Dr. Margaret Ann Armour for coming up with the idea of WISEST in the first place, and the bursary in Dr. Armour’s name for rural students living in residence, because getting the bursary definitely let me have one less thing to worry about before moving up to Edmonton for 6 weeks. I would like to thank Dr. Jung’s research team for being so helpful, for teaching me so much, and for being so fun to work with. Thank you to my sponsors, NSERC PromoScience and Alberta Employment and Immigration (STEP). Last but not most certainly not least, I would like to give an extra special thank you to my family for always being there for me and supporting me throughout my entire journey this summer.

To me, the WISEST Summer Research Program is so much more than just a “summer job”. It’s an opportunity to learn and grow in the science field, meet new people, and take lots of rewarding risks. I was able to spread my wings and learn what I wanted to do with my life after high school and university. It was an incredible experience that I will never forget, and it truly was the best summer of my entire life.



## Kelsey Fay

Supervisor: Dr. Kurt Konhauser / Earth and Atmospheric Science  
Sponsors: NSERC Promoscience / Service Canada (Canada Summer Jobs)

*"The lab had a very laid-back, friendly and honest feel, even though every member of the team is very dedicated and passionate about their work and results."*



I had extremely high expectations of the WISEST Summer Research Program and was not surprised when it easily met all of them with flying colors. I was quite sure I had missed my shot at the WISEST Summer Research Program due to unforeseen circumstances and was beyond thrilled to be accepted into the program. There was not a doubt in my mind that I was in for the summer of a lifetime and I wanted to take full advantage of it and embrace every moment.

I worked in the incredible lab of Dr. Kurt Konhauser and his team, on an ongoing project that is looking at the possible viability of Banded Iron Formations being formed via the photochemical oxidation of iron. Banded Iron Formations (BIFs) are rocks formed with alternating bands of iron-rich and silica-rich sediment during the late Archean/early Proterozoic era. These rock formations offer many clues about the palaeo-marine environments and about the first life in early Earth. There are multiple theories about the exact origins BIFs, one of which involves the oxidation of aqueous iron into a solid iron via ultraviolet light. I did many experiments this summer that looked at the different subdivisions of UV light as a possible cause of significant iron oxidation.

All of Dr. Konhauser's lab team were whole-heartedly welcoming and accepting of myself and the other WISEST student into their lab family. It was amazing to be a part of that atmosphere and environment and to be able to work alongside Graduate Students and Post Doctoral fellows as an equal member of the team. It was an honour to know that I had equal value in contributing to their projects, both on a larger scale and with the associated day-day work. The lab had a very laid-back, friendly and honest feel, even though every member of the team is very dedicated and passionate about their work and results. I had many laughs with my lab partner and our supervisors and more unforgettable moments than one can

count. It has been a mesmerizing opportunity to meet and work with such exceptional individuals who opened my eyes to a world of new possibilities.

Over the course of the Summer Research Program I got to see many different aspects of the work being done in our lab, but also elsewhere as WISEST provided many great opportunities to experience even more. Twice a week, the summer research students got together with one or both of our fabulous co-ordinators to tour different science facilities in Edmonton or to have lunch together and receive great necessary information for the Summer Research Program. I thoroughly enjoyed both of these activities each week but the U of A Q&A sticks out in my mind as one of my favourites. The U of A Q&A was a Friday lunchtime activity that separated us into small groups and allowed us to talk one on one with a current student of the university to gain a better understanding of university life and ask any of the burning questions we all had in the backs of our minds. The discussion that ensued was incredibly beneficial and made me feel more confident comfortable about entering into university a year from now.

I would like to take a final opportunity to thank the research team of Dr. Konhauser and himself for allowing me to work in their lab and for making the summer so fun. My gratitude also goes out to my sponsors-Service Canada (Canada Summer Jobs) and NSERC Promoscience-and the WISEST team for the incredible experience they have provided me with. A special thank you goes to Set Castro, Ebberly MacLagan, Christine Pope and Jaysey Carlson for all of your support, encouragement and honesty.

# Kendall McLaughlin

Supervisor: Dr. Simon Landhäusser / Renewable Resources  
Sponsor: Syncrude Canada Ltd.



*“One time, we heard an inspirational speech from Dr. Margaret-Ann Armour about how networking is important and another time, university students explained the university way of life.”*

Before I attended the WISEST Summer Research Program, I thought I knew what I wanted as a career. I always thought of myself doing research to help save endangered animals or stop global warming. After my experience at WISEST, I became more aware with what's available for my future. Being at the University of Alberta during this program really helped me with what I want to do for my education. I've become more comfortable being at a university and less scared of living on my own and being independent. I feel like I'm ready to graduate from high school and go to university.

During the WISEST Summer Research Program, I worked in the Department of Renewable Resources working with trees. The tree species I dealt with were aspen and jack pine. My research was based on how these two tree species react to droughts at different water potentials. It was really cool working with the equipment. All the information that I've gathered was used to determine the water potential of these type of trees. We use this to see how much drought these trees can handle before they die.

The people that I worked with in the lab were extremely kind and awesome. My supervisor Amanda Schoonmaker always made sure I was doing something new and exciting every day. She even invited me to go on field work to Hinton, Alberta to take pictures of tree roots. It was really fun going on field work. We had to go in the forest to find tubes that she planted in the ground the previous year. We hiked up a gigantic hill with all this equipment including a delicate, long tubed camera and believe me, it was tiring. Shaun Kulbaba is a university student that helped me throughout my research during the summer. He knew all his material and was always helping me understand what was going on in my experiment. He was fun working with and always made me laugh. It was great to know I could be learning yet having fun at the same time.

Besides the research, there were Professional Development Seminars. One time, WISEST gathered inspirational women working in less-traditional occupations to talk to us about how they got to where they are today at the Networking Fair. Those women had to work so hard to find a great job that they would enjoy and I respect them for that.

WISEST also offered us Lunch and Learn Sessions. Every Friday at lunch, we would be taught useful information about how to achieve our goals. One time, we heard an inspirational speech from Dr. Margaret-Ann Armour about how networking is important and another time, university students explained the university way of life. These things really helped with preparing me on what I'm going to do when I'm finished high school.

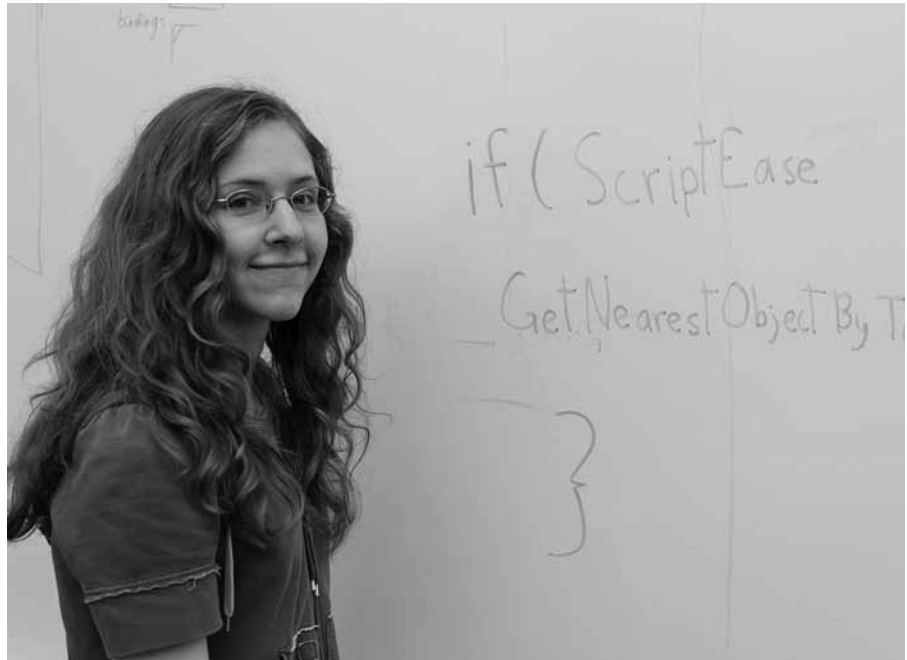
Now that the program is over, I've realized how fast those six weeks flew by. It seemed like just yesterday, when we were introduced to all the other WISEST students and meeting our research team. I'm definitely going to miss WISEST and all the new friends that I've made there. It has given me many opportunities and broadened my idea on what I want to do when I graduate.

I am very thankful to be part of this program and I do not regret any moment of it. I would like to thank Simon Landhäusser for allowing me to be part of his lab, Amanda Schoonmaker for being my supervisor, Shaun Kulbaba for helping me with my research, Syncrude Canada Ltd. for sponsoring me and WISEST for allowing me to be part of this amazing experience. I wouldn't have done it without any of these amazing people.

# Kirsten Svidal

Supervisor: Dr. Duane Szafron / Computing Sciences  
Sponsor: Alberta Innovates - Technology Futures

*“Whether it was in the lab that I worked in, at one of the information sessions, or out and about on a tour, I always had a great time.”*



Have you ever met a hostile penguin? Been in a desert where it snows all of the time? Seen fish that swim above and not in water? I have, through my participation as a student researcher in the WISEST Summer Research program.

This summer, I worked in a computing science research lab at the University of Alberta. The team that I worked with is currently working on a program called ScriptEase which allows people to create their own adventure game stories. Creating stories for games requires manual scripting (a writing code), which as I discovered this summer, is fun, but sometimes very challenging and time consuming. If the code you have written is not exactly correct, then things just won't work. ScriptEase generates code for its users, so all they have to do is pick which patterns they think would best suit their story, and then slightly alter them. ScriptEase is something that everyone can use, and something that I used and tested this summer. I used the game Neverwinter Nights, to create a game module based on the fairy-tale "Rapunzel", with a slight twist. Using ScriptEase 1, I created a playable story, in which I as a player could interact with other characters and objects in the game. By creating a game story, I gained a better understanding of ScriptEase, so I was then able to provide feedback to my team about the program's features and usability. It was a lot of fun. There are currently two versions of ScriptEase- ScriptEase 1 and ScriptEase 2. ScriptEase is a tool mainly used to test out new research ideas. Part of my job this summer was also to use a builder tool to input story actions from ScriptEase 1 into ScriptEase 2. ScriptEase 1 has many actions which are available to its users to use in their stories. All of these actions needed to also be in ScriptEase 2, because in the future, ScriptEase 2 will be replacing ScriptEase 1. After inputting the story actions, I used and tested ScriptEase 2. I never imagined that I would ever get the chance to work on something as interesting and different as

creating computer game stories.

Each day of the WISEST program, was an opportunity to try and learn something new. Whether it was in the lab that I worked in, at one of the information sessions, or out and about on a tour, I always had a great time. One tour that I especially enjoyed was the Electrical and Computer Engineering tour. We went into different laser labs on campus, and learned about all of the different types and uses of lasers. My favourite part of the tour was a demonstration, where we saw the light from a laser as a wave in water. All of the tours were interesting, and allowed us to meet and speak with people from a variety of fields. They all seemed to genuinely love their careers, and were willing to answer all of our questions. I learned more about careers in science and technology that I had some previous knowledge of, and discovered many new career paths that I did not know existed.

I would have not been able to have this opportunity, without the help of many amazing people. Thank you so much Neesha Desai, Duane Szafron, Robin Miller, Matthew Church, Adel Lari, Jamie Schmitt, and Richard Zhao. I learned a lot from all of you, and it was a privilege to be able to work in your lab. Thank you Alberta Innovates Technology Futures, for sponsoring me, and supporting the WISEST program. Without your support, I would have not had this opportunity. I would like to also thank WISEST and the Department of Computing Science at the University Alberta, for allowing me to have this experience. Last, but not least, thank you Miss Byrtus and Mr. Cook for being my teacher references.

# Laine Lysyk

Supervisor: Dr. Joanne Lemieux / Biochemistry

Sponsor: Alberta Innovates - Health Solutions



*“The six weeks of the program offered some of the best learning opportunities imaginable and I am so grateful I was able to be a part of this experience. . .”*

Knowing that in just over a year’s time, I would be leaving high school and entering university, I jumped at the opportunity of participating in the WISEST Summer Research Program. Being unsure of what career path to pursue in the future, I hoped that this program would give me insight into the endless amount of possibilities waiting to be explored, along with a glimpse into what lab work and university life is like.

I was placed in the Department of Biochemistry in Dr. Joanne Lemieux’s lab under the supervision of Cory Brooks and Melissa Morrison. From the moment I met everyone in the lab, I knew this was going to be a summer I would never forget. I had the opportunity to work on a project involving nucleoside transporter proteins; a membrane protein responsible for the transport of nucleosides and nucleobases, both of which are involved in the uptake of anti-cancer and anti-viral drugs. Using the *Pichia pastoris* expression system, I was able to carry out expression trials on these proteins by determining the fluorescence of the cells in which the proteins were located. We had very high expression results with different clones of these proteins, which can lead to further protein purifications and research into the structure of these proteins. Solving the structure of nucleoside transporters has become a topic of increasing interest as anti-cancer and anti-viral drugs could be better designed for intake by cells if the protein structures were determined. I am very grateful for having been given so much responsibility in the lab and being treated as an important member of the research team, rather than just a high school student who doesn’t know what they are doing.

Besides gaining knowledge from working in a lab, the WISEST program provided many other opportunities for learning, such as offering tours of other labs on and off campus during Professional

Development Seminars. The most helpful, and interesting, of these opportunities was my tour of the Syncrude Research Facility. I gained much more from this tour than I believed I would; it helped me to solidify my thoughts on careers I knew were not for me, which I believe is just as important as finding the career you do want to pursue.

From working in a research lab, to learning valuable networking skills, to meeting other students with similar interests as myself, the WISEST program was everything I could have asked for and more. It has helped me become more aware of what interests me and what doesn’t, along with introducing me to careers I didn’t even know existed. The six weeks of the program offered some of the best learning opportunities imaginable and I am so grateful I was able to be a part of this experience; I wouldn’t hesitate for a second to recommend this program to any students.

I would like to thank the WISEST team for organizing this program and raising the awareness about less-traditional career choices; my sponsor, Alberta Innovates – Health Solutions, for making it possible for me to participate in the program. I’d also like to thank everyone in the Lemieux lab, especially Dr. Joanne Lemieux, Cory Brooks, and Melissa Morrison, for helping me to learn as much as possible during the program and for making me feel like a true member of the research team.



## Leah Goettler

Supervisor: Dr. Larry Unsworth / Chemical and Materials Engineering

Sponsor: Alberta Innovates - Technology Futures

*"There seemed to be a similar message behind each woman's story – do what you love, and do not shy away from it because you happen to be a minority."*



When I first started telling people what I would be working on over the summer – nanofiber chemistry in plasma-protein interactions – I could barely repeat it, let tell them what it was. I had never heard of anything like it before! But once I started working in the National Institute for Nanotechnology under Dr. Unsworth, my Principal Investigator, the trouble was in explaining my project so that other people could understand. I learned all about the work of our research team, the applications of nanotechnology, and my project.

If peptides are placed in a solution of certain conditions, they realign themselves to form nanofibers. These fibers can vary in exact measurements but they remain on the nanoscale, which is  $1 \times 10^{-9}$  meters. Once the nanofibers have formed, they create a hydrogel, which is more than 99% water. Contact lenses can be made from hydrogels, but for research purposes they are a different shape and size. Various substances can be placed in a hydrogel and by changing the nanofiber concentration, it is possible to control the rate at which the substance diffuses through. For my project the hydrogel was a bit different; it was made of nanofibers suspended in collagen, a kind of protein, and the collagen was injected with various other types of proteins, including growth factor and lysozyme. The goal of the project was to try to control the diffusion rate of the injected proteins. Specifically, my duty was to analyze the raw data from the experiment and determine the diffusion coefficients of the system – the factors which control how fast the molecules diffuse.

The first few weeks I had to wait for my data to come in, so I brushed up on my math and taught myself some basic calculus and molecular dynamics. Once my data arrived, I set about analyzing it using Microsoft Excel and the equations from a paper written by Dr. Unsworth. I learned how to use Fick's laws, the Stokes-Einstein relationship, and the Excel add-in, Solver. I hit a few snags along the

way, but Dr. Unsworth and the research team were there to either answer any questions I had or to point me in the right direction to find the answers.

The WISEST coordinators did an amazing job of organizing Professional Development Seminars and Lunch 'n' Learn Sessions. The purpose of these events was to expose us to new careers, allow us to ask questions about work or post-secondary education, and to help us develop the skills necessary to excel in our future. On one particular Professional Development Seminar, the Networking Fair, we were able to ask several women working in less-traditional roles about their career choices, motivations, challenges and successes. There seemed to be a similar message behind each woman's story – do what you love, and do not shy away from it because you happen to be a minority. At the end of the Networking Fair, contact information was exchanged in case we thought of any more questions. This was fantastic, as we had learned in the previous Lunch 'n' Learn that networking was one of the most important factors to becoming successful in a career. So to have these women as contacts was fantastic!

The most valuable lesson I have taken away from the WISEST Summer Research Program is that people are more than willing to help you, if you are willing to admit that you do not understand something. Without the support of Dr. Unsworth, the WISEST coordinators, or my sponsor, Alberta Innovates – Technology Futures, I would not have been able to take part in this program. But I have, and I can say that I am sincerely grateful to have been a part of this incredible, once-in-a-lifetime experience!

## Lillian Zuo

Supervisor: Dr. Larry Unsworth / Chemical and Materials Engineering  
Sponsors: Edmonton Glenora Rotary Club / Service Canada (Canada Summer Jobs)



*"I can honestly say that WISEST was everything I expected, and more . . . I got to experience research firsthand, and I toured a variety of labs in diverse occupations."*

"All great things have small beginnings." This statement has been particularly insightful for me after spending 6 weeks in a lab specializing in very small things – nanotechnology! Through the WISEST program this summer, I have had the privilege of working in a university lab that a high school student like myself would typically never have had the opportunity to experience.

Under the guidance of Dr. Larry D. Unsworth of Chemical and Materials Engineering, I was involved in a project at the National Institute for Nanotechnology. What a mouthful! The process of even being allowed to enter my lab took a few weeks before program started, as I needed security clearance and specific training for my lab, which contained potential blood pathogens. I must say, I felt pretty important. But even after I got lab clearance, I didn't go in to it right away; first, Dr. Unsworth stressed the importance of literature research, and so I got down to reading some papers and learning about thrombogenesis, the process of blood clotting.

My research project focussed on the adsorption of plasma proteins to nanoparticles. The nanoparticles which I worked with have great potential as drug-delivery systems, and with the discovery of which proteins adsorb well to them, the nanoparticles can be used to 'hunt down' certain proteins and release drugs directly to the targeted areas. Most of the work I did in the lab was preliminary development – using a UV-Vis spectrophotometer to create a calibration curve relating the colour-absorption of an end product to the concentration of the antibody, and working out the ratios of surface areas of nanoparticles. I also learned about the Western Blotting procedure, in which the use of primary antibodies and enzyme-conjugated secondary antibodies allows observation of the concentration of desired protein adsorbed onto nanoparticles. One of the most surprising things about working in the lab was how

many speed bumps I encountered. There were multiple times when I thought I was all good to go, and then I came across another issue that I needed to think about and overcome before proceeding.

Micro-pipetting in the lab was not the only new skill I gained over the summer. Thanks to the various Lunch 'n' Learns and Professional Development Seminars, I learned everything from parallel parking a robot (that honestly helped me learn how to parallel park in real life...), to the importance of networking, to some post-birth tendencies that mother pigs have. Overall, WISEST gave me an immensely diverse experience and exposed me to a variety of research areas that I hadn't even known existed. My interests in some areas were also amplified, and I feel that this opportunity has enabled me to obtain a clearer grasp of where I want to head in the future. Reflecting back on this program, I can honestly say that WISEST was everything I expected, and more. As I had hoped, I got to experience research firsthand, and I toured a variety of labs in diverse occupations. But probably most memorable of all, I got to meet some amazing people – fellow WISEST students and mentors – that I will never forget.

Of course, none of this would have been possible for me without some very key players. I would like to extend my sincere thanks to my principal investigator, Dr. Unsworth, and the PhD student who took me under his wing, Markian Bahniuk. As well, the entire Unsworth research team has my appreciation for rescuing me a number of times when I was clueless in the lab. To the Edmonton Glenora Rotary Club and Service Canada, thank you for sponsoring me in my endeavours this summer. And last but not least, this year's WISEST team, without whom the program would not have run nearly as smoothly or been nearly as memorable. Thank you all!

## Melissa Wan

Supervisor: Dr. Yongsheng Ma / Mechanical Engineering  
Sponsors: Faculty of Engineering / Service Canada (Canada Summer Jobs)

*"This opportunity to participate in the WISEST Summer Research Program has given me a new perspective for what researchers and engineers do..."*



As a high school student, I never really understood the applications of what we learned inside the classroom. The WISEST Summer Research Program gave me the opportunity to see and experience real applications in the world. Organized by a graduate student working in a different lab, one thing I got to do this summer was go on a tour of a laser engineering lab, and one project that really caught my eye was the laser fusion energy. I was surprised how passionate they were about their jobs, and that I could understand what was happening; it amazed me how researchers use concepts that I have read in books, or seen in videos. This was just one of the many things I got to experience.

Over the course of this summer, I had the honour to spend most of my time working in Dr. Yongsheng Ma's lab, in the department of Mechanical Engineering. My project for the summer was to design a mold for manufacturing two plastic components and analyze a manufacturing layout. Upon learning that my project would involve using a computer 100% of the time, I was a little sceptical because I wasn't very familiar with 3D Computer Aided Design and Engineering. I had some previous experience with 3D Computer Aided Design, however, it was an introduction to the software and architectural based, not product based. Even with that being said, there was still a steep learning curve working with Siemens NX 6.0.

While trying to overcome the learning curve, I was scared that I would not be able to produce anything after six weeks. Dr. Ma however, understood about my concerns, and he tweaked my project for the summer: model any object that I could think of; that I was interested in. I could then do other tests such as simulations after the modelling, to see if my product concept was feasible. This task, to me, was even more daunting than the initial project of designing a mold for manufacturing two plastic components and analyzing a

manufacturing layout.

I tried my best to think of something I could model, but even a simple object, like a computer mouse, takes a lot of familiarity with the software. After about four weeks with tutorials, I decided that the modelling aspect of product designing was not what I was interested in, but the simulation testing was. I consulted with Dr. Ma again, and I chose to do a simply supported solid wooden beam, and did some analysis such as the deflection due to a load, maximum bending stress, and some linear buckling analysis. In the end, I was very proud of what I accomplished, and how much I learned.

This opportunity to participate in the WISEST Summer Research Program has given me a new perspective for what researchers and engineers do, and I now have a re-defined appreciation and outlook on less-traditional careers. Each day I walked through the halls in the Mechanical Engineering building, I didn't see very many women in the pictures of the graduates, let alone any in the first couple. However, as I walked further and further, I started to see pictures of women appear more and more frequently. Organizations and programs such as WISEST have been promoting less-traditional careers for genders, and I am very grateful, and thankful, that I had the opportunity to participate in the WISEST Summer Research Program. Thank you to my sponsors, the Faculty of Agricultural, Life and Environmental Sciences, and Service Canada. I would also like to thank Dr. Yongsheng Ma, Narges Sajadfar, Wei Wang, and Md Moin Uddin for helping me throughout the six weeks of the program. I spent my summer gaining invaluable knowledge and skills, about diverse career paths, engineering, researching, and so much more. It was a privilege to work alongside the other students, these researchers, and it was also a great experience.

## Michée-Ana Hamilton

Supervisor: Dr. Craig Heinke / Physics

Sponsor: Syncrude Canada Ltd.



*"I would highly recommend it [Summer Research Program] to all students who have the desire to explore and research, and have a craving for knowledge and adventure."*

My summer at WISEST was a myriad of unforgettable experiences. I had anticipated a summer of full of learning and research, but I got so much more. I had the opportunity to be mentored by, and to collaborate with experts in my field of interest. In addition, there were opportunities to learn about other research and career opportunities in Professional Development Seminars. We also had Lunch 'n' Learn Sessions, opportunities for students to learn diverse skills from writing reports, to learning the dos and don'ts of networking. The entire summer was packed with amazing opportunities for learning and adventure.

Professional Development Seminars were one of the highlights of the WISEST experience; these tours gave us the opportunity to learn about the different career options available in various fields of science. Although my favourite Professional Development Seminar was the tour of the NanoFab laboratory, I also enjoyed visiting the Edmonton Research. This tour gave me an opportunity to learn about research and career opportunities in a field of science completely different from my area of research. On the tour, we learned about the different experiments, and why these experiments were relevant. We also learned about how environmental science and reproduction physiology was related to other industries, such as nanotechnology. This seminar gave us an inside look at the different areas of study related to biology and gave me an amazing opportunity to learn about a field that I was unfamiliar with, and ignited an interest in me to explore other fields in science.

Along with my experiences in the lab, I had the pleasure of staying in residence. I got the opportunity to bond with my fellow WISEST students, and to share my experience with my peers. While staying in residence, we got to experience what it was like to live 'on our own' in Edmonton; we went to festivals, movies, and got to splash

around in the fountain a few times. Our favourite place to be, however, was in the lounge playing cards and watching Dr. Who. Staying in residence was especially memorable because by the end of the summer, we had become a huge family, and we shared so many amazing memories.

When I found out what my project would be for the summer, I could hardly contain my excitement; I had always loved astronomy, and the opportunity to learn more about this subject, and possibly contribute to the field was compelling. My project for the summer was to study the distribution of energy in X-ray sources in a globular cluster. X-ray sources are often found in binary systems, and that's where my research was mainly focused. Binary systems are structures containing two stars that orbit around each other; a compact star, such as a black hole, neutron star, or white dwarf, and its companion star. The compact star takes (or accretes) gas from its companion; as the gas travels to the compact star, it heats up to millions of degrees and emits X-rays. X-ray telescopes are used to observe and analyze these X-ray sources to gain a better understanding of how they behave. Basically, I obtained two sets of data from NASA's Chandra telescope, of the same sources taken at different times, and I fit each source various models and examined their behavior. This gave me the remarkable opportunity to gain knowledge, and experience what it would be like to research in my field of interest, and it was an invaluable experience.

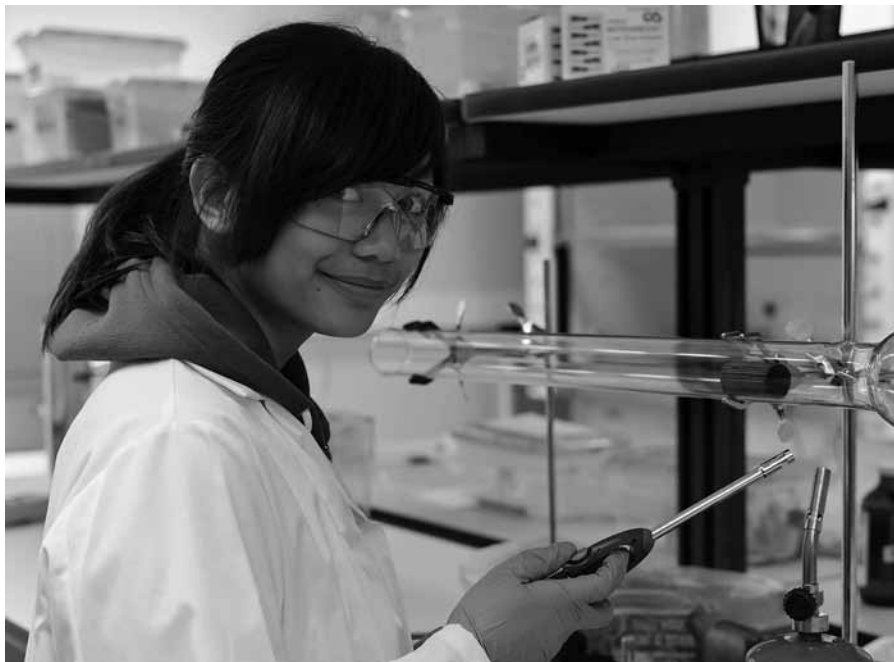
In all honesty, when I reminisce about the time I've spent here, I feel as if the entire summer went by too fast; it was filled with so many amazing memories, and experiences, and I will always be grateful for this opportunity. I would highly recommend it to all students who have the desire to explore and research, and have a craving for knowledge and adventure. Thank you to my sponsor, Syncrude Canada Ltd. for making this experience possible.



## Michelle Mabuyo

Supervisor: Dr. Thomas Thundat / Chemical and Materials Engineering  
Sponsors: Faculty of Engineering / Service Canada (Canada Summer Jobs)

*"Luckily, I had the help and guidance of my supervisor Dr. Lana Norman, who not only answered my questions but also made sure I understood the purpose of our experimental methods."*



Every great scientist and engineer in history started out as nothing more than what we are now: student researchers. If they can do it, why can't we? This sums up the mindset I had coming into orientation, anticipating six weeks of lab work and innovative research.

I was placed in the Chemical and Materials Engineering Department in the National Institute of Nanotechnology building. The view from the fifth floor corridor windows was amazing, but the numerous ongoing research projects were even more so. My project focused on quartz tuning forks (QTFs) and their usefulness in sensing applications. In the first week, I learned how to build a circuit, operate a lock-in amplifier and handle the experimental setup. It was a thrill to learn things along the way and fix problems with QTF positioning and data acquisition and analysis. With these skills, I was ready to take measurements independently. We observed the changes in resonance frequency from a bare QTF to a QTF coated in polymer three different ways and then finally to a polymer-coated QTF exposed in vapour. These shifts in the resonance frequency, along with the amount, properties, and type of polymer, will help make the sensing device more sensitive and selective. Eventually, it will pave the way to developing an electronic nose that can detect food spoilage.

A fair amount of collaboration occurred in my lab research group, which consisted of more than twenty five people. The diversity of their backgrounds and projects guaranteed that I would learn something new every day. My questions from science and engineering careers, their projects, and laboratory practices, to university, life experiences and events around Edmonton were easily answered.

The city had plenty to offer, especially since I was living in the MacEwan residence. There were many stories and adventures to be shared amongst our group of eight during the trip to and from work,

lounge nights and card games. Festivals, fountains and TV show marathons were entertaining ways to fill up the after-work hours.

That's not to say that the WISEST coordinators didn't keep everyone busy! With sixty people in the program, it was a normal occurrence to encounter at least one student every day and get a chance to catch up with their progress. Professional Development Seminars and Lunch n' Learn Sessions gave us more opportunities to bond. A session I really enjoyed was the tour of the Electrical and Computer Engineering Department, where we had the chance to learn about lasers and fibre optics, and play with the hands-on demonstration stations. In one memorable Lunch n' Learn Session, we were lucky enough to hear from Dr. Margaret Ann-Armour, who gave us helpful advice and insight about women in less-traditional fields. Much like every inspirational woman we had talked to, we were assured – encouraged, even! – to follow our own path. It was a relief to be told that changing my mind to pursue different areas of interest was fine because it would give me the opportunity to learn about what I like, to learn about what I don't like, and to learn from my mistakes.

Looking back, I was right in thinking that even though I knew next to nothing about the research I was undertaking, I could step up to the challenge. Luckily, I had the help and guidance of my supervisor Dr. Lana Norman, who not only answered my questions but also made sure I understood the purpose of our experimental methods. Thank you also to Dr. Thundat and his research group for making me feel welcome. Thank you to my sponsors in the Faculty of Engineering and Canada Summer Jobs, the sponsors of the bursary fund, the girls in residence, and the WISEST team for making all of this possible. Every great scientist and engineer has to start somewhere, and the WISEST Summer Research Program is definitely one of the best places to do so.

## Morgann Lynn

Supervisor: Dr. Ian Mann / Physics

Sponsors: Faculty of Science / Service Canada (Canada Summer Jobs)



*"I felt very privileged that the research we did was significant to the "bigger picture" of our research groups' studies."*

Walking into Orientation on July 5th, I had no idea what to expect of the Summer Research Program. I was living alone for the first time in a city I'd only ever been to a few times before, away from all of my friends and family. Making new friends was easier than I thought though, and I expect that I will continue to talk to the friends I made this summer for quite some time . . . maybe we'll even attend university together! This program was not at all what I expected—it was so much more! It wasn't just the things I learned, or the research I did that made this experience worth-while, it was the amount of influential people I met, including the other students in the program, our research team and the women we spoke to through events such as the Networking Fair.

I was placed in Dr. Ian Mann's Space Physics group along with one other WISEST student. Although we worked side-by-side everyday on computers, we were working on separate projects. She was studying the Aurora Borealis, while I researched the effect of solar activity on our magnetosphere. The first few days were overwhelming as both of our supervisors and our Principal Investigator. all gave us their view on space physics. I can proudly say that after these six weeks I can now give you my view on space physics, although it won't be quite as in-depth as my supervisor's or Principal Investigator's.

My project was done solely on the computer, which I admit at times got a little tedious, but it was also very interesting when we found important events occurring in the data. I spent most of the time looking at data from ground-based magnetometers for electromagnetic ion cyclotron waves, or EMIC waves. I collected two years' worth of data from various magnetometers, including ones from the University of Alberta's own CARISMA. After collecting and analyzing the data, looking for different events, I then found conjunctions

between the magnetometers and a special satellite used to measure particle precipitation into our atmosphere. The program I used to do this was one of my favourite parts of my research; I even downloaded it onto my own computer to show my mom!

My six weeks of research was vital to understanding if EMIC waves empty the radiation belts of "killer" electrons that could affect technology on our planet, and also important to my supervisors own research. I felt very privileged that the research we did was significant to the "bigger picture" of our research groups' studies.

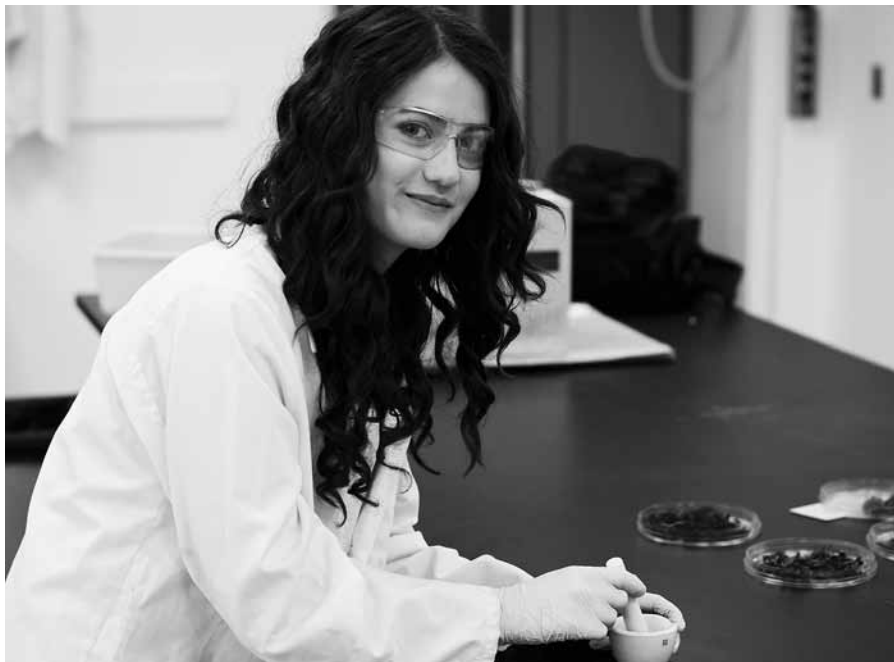
For the majority of my summer I was working, but not at your typical summer job. As I am about to enter grade twelve now, I feel as though I have experienced more than a lot of people do in their lifetimes. The knowledge I have gained this summer of less-traditional careers, research, networking and so much more has been absolutely outstanding. I had been hoping that by attending this program I would have my mind completely made up about how I want to spend the rest of my life, but it has only opened doors instead of closed them.

I have gained so much from this experience and there are quite a few people I have to thank for that. First, I would like to thank my friends, family and teachers for pushing me to apply in the first place. Also, I would like to thank Canada Summer Jobs and the Faculty of Science for being my sponsors. Of course, my research team deserves a thank-you, because they are an amazing group of people, and this would've been impossible without them. Lastly, I would like to thank WISEST for providing myself and others with such an amazing opportunity. It was such a pleasure to be able to spend my summer the way I did with the WISEST Summer Research Program.

## Natalie Hervieux

Supervisor: Dr. Colleen Cassady St. Clair / Biological Sciences  
Sponsors: Weyerhaeuser / Service Canada (Canada Summer Jobs)

*“So among all of the other things that the WISEST program has given me, I am leaving with an entirely new sense of confidence in my future.”*



Before this summer I had no idea what I wanted to do for the rest of my life and now that the WISEST program is finished, I still don't. What I have realized however is that I do not need to figure everything out right now. I have met so many successful people through this program and the majority of them did not have their career paths planned out at my age or even during university. So among all of the other things that the WISEST program has given me, I am leaving with an entirely new sense of confidence in my future.

I was placed in the Department of Biological Sciences in the lab of Dr. Colleen St. Clair along with another WISEST student, Irina Simin. Finding out I was going to be working in that lab was very exciting and my excitement grew even more when I found out the variety of projects that I would be participating in. The topics of the various research projects were: protecting avian populations in the oil sands, urban coyotes, deterring birds from hitting windows, and elk behavior and personality. With all of those research projects it felt like I was doing something new every day. I did do quite a bit of computer work, analyzing photographs of birds and elk, but I also got to walk and drive around the city, go kayaking, go camping, analyze scat under a microscope, visit an elk farm and even go to Fort McMurray to see the oil sands. I had so many amazing experiences this summer and I am so happy that I got into this program.

Besides what I learned in my own lab I also got a new insight into different fields of science through the Professional Development Seminars. Those were interesting because I got to see how university science is applied to the world and how it affects everyone. One tour that I really enjoyed was the Edmonton Research Station. We got to go to the university farm and see all of the different research projects that were going on involving cows and pigs. It was remarkable how many different types of research that could

be done just by studying the animals. Another thing the program helped me with was that I became very familiar with the University of Alberta campus and some parts of Edmonton so I won't be as nervous when I move here for university. It was all of these things that made the experience so great.

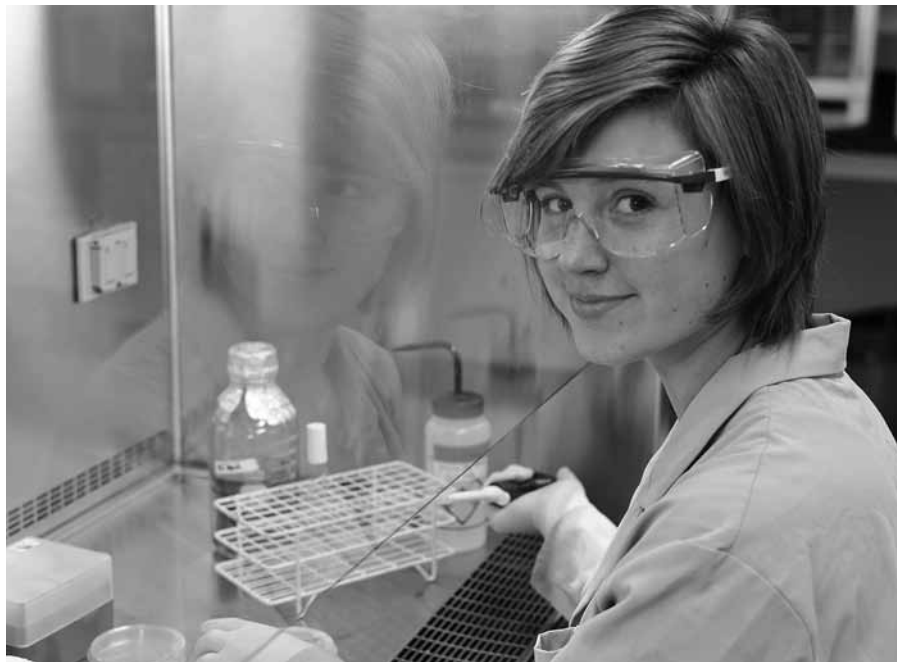
If I had to pick one thing that really stands out to me from my summer, it would be all of the people I met. I met dozens of other WISEST students, all of whom are smart, interesting people. Through the Networking Fair and other WISEST events, I met successful people in science careers. My lab was also full of role models who welcomed new ideas but also encouraged critical thinking. They taught me so much about science and university, but also random words of advice and caution that I can apply to the rest of my life. It was getting the opportunity to meet all of those people and hearing what they have to say that I appreciated most.

By the end of the program, I have forgotten that it was a job because it did not feel like one. For it truly was so much more. I would like to sincerely thank my sponsors, Weyerhaeuser and Service Canada (Canada Summer Jobs), for allowing me to take part in this program, as well as everyone involved in WISEST and my lab group for everything they taught me. I cannot wait to share my experience with others and use everything I have learned.

## Nicole Bilan

Supervisor: Dr. Yang Liu / Civil and Environmental Engineering

Sponsor: Department of Civil and Environmental Engineering / Service Canada (Canada Summer Jobs)



*"It was interesting to find people who liked what you like, thought the same was as you did and were all enthusiastic about the work we experienced."*

WISEST has allowed me to see the many diverse fields and occupations that women can enter in science, engineering and technology. Following this program I am more determined to pursue engineering as a career!

During the summer, I participated in research that involved nanoparticles and the toxic effect they had on microorganisms. Nanotechnology has become increasingly popular in the recent years, and unlike carbon dioxide, sulphur oxides and other emissions, there are no regulations restricting the amount of nanoparticles being released into the environment. We used nano C60 as our nanoparticle because it is one of the most commonly used nanoparticles, being used in electrical, medical and material industries, and it is able to enter water phases. We tested the nano C60 suspension on Escherichia coli K12 (E. coli k12) and Bacillus subtilis(B.S.). We would culture the bacteria on LB agar plates and allowed the bacteria to grow. After the plate had produced enough bacteria, we then took one single colony from the plate and put it into LB broth. When it reached the log phase (fast growing), we would then expose it to the C60 suspension, making sure that we had a control (bacteria growing naturally) to compare results.

Our results were not what we expected, the nano C60 appeared toxic. In reality the bacteria treated with C60 grew the same and sometimes even better than the control, this occurred multiple times. One test was unique from the others, the C60 suspension proved to be toxic. We ran another test following this toxic test and it proved to be non-toxic once again. We concluded that the suspension was too unstable to prove the results that we obtained. Further research must be done to improve the stability of the C60 suspension and to prove if it is toxic or not.

Besides research, WISEST offered us many chances to go on tours

that could help us decide what we want to do with our future. One of the tours that I enjoyed the most was Exploring U of A Research. I was able to enter one of the labs in NanoFab, and experience a small part of what they do on a regular basis. Before we could enter the extremely clean lab, we had to put on "bunny suits" so that we wouldn't bring in anything that could contaminate the area. We were able to experience the different types of technology in use.

This summer turned out to be more than I expected. I made many new friends who all shared the same interests as me. I spent lunchtime talking about experiments, tours, life on campus, and Harry Potter, something that I would probably never experience at school. It was interesting to find people who liked what you like, thought the same was as you did and were all enthusiastic about the work we experienced.

I would like to thank my sponsors, Service Canada (Canada Summer Jobs) and the Department of Civil and Environmental Engineering, for without them, I would not have got to have such an amazing summer. I feel extremely honored that Dr. Yang Liu allowed me to be a part of her research project and for her research team, who were always there if I needed help. My direct supervisor, Zhiya Sheng, made working in the lab absolutely amazing and I would like to thank her so much for everything she did for me. She let me plan out the experiments and with her guidance, I was able to do everything on my own. Her trust in me was more than ever I expected.

Thanks to the WISEST Summer Research Program, I was able to be a part of one of the numerous ongoing research ventures occurring on campus. It was an eye-opening experience and I will never forget it.



## Nicole Brisson

Supervisor: Dr. Tom Etsell / Chemical and Materials Engineering  
Sponsors: Faculty of Engineering / Service Canada (Canada Summer Jobs)

*“Immediately, I fell into the groove of running experiments, testing samples, collecting data, and (sometimes!) getting answers as to why things happened the way they did.”*



When I heard about the WISEST program, I was immediately intrigued. The summer after Grade 11, I was given the unique opportunity to experience six weeks of research at the University of Alberta myself! Participating in the WISEST program gave me insight and knowledge I would benefit from in the future. This program taught me the basics of networking, and I learned about the depth of research that happens at the U of A. I also acquired many skills, such as delivering presentations in meetings, that are bound to come in handy sometime in the near future. This summer, WISEST placed me in a fuel cell laboratory under the supervision of Dr. Tom Etsell. Immediately, I fell into the groove of running experiments, testing samples, collecting data, and (sometimes!) getting answers as to why things happened the way they did.

Solid Oxide Fuel Cells (SOFCs) are a relatively new technology with a promising future, because they are chemical batteries that generate electricity and only produce water as waste product. There are three main parts to a fuel cell: the anode, the cathode, and the electrolyte. This summer, I worked on improving the mechanical strength of the support of the fuel cell. The state-of-the-art material to use for SOFC anodes is a nickel (Ni) catalyst impregnated into a yttria stabilized zirconia (YSZ) solution. The Ni provides the electrical conductivity for the cell, while the YSZ provides the ionic conductivity. However, when the two elements are mixed and heated, Ni expands 30 volume %, causing particles to move around and the cell electrolyte layer cracks. To avoid this problem, my research team uses foams to provide adequate and constant strength. Foams are porous, and when dipped in a YSZ slurry and then sintered (burned) at high temperatures, the foam leaves a skeleton support that provides the Ni particles adequate room to expand without damaging the electrolyte. Since this foam acts as the support for the entire fuel cell, it is important that the foam is mechanically very strong.

This summer, I worked with dipping the foams multiple times in various YSZ slurries. The foam samples were then tested for their strength (in MPa) using a 3 point bending test. I also measured the density of the samples after dipping to ensure that the pores were kept open, and not clogged excessively by the slurry. I also learned a lot about fuel cells and their applications to society through many informative chats with my supervisors.

Working with fuel cells for the summer was a very fulfilling experience. Though I was working in such a narrow area of fuel cells, I quickly learned about my contributions to the bigger picture. Fuel cells are a promising technology for the future; many industries are funding projects to improve cell efficiency and output. Though my experiments were quite small, in no way did they seem insignificant.

What I enjoyed most about the program was the chance to meet new people. All of the students in WISEST were very enthusiastic and bright, and the supervisors in my lab had a lot of knowledge to share about university life. They opened my mind as to what career options are available to me. I definitely know a lot more about university now than when I walked in at the beginning of July! WISEST offered me a once in a lifetime chance to get a head start planning for my future, and I am very grateful that I took this unique, amazing opportunity to learn as much as possible.

Thank you to my sponsors Service Canada (Canada Summer Jobs) and the Faculty of Engineering. I would also like to thank the undergraduate and graduate students in my lab, as well as Dr. Etsell, for making my experience so worthwhile. They were always calm and patient with me, and tolerated my many questions! Without them, my WISEST experience wouldn't have been the same.

## Nicole Hobbins

Supervisor: Dr. Douglas Ivey / Chemical and Materials Engineering  
Sponsors: Weyerhaeuser / Service Canada (Canada Summer Jobs)



*“Our (Syncrude) guide paid special attention to letting us know what kinds of jobs were available there and how they could relate to our interests in science, and vice versa.”*

What do you get when you take 60 teenagers, 6 weeks, and the University of Alberta campus? You get the WISEST Summer Research Program, but you also get the experience of a lifetime.

I have been interested in science, engineering, and technology as long as I can remember. However, I always thought that science meant research, engineering meant building and designing, and technology meant playing around with computers. WISEST taught me otherwise. During this summer, I learned that there are endless possibilities within the science, engineering, and technology world.

From July to mid-August, I was stationed in the Chemical and Materials Engineering Department working with Neda Dalili under Dr. Douglas G. Ivey. My project focused on finding the best conditions under which a layer of manganese oxide would deposit onto gold-plated silicon. Eventually, this technique can be applied to nanotechnology, allowing for smaller and faster electronic devices.

Working in the lab was not at all what I was expecting; it was better! I had always imagined real university labs as being isolated, full of many people working on one project, and full of everything that those people needed. It was not like that at all. I was working on a separate project from everyone in my lab, and I got to collaborate with people in other labs frequently. For example, the ACSES lab used a scanning electron microscope to take clear images up to 100,000 times the size of my samples. I cannot express how much I appreciate their help with my research.

This summer was about more than doing research and working in a lab. It was also about being introduced to infinite career opportunities, whether through listening to other WISEST students' experiences or through Lunch 'n' Learn and Professional Development Seminars. One of my favourite events was the Syncrude tour. Our

guide paid special attention to letting us know what kinds of jobs were available there and how they could relate to our interests in science, and vice versa. It really opened my eyes to all of the different applications of science in the real world. Another favourite event of mine was the tour of the research facilities on campus. I visited the Swine and Dairy Research and Technology Centers. It was amazing to be on what was essentially a farm in the middle of Edmonton. The tour guides were so knowledgeable about their fields of research that they could explain it in a way that anyone could understand, and that made it much easier for me to see why they loved what they did.

My biggest fear coming into the summer research program was that I was not going to make any friends. I do not know why I even thought that was a possibility, as it was almost impossible not to make friends this summer! I stayed in the MacEwan Residence with seven other girls, and by the end of the summer we were basically a family. On the first day during Orientation, I made two friends who ate lunch and explored campus with me virtually every day throughout the summer. I could not believe how friendly everyone was, nor could I believe how many people shared my interests. The friends I made at the summer research program will stay with me forever.

Although the end of the Summer Research Program means that I leave the lab and all of my new friends, I find it near impossible to be disappointed. In the words of Dr. Seuss, “Don't cry because it's over. Smile because it happened.” Thanks to the help of my sponsors (Service Canada and Weyerhaeuser) and lab group, this summer has equipped me with innumerable resources and unique, once-in-a-lifetime experiences that will impact me more than I could ever imagine. It would be an understatement to say that my summer in the WISEST Summer Research Program was a success.

## Nicole Mirecki

Supervisor: Dr. David Zhu / Civil and Environmental Engineering  
Sponsor: Suncor Energy Foundation

*"I was happy to be exploring such a new field and contributing to new findings."*



I still remember my Chemistry teacher pulling me out of my English class to come to talk to me about the WISEST Summer Research Program. I was more than excited when I found out she wanted me to apply to the program and that she thought I would make a good candidate. After being accepted into the program, I was more than thrilled. Engineering had always been a career field that had interested me so I was ecstatic upon hearing that I would be working on an engineering based project. After completing WISEST, I could not have thought of a better way to spend the majority of my summer. I not only learned so much and but also had an incredible experience.

I was placed in the Department of Civil and Environmental Engineering. In this department I worked in the water resources lab. The supervisor of this project was Dr. David Zhu, but I worked primarily with one of his PhD students. The project I worked on over the course of six weeks was the Diavik habitat compensation project. There were two main portions to this project. One portion was related to the aquatic ecology of the ecosystem and the other portion was the water resources portion. The goal of studies is to help determine how effective the habitat compensation is. My involvement of the project was primarily working on the water resources portion, which entailed gaining a better understanding of nature-like fish passes and their effectiveness in allowing unobstructed fish movement between bodies of water. When hearing there has been very little research done in this area and that most existing pass had been designed from experience rather than a guideline, which currently does not exist, I was very excited. I was happy to be exploring such a new field and contributing to new findings. The ultimate goal of the project would be to create such a guideline or standard to which others could abide to in the creation of fish passes.

The purpose of the experiment I conducted was to investigate the preferential flow paths for fish swimming from downstream to upstream in a particular zone of the rocky ramp nature-like fish pass. This experiment was conducted in an indoor exploratory rock ramp type natural-like fish pass. Detailed velocity measurements were taken along a specific location of the fish pass. They were taken at three different flow rates: 130,160 and 190LPS (Litre Per Second). Using an instrument called a Yaw Probe, we measured the two-dimensional velocity of the water flow. After conducting this experiment we were able to draw several conclusions that will help in further studies of this project.

Besides working in a lab setting, WISEST had many events and activities that allowed me to interact with not only other students but also professionals. The Professional Development Seminars, Lunch' n' Learn' Sessions and Team challenge were all very all very fun and informative events that WISEST had planned. The Professional Development seminars exceeded my expectations greatly. These seminars allowed me to attend a Networking Fair and attend a wide variety of tours. The Networking Fair allowed me to be more aware of less- traditional careers for women and also give me a better idea of what career field I wanted to enter after high school.

I would like to personally thank everyone who made my WISEST experience as incredible as it was. My thanks go out to all the members of the WISEST Team, my sponsor Suncor Energy Foundation and my research team. Without them I would not have been able to participate in such a beneficial and eye opening experience. WISEST has been an experience of a lifetime and I feel extremely lucky to have been apart of it.

## Nicole Moffatt

Supervisor: Dr. Rhonda Rosychuk / Pediatrics

Sponsor: 2011 Synapse Mentorship Award - Research Group



*"Thanks to this program, I became more confident in my abilities, and, now, after this summer, I feel like I can accomplish anything!"*

Little did I know that my high expectations of the WISEST Summer Research Program would be surpassed on the very first day of the program, and this summer would not only be a summer to remember but also an experience of a lifetime.

I had the opportunity to work with Dr. Rhonda Rosychuk in the Department of Pediatrics. For my research project, I used data to examine trends in mental health emergency department visits made by children diagnosed with anxiety, substance use, and mood disorders. Using the data for these emergency department visits and a program called PASW Statistics, I was able to create graphs, charts and tables. Some of these graphs showed an alarming number of visits for substance use throughout the study period for both males and females aged 10-17, while other graphs showed that youth aged 10-17 in the Aboriginal group had the highest visit rates for substance use and that youth aged 10-17 in the Registrant without Subsidy group had the lowest visit rates for substance use.

Furthermore, not only was I given the chance to work on a research project, but I toured various labs, networked with professionals in science, engineering and technology, and shared experiences with the other summer research students during Professional Development Seminars and Lunch 'n' Learn Sessions. I especially enjoyed the very first Lunch 'n' Learn Session, which was geared towards preparing us for the Networking Fair. During this event, Dr. Margaret-Ann Armour spoke to us about the importance of not only networking, but also dreaming, keeping options open and asking questions. Dr. Armour's presentation was extremely inspiring, full of important information to help us make future decisions. Another WISEST event that I really enjoyed was the Networking Fair, a Professional Development Seminar where we had the opportunity to network with professionals in the fields of science, engineering

and technology. During this seminar, I was able to ask questions and learn about what it takes to pursue various careers. The role models were very helpful, answering any questions we had and giving us advice about education, career choices and plans for the future. It was events such as these that made the program even more amazing.

I learned more during this past summer than I ever could have by just sitting in school and studying. I gained first-hand experience by working in the research lab, and I learned about different careers in science, engineering and technology by touring various labs during the Professional Development Seminars. There was never a day that went by without having learned something new. Thanks to this program, I became more confident in my abilities, and, now, after this summer, I feel like I can accomplish anything!

Overall, this program was an eye-opening experience, and instead of making my career choice easier, it made my decision much more difficult by showing me a variety of careers in science, engineering and technology that I had never even heard of before. The WISEST Summer Research Program is phenomenal, and I would recommend it to anyone especially if they are considering a career in science, engineering or technology because this opportunity allows students to gain valuable knowledge and experience that they wouldn't be able to get anywhere else.

I am extremely grateful for this opportunity, and I would like to thank Dr. Rosychuk and her research team, and the WISEST Team for giving me this amazing experience. I would also like to thank CIHR, the sponsor of the Synapse Award, for its generous contributions, and everyone else who made this incredible program possible.



## Radhika Kalra

Supervisor: Dr. Samer Adeeb / Civil and Environmental Engineering  
Sponsor: Edmonton Chapter Beta Sigma Phi

*“Besides being in my lab, I had the fortunate opportunity to meet a large group of motivated young women like me, all oriented towards different directions in science and engineering.”*



It has been very worthwhile spending my summer in the WISEST Summer Research Program. At the end of my Grade 11 year, I thought I was pretty well aware of the opportunities that university offers and what direction I might go into. But after spending these past six weeks in WISEST, I found out I was wrong and that I have not yet opened my eyes to nearly half the types of careers available. I got the privilege to try out engineering in the program, the option I was considering going into . . . I couldn't be any happier of the way I spent my summer!

Placed in the Department of Civil and Environmental Engineering—a good match for my interests and strengths— I worked under Dr. Samer Adeeb, with a group of graduate students. In my lab, which focuses more on Biomedical Engineering, I became familiar with a computer software program called SolidWorks, used to create 3D parts and put them together to make assemblies. The grad students use this for their projects to design innovative medical devices for people who have disabilities/injuries and need artificial support. I myself created sample SolidWorks models, getting the feel for how difficult yet fun it is!

One of the projects I was involved with, under the direct supervision of Jonathon Schofield, had me data filtering, or smoothing out graphs, in order to make them easier to read. The graphs measured velocity and acceleration in one's knee, hip and ankle when they move from a sitting position to a standing one. The motion capture system that detects their movement would translate small changes in positional data into large noise on the graphs, making them hard to read. These results and statistics will be used to design a leg brace for people with unstable knees.

Besides being in my lab, I had the fortunate opportunity to meet a large group of motivated young women like me, all oriented to-

wards different directions in science and engineering. WISEST is the perfect place to find friends who are easy to get along with and will last long. Along with the social networking aspect, we were keen on visiting each other's labs to get to know more about our diverse project. These tours exposed me to a whole new set of careers I didn't even know existed! There was everything from viewing cells with lasers, investigating toxins in pond tailings, and creating video games. It didn't seem like the program missed covering any corner of science and engineering, no matter how less-traditional it is!

Every Friday we had Lunch 'n' Learn Sessions with our entire group, listening to either guest speakers or Kerry and Catherine themselves, offering us their advice and mentorship. My favorite session was with Dr. Margaret-Ann Armour and her discussion about role models. She was very inspirational as she told her story of how she reached the position she is in today and the opportunities and challenges she had as a woman. Her tips were simple, but easy to follow, enjoyable, and effective.

As the program came to an end, I feel a lot more open to the diverse possibilities in university and confident with the idea of women in science and engineering. I have a clearer idea of what I want to go into after high school, as I thoroughly enjoyed my lab in Biomedical Engineering. I am so grateful for this opportunity to get to know myself and my working methods better. I would like to acknowledge my school teachers for writing amazing references, and Dr. Adeeb and my research team for giving me a chance to participate in their lab. I would not have been able to receive this privilege if it wasn't for the support of my sponsor, Edmonton Chapter Beta Sigma Phi. Last but not least, the WISEST team did an incredible job putting this unforgettable program together and I cannot thank them enough. The WISEST Summer Research Program was an experience of a lifetime!

# Rhiannon Schrader

Supervisor: Dr. Thomas Churchill / Surgery

Sponsor: 2011 Synapse Mentorship Award - Research Group



*"In my eyes, knowledge gained from every experience this summer is just as valuable to a grade eleven student as the research project itself."*

One would think that a six week research program in an area of interest would solidify someone's decision as to what path they choose for their future. For me, this summer has done everything but narrow down my interests. Walking to the Department of Surgery on the first day, one member of the research team told me that I would learn a lot more about "other things" than I would learn about the actual research project.

This July and August, I was taught complex details about the small intestine's response towards ischemia (shortage of blood supply) and how this injury can be prevented and minimized as it is detached from the oxygenated blood during transplantation. A lot to take in right? I was lucky because I spent the majority of my summer assisting with rat surgeries, but also learnt mechanical and technological skills as I set up a SMART board, for example. I may have been placed in a very specific area within science, but my knowledge in all areas of science was tested in lab. In my eyes, knowledge gained from every experience this summer is just as valuable to a grade eleven student as the research project itself.

The lab was not to be the only place I absorbed new information. Every Monday my brain was stretched to a new limit when I participated in tours of different research facilities, on and off campus, organized by WISEST. When given the option between tours of the two facilities, I often surprised myself by choosing the one that I knew less about so I could go in with more questions, expand my knowledge and end the day aware that I can either cross off or add another area to my ongoing career considerations list. My gratitude goes out to WISEST's efforts to accommodate the interests of sixty high school students every Monday; the benefit of being exposed to different careers will be everlasting.

The WISEST coordinators kept me busy with many programs, but so

did other events organized by the 60 WISEST students. It was truly refreshing to be placed in a program of such friendly and driven people my age, who took advantage of Facebook to constantly plan dinners and get-togethers for everyone in the program. You could say that we used the advice given during the networking opportunities, and took it upon ourselves to create our own social network this summer. This network may be the most important bond as we leap out of high school and stretch our wings in university.

Looking back on my six week project in the lab, I see just how many relationships I established. I was fortunate to be placed in a lab environment with a small research team made up of professionals of all ages that encouraged me and were willing to answer, with their extremely vast knowledge, the many questions I asked. The sociable atmosphere within my lab is what allowed me to feel comfortable enough to share my interests and relate to the team, which is what ultimately led to an unforgettable experience. It's difficult to express enough thanks to Dr. Churchill's team, and also to CIHR, the sponsor of the Synapse Award, whose funding allowed me to create these memorable links within the University of Alberta.

With confidence I can say that my summer in the lab has topped any summer consisting of a beach and a bathing suit. It's no secret that my months off school have been more laborious than most, but I have faith that the program has already and will continue to give back. I am proud that I spent the majority of my vacation productively by preparing myself for the years ahead.

## Samantha Brown

Supervisor: Dr. Yongsheng Ma / Mechanical Engineering  
Sponsor: Syncrude Canada Ltd.

*“Walking through the NanoFab lab was extremely interesting and getting to see magnified bugs in a scanning-electron microscope was my favourite part.”*



I never would have thought that I would spend my summer working in a research lab, yet I did and I enjoyed every second of it. WISEST was able to give me a fun, educational, and interesting summer which is something I never would have had at home. Working in an environment like WISEST you get to meet so many people with the same interests and goals as yourself and it's just the most amazing thing to see how many people there are like you.

When I was first told I would be working in the Department of Mechanical Engineering I had no idea what that meant. I wasn't even sure what a mechanical engineer did. I soon found out that in my case it meant working on the computer learning how to use a program called NX and designing a product; I chose to do a badminton racket. Over the summer I learned that Mechanical Engineering can also mean so many other things from design to producing, to testing, or even sales. In my lab we focused on design on computers but in other labs we took tours of over the six weeks at the university, we got to see so much. This included machines that test the strength of objects, lasers, and a 3D printer which was one of the most amazing things I have ever seen.

We also got to go on tours of other departments as well as just in our own. Walking through the NanoFab lab was extremely interesting and getting to see magnified bugs in a scanning-electron microscope was my favourite part. Getting to go on a tour of the Syncrude Canada was also a great chance especially since they were my sponsors for the program and I couldn't be here without them. Letting us shake the bitumen free from oil sands was a lot of fun and made it so we actually had a hands on experience in the tour rather than just hearing about everything. Being from Fort McMurray, this tour gave me a great chance to really learn something about where I'm from and why it's the town it is.

We didn't only go on tours though, we also got to meet mentors and learn about what we should be doing for things such as our posters and reports. WISEST set up Lunch and Learn Sessions that prepared us for what we were supposed to do. These also gave us a chance to meet with the other WISEST students. Through these we got to meet Dr. Armour, who taught us the importance of networking, and we were taught the dos and don'ts of making posters and writing reports. Another WISEST session we got to attend was the Team Challenge on the first Friday in the program. We got to get in groups and work with robots to make them parallel park. It was one of the most entertaining and fun things I have ever done.

It has also changed me as a person. I have become more independent and because of the new environment and having to talk to and meet new people every day, I have become more outgoing as well. I met so many amazing people while living at the residence and even more while working in the lab. Without the help of my Principle Investigator, Dr. Ma, and the rest of the lab my experience wouldn't have been the same as it was and not nearly as enjoyable. My lab did include a lot of working alone though and that really needed me to be self-motivated and to stay on track. Due to that, I was able to grow more independent and it helped me to stop some of my bad habits of procrastinating.

Overall my time spent in the WISEST summer research program was amazing and if I could I would do it again.

## Shannon Hill

Supervisor: Dr. Tom Etsell / Chemical and Materials Engineering  
Sponsor: Total E&P Canada



*“One of the most valuable experiences WISEST offered everyone was the chance to explore other areas of research that differed from their own.”*

It would take more than a forest of trees to create enough paper to write down all I have learned in my six short weeks as a WISEST Summer Research Student. From valuable lab experience and learning about countless exciting career opportunities to making important connections and numerous new friends, WISEST has provided me with more than I ever thought possible.

This summer, the WISEST Summer Research Program gave me the opportunity to have an active role in Dr. Etsell's Chemical and Materials Engineering research lab. Under the supervision of my supervisors Mark Zazulak and Amir Reza Hanifi, I assisted with the fabrication and testing of fuel cells. The fuel cells being researched in the lab are third generation 'Porous Electrolyte-Supported' tubular solid oxide fuel cells (SOFCs) that use hydrogen as a fuel. This new generation of SOFC hopes to solve the redox cycling problems that previous fuel cell generations face. With previous generations, if the anode is exposed to air instead of fuel, the nickel in the anode will oxidize and expand. This breaks the fuel cell and renders it useless.

The first week I spent in the lab was a little intimidating. I was surrounded by people with many more years of study and education behind them than I had. Acronyms and scientific terminology passed over my head as if they were speaking a different language. However, my supervisors were more than understanding and if I ever tried their patience by constantly asking and repeating questions, they never showed it. I was guided through the entire procedure of fabricating a tubular ceramic SOFC – a task that I discovered is as much an art form as a science.

The learning curve in the lab was a very steep one. I had to learn about the research currently taking place as well as the lab's previous research in order to understand many of the choices researchers were making in regards to the fabrication of the current cells.

I quickly became accustomed to life in the lab and eagerly anticipated learning and performing a new step in the fabrication of fuel cells. Throughout this unique experience I learned to fabricate and test a fuel cell, limited only by my initial lack of confidence. In one case I spent almost a whole day practicing infiltrating the inside of a tubular support with nickel, the anode. I was taught to slip cast tubes, dip coat the tubes to apply thin layers of various mixtures that form the cell, infiltrate both the anode and the cathode and set up the cells for testing.

As well as fabricating my own fuel cells, I also helped with several other experiments. These involved testing different materials that could be used to make the thin porous supports and a new procedure for infiltrating the anode with nickel. These experiments only helped to strengthen my understanding of why my fuel cells were created the way they were and to understand that there is endless research to be conducted in this area.

One of the most valuable experiences WISEST offered everyone was the chance to explore other areas of research that differed from their own. These experiences were part of the professional development sessions held every Monday afternoon. They allowed the summer researchers to interact with one another, learn about other research and visit companies and areas of the university they would not otherwise have had the opportunity to see.

My WISEST experience could not have been possible without the generosity of my sponsor, Total E&P Canada. My supervisors and everyone in the fuel cell lab who were so friendly and informative throughout my stay in the lab definitely helped make my WISEST experience a beneficial, educational and unforgettable one. I would like to thank everyone who had a part in making this summer so great.



## Stephania Irwin

Supervisor: Dr. Fiona Bamforth / Laboratory Medicine and Pathology

Sponsor: 2011 Synapse Mentorship Award - Research Group

*"I learned how transferable skills are, and how many different paths can lead to the same job, and how many jobs can come from the same initial path."*



Possibly the most important decision people make in their lives is what they want to do when they grow up. WISEST is an excellent program for high school students to explore careers that they may never be exposed to because they are in a less-traditional field for one's gender. Through many different activities, I was exposed to numerous careers, role models, and hands-on experience in a particular field: Laboratory Medicine and Pathology.

I had the pleasure of working with Dr. Fiona Bamforth and Shaina Archer as a part of the Newborn Metabolic Screening Lab for Alberta, The Northwest Territories and Nunavut. Newborns are screened for 17 disorders, including biotinidase deficiency, the focus of my project. Biotinidase is an enzyme responsible for the production of biotin, a B-vitamin. Two types of testing are performed to identify deficiencies in biotinidase, a qualitative method, called a Biotinidase Screen (BTDSC), and a quantitative method, known as a Biotinidase Quantitation (BTDQ). Through my research, I was able to set an initial reference range for newborns under 30 days of age, using BTDQs, rather than using the adult reference range, which is higher and leads to false positive results. In addition, I improved sample storage regulations, by proving that the ranges of frozen samples and refrigerated samples are statistically significant. For the BTDSC, a new method that is semi-quantitative is currently in development, and I assisted in further developing the method.

One of the most valuable parts of the WISEST program was the Professional Development Seminars. We participated in tours of other laboratories on campus, as well as touring laboratories in a commercial environment. In particular, I enjoyed the tour of Afexa Life Sciences, a pharmaceutical company. The tour showed me a path I could choose to take in industry, in addition to the path of univer-

sity research. WISEST also had Lunch 'n' Learn Sessions every Friday, where we were able to have large question and answer sessions, learn about creating posters and writing reports, and socialize with fellow WISEST students.

Even though my research was focused on a very particular piece of a larger experiment, I was able to see how interdisciplinary research truly is. When analyzing the results of my testing, I used various statistical calculations and mathematical formulas to create comparisons and to draw conclusions. Working in a large laboratory in the Walter C. Mackenzie Health Sciences Centre allowed me to be exposed to numerous other research projects and job opportunities within a similar field. When we had the opportunity to explore other laboratories, I found that the same methods, instruments and techniques are applicable in many areas of research, whether it occurs in a university setting, or commercially. I learned how transferable skills are, and how many different paths can lead to the same job, and how many jobs can come from the same initial path.

I would like to express my gratitude towards the laboratory technicians within my lab, as well as Dr. Bamforth and Shaina for their time and patience. I feel incredibly privileged to have been able to have an impact on a program that is used every year on approximately 50,000 newborns. Science is best learned in a hands-on environment, and WISEST is certainly a hands-on program. I would also like to thank my sponsor, CIHR who sponsored the Synapse Award. Regardless of what discipline I choose to pursue in university, I feel that WISEST has better prepared me for university than any amount of preparation high school offers. The WISEST program is certainly something that I would recommend to anyone who is interested in pursuing science or engineering in university.

## Tanis Quaife

Supervisor: Dr. Jillian Buriak / Chemistry

Sponsor: Alberta Innovates - Technology Futures



*"I would like to acknowledge all of the people I worked with, because with their acceptance and support my whole summer experience has been elevated to another level."*

I first applied for the WISEST program hoping for a great summer research experience, but it gave me more than that. Through WISEST I was able to build my research integrity, and learn essential skills that I find myself continually using even now the summer is over. Orientation was a great and equitable representation of the days to come, though I didn't know it then, it effectively portrayed the hard work, learning, fun, and success that the rest of the summer promised.

It began with a bang, as I toured around the National Institute of Nanotechnology with Dr. Huck, seeing all of the amazing equipment that was hidden behind the concrete; AFM, SEM, Nanofab and more, all amazing places that offer so much to learn. We soon beveled into the world of nanoparticles, and chemical processes that yielded a single, desirable result; gold nano-stamps.

How do you make gold nano-stamps? I didn't have a clue in the beginning, but through patient explanation and demonstration, I soon began my trials and experiments, testing different ways to make these stamps. I spin coated silicon oxide squares with a chemical called block copolymer that patterned the surface with hexagonal dots, serving as a template to deposit gold salts. I then soaked the squares in a solution of gold salt, effectively binding the salts to selected areas. They then received a treatment of argon/hydrogen plasma in the plasma cleaner, in order to reduce the salts to gold zero. Now, here is where the experimentation began. We attempted leaving some organic matter on our samples to serve as a template for further growth in a gold growth solution. The growth solution enhanced the grip of the stamp material, PDMS, on the gold nanoparticles by increasing their size thus ensuring the perfect stamp. Through many attempts, we found that we could control their growth with the aid of some form of organic template. It was so exciting and inspiring developing a method to produce

something so valuable, yet so tiny!

Although it was daunting at first, with the guidance of my supervisor, the welcome of Professor Buriak, my research team, and the support of the WISEST team, I soon felt at home in the lab and a productive part of a family. I would like to acknowledge all of the people I worked with, because with their acceptance and support my whole summer experience has been elevated to another level. Even though sometimes it felt as though there were more failures than successes, I've learned as a researcher, there aren't any failures because you learn so much from every trial you run, and it all adds up to achieving your goal. Being a part of the WISEST really opened my eyes and enforced my belief that no occupation is off limits, no matter if it is unconventional or nontraditional. WISEST was more than just a learning experience, it was also incredibly fun discovery process jam packed with tours, from Syncryde to the Edmonton Research Station, which further exposed us to the possibilities.

Thank you to Alberta Innovates- Technology Futures for sponsoring me. Through WISEST I have learned to embrace every opportunity, even though something may not seem interesting at the time, it is guaranteed that there is a hidden treasure waiting to be uncovered, knowledge, experience; you might even find your passion in it. I went into WISEST hoping to narrow my career paths, but it has done the opposite. Through WISEST I was able to recognize the limitless potential for science in our lives, and all of the occupations applicable. Meeting so many influential people really reopened my eyes to topics I had previously dismissed, and I know that armed with both this new mentality and these new skills, I will be able to become whatever I want. WISEST let me do something incredible with my summer, I highly encourage any grade eleven student to take a leap of faith, and dive into this wonderful experience.

## Teela Strong

Supervisor: Dr. Eleni Stroulia / Computing Sciences

Sponsor: Eleni Stroulia, Ph.D.

*"My summer was made so much better thanks to the wonderful undergrads, the numerous lab personnel, the tours of the labs, the mentors, and the entire WISEST team ..."*



There really are no words to describe my WISEST experience, wonderful, memorable, brilliant, eye-opening, none of these come close. I had been reluctant to apply, but after spending a mere week working in my lab, I was thrilled for being accepted, I was overjoyed at the prospect of working here, and excited for all that was in store. I was placed in Computing Sciences, an area I had never previously considered as a career option and had very little experience in. Throughout the summer I learned numerous computer techniques, languages and lingo, some quickly, others slowly. This summer has merely scratched the surface of the vast amount of knowledge there is to be gained in computing sciences and although I learned a great deal, I will not stop learning at the end of this program.

The WISEST Summer Research Program has not only piqued my interest, but also opened many doors and shown me numerous paths to which I can satisfy my curiosity and delve deeper into the world of science, engineering and technology. Throughout the summer I worked on numerous projects, all linking to the research group's project. I worked alongside two HIP (high school internship program) students, and we all had experience in different areas of computing science. This worked quite well when working on the projects because we were able to exchange knowledge amongst ourselves and experiment with different programs to gain a clearer understanding of just how much information computing sciences encompasses.

I spent the first couple weeks creating a virtual model of the North Campus, using a program called Hippo OpenSim viewer, a program much like SecondLife, except private only to those with whom we grant access. To create the virtual campus, I learned how to work with OpenSim, and GIMP 2 (an editing program, much like photoshop) thanks to Matt Delaney, my direct supervisor. I also worked

with the fAR-Play (for Augmented Reality - Play) website. The HIP students and I were testing for bugs, and trying to learn how to fix them, which required knowledge of HTML, CSS, and PHP, three programming languages that I didn't know prior to working this summer. Learning all three is a work in progress, however with the help of Matt and the two HIP students, I learned enough to be able to fix minor errors in the coding of the fAR-Play website. With most of the largest, most important errors fixed, we ran trials, guiding the summer camp students through our "Campus Mysteries" scavenger hunt game based on finding a QR tag (like a barcode) in different buildings, scanning it with a smart phone, and answering a question to complete challenges.

The entire summer research program has been such a unique and amazing opportunity, one I will never forget. The experience opened my eyes to so many new career opportunities daily through the tours and speaking with campus personnel in my lab. I met some great undergraduate students who were truly amazing, and through them I learned about university life, and life in general after high school. The friends I made this summer and the unique footprint they left will last a lifetime. My summer was made so much better thanks to the wonderful undergrads, the numerous lab personnel, the tours of the labs, the mentors, and the entire WISEST team making all the effort to make me feel welcome.

I am immensely grateful to Dr. Eleni Stroulia for without her funding, my WISEST experience would never have been possible. I thank my research team for making me feel so welcome, really like one of the team, and for teaching me everything I could possibly learn in these 6 short weeks. Also, thanks to Catherine, Kerry, and the entire WISEST group, past and present, for creating such a wonderful program and for making my summer of 2011 one to never forget.

# Victoria Hessdorfer

Supervisor: Dr. Ian Mann / Physics

Sponsor: Alberta Innovates - Technology Futures



*“My research throughout the program put me in a position where I was constantly learning new information and encountering different forms of data, and it was an amazing experience.”*

“Space Physics? So, you’re just going to be looking through a telescope all summer?” This was the most common question I received whenever I tried to explain to friends and family what I would be doing this summer. I usually tried to tell them that I was working on a computer and not at a telescope, but I was basically as clueless as they were about what the WISEST program would involve. Though I was right about not having to use a telescope, I would never be able to predict the amount of new people I’d meet, and everything I’d learn over the course of six weeks. So, when I arrived at orientation, I was completely clueless.

After the opening remarks and icebreaker games, I was introduced to the “who”, “what” and “where’s” of my summer. I would be working in the beautiful new CCIS building, under the supervision of Dr. Ian Mann and Jonathan Rae. My job would comprise of looking through three years All-Sky Imager data (photos of the aurora borealis taken by 180 degree cameras placed in remote locations all around Canada) for a few different types of specific auroral activity in the night sky. Throughout the summer we researched how the auroral signatures of these phenomena (named streamers, substorms and field line resonances) corresponded with the processes in the Earth’s Magnetosphere. After sufficient amounts of data were collected, we compared our data with that of the UCLA Space Physics Department, who were doing a similar study, to see if our data corresponded with their hypothesis. My research throughout the program put me in a position where I was constantly learning new information and encountering different forms of data, and it was an amazing experience.

The job itself required a lot of new knowledge on my part: information and theories on the workings of the Earth’s Magnetosphere, how to use the programming language IDL to

compare different types of data, and the most difficult of all, dealing with the battlefield that is Excel spreadsheets. Apart from work, I also had the chance to attend tons of different seminars and tours of campus labs. One particular seminar given by Dr. Margaret Ann-Armour was particularly interesting. Dr. Armour is the vice president of the Department of Chemistry, a position she’s held for 21 years, and has been inducted into the Order of Canada. During her speech, she recounted her life story to us, and her belief that life has a way of exceeding your expectations if you give it a chance to do so. Dr. Armour also emphasized how important it is to explore different career options, as to give yourself the chance to find something you’re truly passionate about. Her speech was one of the most inspiring and informative of the summer, and I am very thankful to have been able to hear it. By the end of the program, I had a great deal of knowledge of everything from Magnetospheres to Auroral Composition to the basics of making a scientific research poster, so still being unable to use Excel didn’t seem that bad anymore.

This summer by far exceeded all of my expectations. Before I applied, I’d have imagined myself working my boring minimum wage job all summer, and instead I received an amazing opportunity to spend my summer doing something I really love. I’d like to thank Alberta Innovates - Technology Futures for sponsoring me, CARISMA and THEMIS for their All-Sky Imager and Magnetometer data, Dr. Ian Mann and Jonathan Rae for helping and guiding me through the research, and WISEST, for giving me this opportunity in the first place.



# MAKE THE WISEST CHOICE

## Empower women in science, engineering and technology

*Help us encourage women 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)

