

WISEST

women in scholarship, engineering, science & technology

JOURNAL OF STUDENT RESEARCH 2013





women in scholarship, engineering, science & technology

WISEST

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Our **VISION**

*To strengthen science,
engineering and technology
communities through diversity.*

Our **MISSION**

*To promote the participation
of underrepresented groups
in science, engineering and
technology through education,
outreach and mentorship.*



SUMMER RESEARCH PROGRAM 2013



The WISEST Summer Research Program is a six-week paid experience for young women and men who have completed grade 11 to gain first-hand information about diverse science and engineering disciplines. It is an exceptional opportunity for the students to learn about trail-blazing research, participate in current investigations, meet incredible people and broaden their horizons. The young women experience research in science, engineering and technology, fields of study that are currently experiencing an underrepresentation of women. The program also creates positions for young men in science fields that have fewer males, such as nursing and nutrition.



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WISEST ENCOURAGES DIVERSITY

In 1982, WISEST was created by the University of Alberta to find the reasons why so few women were choosing careers in engineering and science and then to 'do' something to change that. In 2013, our renewed vision is to strengthen science, engineering and technology communities through diversity.

We offer programs and networks that are designed to provide opportunities and hands-on experiences that promote and nurture interest in careers that are currently experiencing an underrepresentation of women.

Community outreach events hosted by WISEST are dedicated to building a stronger, more diverse workforce in science, engineering and technology.

WISEST initiatives are funded through donations from corporations, individuals and the public sector.

Choices – a fabulous day of science, engineering & technology activities for 600 Grade 6 girls and their teachers.

SET – a one day Science, Engineering & Technology conference that provides young women in grades 10-12 with the opportunity to engage in hands-on experiences and learn more about careers and studies in the SET fields.

Summer Research Program – a once-in-a-lifetime six-week paid research work experience for young men and women in Grade 11. This unique program allows students to be actual researchers in fields such as science, engineering, nutrition and nursing.

Meet-a-Mentor – videoconferenced experiments presented by researchers in science, engineering and technology.

Tales from the Science Buffalo – a series of interactive and hands-on classroom presentations that honour

Aboriginal Ways of Knowing and introduce careers in the sciences.

UA-WiSE Network – a learning and support group for undergraduate women in the fields of science and engineering.

WISER Network – connects early-career women in STEM fields with one other and with the information, resources, support, and professional development opportunities they require to advance in their careers.

WISEST Annual Guest Lectureship – raises awareness of the importance and value of diverse voices being heard in all areas of science, engineering, and technology.

WISEST Annual Golf Tournament – an important fund-raising event to support WISEST in the promotion of diversity in the fields of science, technology and engineering.

For more information about WISEST initiatives and future directions, please visit www.wisest.ualberta.ca



WISEST was created by the University of Alberta to find the reasons why so few women were choosing careers in engineering and science and then to 'do' something to change that.

THE WISEST COMMUNITY

The WISEST Team would like to extend its sincere appreciation to the many, many thoughtful, dedicated people who make this remarkable WISEST Summer Research Program possible for the students. Thank you all for your amazing work!

We are grateful for the support given by high-school teachers throughout Alberta for publicizing information about WISEST programs. Teachers spark the students' interest and enthusiasm to see themselves one day working or studying in the science, engineering or technology fields.

Throughout the program, it is the University of Alberta faculty and their research team members who volunteer to guide, inspire and teach the WISEST students in the research setting. We are immensely thankful for the commitment of the university's research community to the success of the students' experiences in the program.

The weekly learning sessions that broaden the students' awareness of possibilities in diverse fields are made possible with the support of volunteers from many sectors.

Throughout the program, community people share their experiences and wisdom with students, give tours of research facilities, teach students how to create research posters, give tips on to make effective

“Volunteers are the backbone of WISEST and the key to the success of our programs.”

presentations, and above all, build the students' confidence to succeed in the science, engineering and technology fields. Volunteers are the backbone of WISEST and the key to the success of our programs.

Once WISEST has the high-school

students and the in-kind support of hundreds of volunteers in place, we need the financial support of the broader community. It is important to acknowledge the financial commitment given by local industries, philanthropic groups, the Provincial and Federal governments, and the University of Alberta. We simply could not present the WISEST Summer Research Program without their financial support.

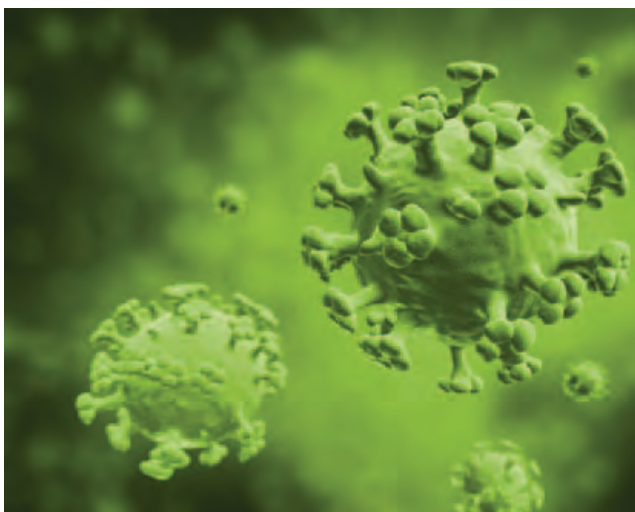
Everyone's commitment to the Summer Research Program means so much to WISEST but even more to the students we interact with through our inspirational programs.

Thank you from the WISEST Team.



L to R: Jen Duffy, Brittany Lissinna, Grace Ennis, Denise Hemmings, Kristy Burke

WISEST 2013 PARTNERS AND CONTRIBUTORS



Alberta Education

Allard Foundation

Alberta Innovates: Health Solutions

Dow Chemical Company

Edmonton Area Council - Beta Sigma Phi

Edmonton Glenora Rotary Club

The GlaxoSmithKline Foundation

Nexen

NSERC PromoScience

Process Solutions Canada

Syncrude Canada Ltd.

University of Alberta

- Dept. Computing Sciences, Dr. Eleni Stroulia
- Faculty of Agricultural, Life and Environmental Sciences
- Faculty of Engineering
- Faculty of Medicine and Dentistry
- Faculty of Science

Weyerhaeuser

WISEST Golf Tournament

WISEST Guest Lectureship in honour of Dr. Elizabeth Croft, P.Eng.,
Professor and NSERC Chair, University of British Columbia

Contributors

New Paradigm Engineering Ltd.

St. John's Institute

PROFESSIONAL DEVELOPMENT

Weekly seminars help WISEST students develop important leadership skills and gain insight into diverse career and academic opportunities.

LEADERSHIP IN THE WORKPLACE

By Ripple Patel

In our first Professional Development Seminar WISEST students learned from the wise words of Ms. Nicole Baker. She was a WISEST Summer Research Program student in 2009, participating in Environmental Engineering and continued her passion for the field in the Faculty of Science at the University of Alberta. Ms. Baker encouraged students to focus on skills beyond basic reading and algebra; principal personalities which impress employers with traits not possessed by common individuals.

Through her PowerPoint presentation, the guest speaker explained that these traits associated with leaders consisted of drive, desire to lead, honesty, self confidence, intelligence, job relevant knowledge and extraversion. One of the ideas that really motivated me was that everyone has a really important part to play in the workplace, no role is considered insignificant as one could not really reach the top without climbing the several small stairs. Other significant ideas stressed upon

were enthusiasm, courage, determination, networking, critical thinking and resilience. Positivity is the first step to developing these traits which would not only allow one to enjoy their time at WISEST but also seek appreciation. Ms. Baker explained

the students better understand the moral of her talk and feel comfortable relating to her and trusting her words.

I think WISEST's goal to provide the students with leadership sessions is an important message. I am thankful for the

“Traits associated with leaders consisted of drive, desire to lead, honesty, self-confidence, intelligence, job relevant knowledge and extraversion.”

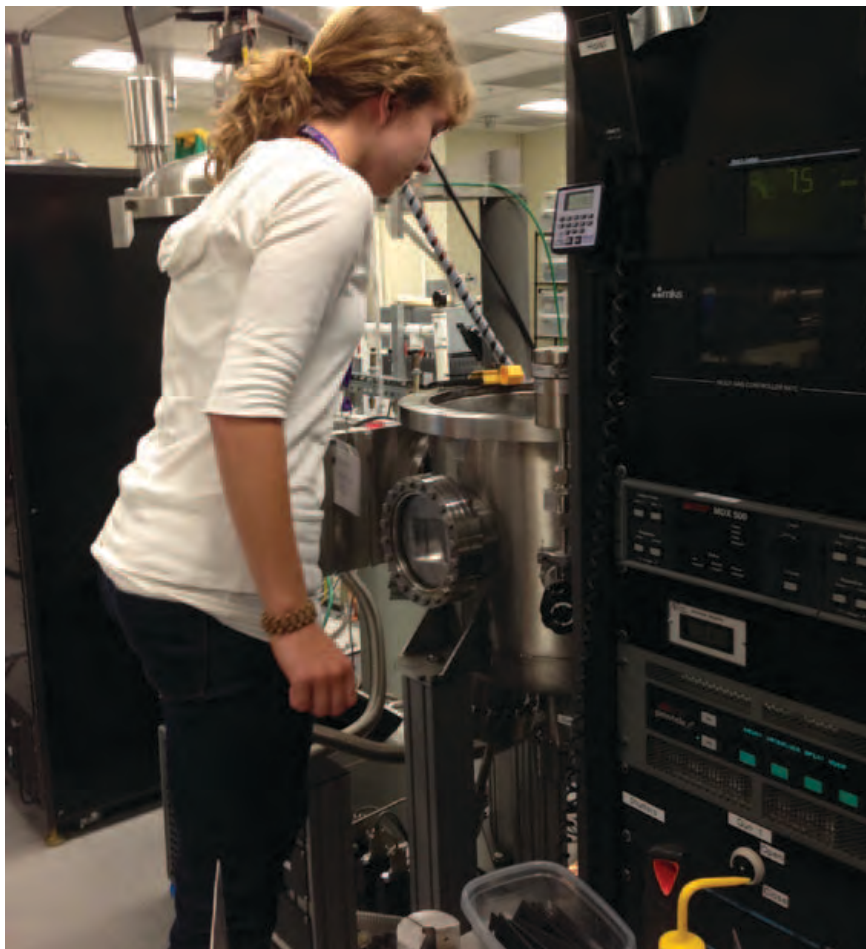
the difference between praise, criticism and feedback and questioned us on their appropriate usage and urged us to not be intimidated by certain comments but to take them and use them for personal improvement.

Apart from the PowerPoint, Ms. Baker's use of personal connection via her experiences at WISEST and her jobs helped

support I have received from this session in regards to personality building and pursuing a successful career.



RESEARCH IN ACTION: **QUANTIAM TECHNOLOGIES INC.**



By Emilee Anderson

The field of nanotechnology and research into what nanotechnology is capable of is a rapidly growing area. I didn't realize how popular nanotechnology is until I went on the tour of Quantiam Technologies Inc. I also didn't know much about what nanotechnology entailed (other than it being work with "small stuff") until I had participated in the tour. I think that for many of my fellow summer researchers who went on the tour, this was also the case. By the end of this tour, though, I feel we all had a better understanding of the field of nanotechnology and opportunities within it as well as what the role of different people within Quantiam is and how everyone is important and every job worthwhile.

Our tour started with a power-point presentation. We learned that Quantiam had recently been recognized as one of the top 25 most innovative companies in Alberta

for their work in their field. At Quantiam they do a fair amount of research and development of new technologies and applications of nanotechnologies along with

“The tour of Quantiam was a beneficial experience that allowed ...summer researchers to see further into an area of science we knew very little about.”

the production of nano-coatings. Currently, their main business is the catalytic coating of pipes to prevent buildup of particles

within the pipe. The four areas that Quantiam focuses on are petrochemicals, oil and gas, aerospace and defense, and future innovations. We learned that Quantiam employs people with backgrounds in materials and mechanical engineering and science, as well as people with chemical backgrounds. The employees of Quantiam have differing levels of education and all work together to help achieve Quantiam's high standards for performance and innovation.

Once we had background knowledge of the company, we were toured around the building and had different equipment explained to us. My favourite device was the scanning electron microscope (SEM). We learned that it can indicate differences in elemental composition, as well as show hills and valleys in the material being studied; something I didn't know about SEM's is that they can also produce a spectrum from the sample, which can then be used to identify what it is comprised of. We also saw lasers that are used to identify how an entity is bonded. The woman giving the tour showed us furnaces – which can reach temperatures above 1000 degrees Celsius – in which they can manipulate metals to their liking. It was interesting and enlightening to see what a job in the field of nanotechnology could involve.

At the end of the tour we had time to ask questions of the different women who had been involved in the tour. I found this time valuable as it gave me a chance to further discover what ending up with a career in nano-sciences could look like. The tour of Quantiam was a beneficial experience that allowed myself and the other summer researchers to see further into an area of science we knew very little about. Having done the tour of Quantiam Technologies Inc., I now have a better idea of a possibility for my future and I better appreciate the science behind nanotechnologies. Thank you to Quantiam Technologies for allowing us to tour their facility and explore a different area of science.

RESEARCH IN ACTION: **SYNCRUDE CANADA**

By Abbey Peterson

The WISEST Summer Research Program consists of many great experiences and learning opportunities. One that stood out for me was the industry tour of Syncrude Canada. This tour provided a great chance for us to see many diverse careers options and the inner happenings of a large oil company. For me, this tour really hit home, as I am pretty much convinced that I want to work at Syncrude when I finish school. The people who work there as well as all of the things going on were all very interesting and fun to learn about.

At the Syncrude Research Facility, we met a group of women role models, as well as two men, who told us their stories of success. They told us all about their educations and what they do on a day-to-day basis, all with great enthusiasm. They told us about the projects they are currently working on, some of which we were able to see later on, as well as some they've worked on in the past. We also learned about their contributions to Syncrude's efforts in keeping the planet clean. It was very nice to meet a group of people so knowledgeable and passionate about their careers.

Outfitted with hard-hats and safety goggles, we toured through the Syncrude Research Facility. In a large, high-ceilinged room were the large-scale models of Syncrude's latest experiments. The pilot projects in this room had already passed the small and medium scale tests, and if they passed this step they would be made into full-scale, multi-acre operations. Next, we toured the smaller labs, where other pilot projects were still in the first stages of testing, at a much smaller scale. We saw and learned about spectrometers, scanning electron microscopes, distillation mechanisms, and many other neat pieces



of equipment. Throughout the tour we were told about the co-op program, oil pipe corrosion, and Syncrude's efforts to minimize the environmental impact of tailings ponds and other operations. We were introduced to many of the employees in the labs we toured, as well as a few co-op students from the University of Alberta. The last place our tour brought us was a fish tank where three fish that had lived happily and healthily for three years in

water that Syncrude had used and treated. Then we returned to the Alberta Room where we received Syncrude brochures and our own little bags of oil sand.

This tour, along with all of the other aspects of our visit to Syncrude, was a real eye-opener. Before this, I thought oil companies employed pipeliners and rig workers, but now I know they employ so many other people in so many other areas. Who knew places like Syncrude employ environmental scientists, and people who use scanning electron microscopes? You'd think it'd be obvious, but you never really see things like this until you take a closer look. I can only hope that I find a career path and a career that I love as much as these people do, or a place to work that treats me as well. This tour inspired me, as I believe it did for many of the other WISEST students.

“Who knew places like Syncrude employ environmental scientists, and people who use scanning electron microscopes?”

NETWORKING FAIR: **THE IMPORTANCE OF MENTORS**

By Disha Patel

Just about everyone in the world has put an extreme amount of pressure on themselves and thought that it will be too difficult for them to live their dreams. However, mentors are there to say ‘Look, it’s not tough and it’s not as hard as you think. Here are some guidelines that I have gone through to get to where I am in my career today’. Mentors are extremely important to have in one’s life; they have trust and faith in you even when you don’t. They guide you through the difficulties and they teach you based on their past experiences. The Networking Fair held for WISEST Summer Research Students reflected a similar scenario, where a group of mentors from various fields, where women are under-represented came together with the WISEST Research students to share their experiences and lessons.

The Fair started off with a presentation from Mrs. Jessica Vandenberghe, Director of Outreach and Product Services at APEGA. She gave three important pieces of advice that are key to becoming successful: the importance of having support, confidence, and acceptance. The students were then introduced to the mentors through an ice breaker.

This taught us how important it is to be able to start a conversation. The ice breaker was an amazing opportunity for us to learn a bit about the mentors’ experiences.

Through our small group discussions, we learnt that life is not a linear, one way path; but rather one with many turns and pathways. The fact is that 2 of 4 people change career paths before they even

“a group of mentors from various fields where women are underrepresented ... shared their experiences and lessons.”

graduate from university. They encouraged our confidence and explained to us that at often times, it is okay to be puzzled. The most important lessons were given by the mentors when they were asked: ‘If you could go back to high school, what

would you want to know before beginning university?’ various answers came up. Many of which included, a gain in confidence, having stronger backgrounds, improved communication skills, better time management skills and most importantly getting to know yourself.

The mentors shared that it was important to have a balance between professional and personal lives, however, many women still struggle with it today either due to their own personal habits or through the structure of the workplace. Improvements would include having set a certain amount of hours for work (setting boundaries), taking no work home and making commitments. We also got the opportunity to ask questions during the discussions. Many of which were: What do you think are the assets for going through university? How difficult was it to be a part of the field where there is an under-representation of women? What to you is the perfect workplace?

I would like to, on behalf of all the WISEST Summer Research Participants, give the mentors as well as Mrs. Jessica Vandenberghe a huge thank you for being a part of WISEST.



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

By Mercedes Liddicoat

During the WISEST Exploring U of A Research Tours, a group of WISEST students was fortunate enough to be able to take part in a tour of the U of A Observatory. This tour was an out-of-this-world experience! Right as we entered the observatory, we immediately delved into a presentation that gave us a brief introduction to the vast theories of astrophysics. It focused on the formation of neutron stars and the ideas behind black holes. Some physics concepts taught in High School were mentioned in the presentation, so it was a refreshing outlook on how the things learned in school can be expanded on and applied to modern-day research. After the presentation, we broke off into two different groups; one group went outside to see the telescopes and the others stayed in the lab to view the meteorites.

The three telescopes were stationed high above the campus, perfect for the solar observing we would have been able to do if it has been sunny. Each telescope was unique, with the strength of the telescope depending on the diameter of the mirror inside it. We were taught the basics on how to use the finder on the side of the telescope to locate the exact star you're looking for. In fact, the finder on the oldest telescope came from the scope of an army tank! Different research was being conducted using each telescope. One project involved monitoring the brightness of stars, because if one were to dim it could suggest that a planet had passed in front of it. The two groups then switched locations and those who were outside got to take a look at the collection of meteorites the university had. Included in the collection was what they called "meteorwrongs." That assortment included peculiar rocks that were mistaken to be meteors. We were taught to distinguish the difference between a space and earth rock by testing its magnetism and simply weighing them. One could easily feel the astronomical difference between the mass of a meteorite and normal rock. Meteorites are typically heavier and attract magnets more readily due to their high iron content as compared to the average meteorwrong.

Overall, it was an enthralling tour and I



“I am thankful to the volunteers at the Observatory for taking the time to organize the tour and welcome us into their lab.”

am very thankful to the volunteers at the Observatory for taking the time to organize the tour and welcome us into their lab. The lucky WISEST students who took part in

this tour gained a wealth of knowledge and interesting facts, which we will surely carry on with us beyond the Summer Research Program!

EXPLORING U OF A RESEARCH: **BIOLOGY GREENHOUSE TOUR**



By Maryam Osman

While studying the Advanced Placement Biology Program in school, a lot of time was devoted to Plant Biology, including many of the different species that exist in the world we live in. I always enjoyed the days where we would spend extra time talking about the different characteristics and distinguishing features. This summer, a group of WISEST students including myself had the opportunity to participate in the Biology Greenhouse tour, and since then it has expanded my knowledge of plant biology in ways I couldn't have imagined.

Our group was lead into the Biological Sciences building where the many displays in the lobby caught my eye. We were quite astonished upon discovering the great diversity in the field of Biology; the entire 6th floor was one massive greenhouse- larger than any greenhouse I had ever been to in my lifetime.

An adventure lay behind each door as our tour guide explained the many different plants and research that goes on in botany. We were able to see plants only mentioned in textbooks like the sensitive plant; a plant whose leaves fold in when

touched as a defense mechanism. We also saw many plants that bear fruit; from papaya to pineapple and even a plant whose leaves are used to make cough drops. Our deepest appreciation surfaced when we learned about a special plant used to treat children with leukemia, and strengthened our intentions to preserve the natural vegetation of our planet.

Out of all the incredible plants we observed, the world's smallest visible flowering plant ranked very high on the list. It was a great treat for the group, we were mesmerized at its tiny size and fascinated by its beauty all at the same time. After the greenhouse portion, we headed down a secret spiral staircase down into the research area to the growth chambers where variables like temperature and light could be altered to meet the environmental condition of the plants inside. We got a glimpse of the type of research that is studied like certain insects' behavior towards a plant in different climate conditions and time of day. We also learned about the many different programs and degrees offered in the Department of Biological Sciences, as well as the variety of

careers available.

This tour has helped me understand the complexity of our environment and how much our lives depend and have been facilitated by the existence of plants. I have been very honoured to have been a part of this research tour and know that the other

“...students were equally impressed with the range of research work being conducted on campus.”

students who participated in this and other tours were equally impressed with the range of research work being conducted on campus. We are very grateful to the research teams for volunteering their time and opening up their labs. This was a great afternoon spent further exploring science, engineering and technology.

EXPLORING U OF A RESEARCH: **MECHANICAL ENGINEERING TOUR**

By Ripple Patel

A quote by Santosh Kalwar which I strongly believe in is, "Experience is more important than knowledge." WISEST could just organize a lecture to explain what each engineering faculty focuses on; however, it made it possible for us to physically go and look around and see the work in action. Therefore WISEST students got to explore different fields of work.

The Summer Research students were given a chance to experience fields of study different from their own and interact

career options related with mechanical engineering after which she introduced us to some of her students. One of the graduate students presented his idea of a prostate from the human tetanus bone. He even created a 3D model of his design and passed it on for us to have a detailed look at. Another student explained her work with scoliosis and the method she recommended for an effective open surgery. It was amazing to realize the different perspectives one might have to consider when working on an engineering

idea of improving the nervous system with prosthetic limbs. The passionate graduate student explained how when a person's limb is amputated, the nerve endings in the limb could be attached to the upper arm or leg and upon touching that region, the patient would say, "Hey you are tickling my pinky!" With the nerve endings still present in the body, it is possible to connect them to the prosthetic limb and give the patient more control over the prosthetic. We then learned about software that was being created to allow physiologists to determine how much pressure is needed to be applied to a body part and how much pressure that they are applying.

The last project was about testing different fibres and the pattern to knit the threads in order to get a stronger material. In the main lab we saw the machine which knits the threads together and we learned how the 3D printing machine works.

Overall, the passion and interest of the mechanical engineering students regarding their projects was enough to inspire me to consider mechanical engineering as a possible career route. The idea of creating something which could help mankind and the society progress made me feel proud to have considered engineering for my future.

"students were given a chance to experience fields of study different from their own..."

with researchers passionate about those respective fields. There were a number of different engineering fields the students explored ranging from nanotechnology, computing sciences, structural designs, etc. I got the opportunity to join the mechanical engineers.

We met with a professor from the mechanical engineering department who encouraged us to explore the different

project used to better someone else's life. One of the things I had not considered earlier was the need to have the chest and abdomen areas of the seat positioned higher so that when a patient is sleeping on his or her chest side during surgery, the spinal part would wilt down and prevent internal bleeding.

The next project was the coolest thing that I was told about till date. It was the



EXPLORING DIVERSE CAREERS: **WOMEN IN TECHNOLOGY**



By Sarah Yemane

The WISEST participants got the amazing opportunity to attend a seminar presented by women working in BioWare, a Canadian video game developer that was founded in February 1995 by three doctors from the University of Alberta.

When playing a video game, little thought ever goes into how much time, effort, and sheer hard work goes into developing it. All we think about is how to win, how to upgrade, or proceed into the next level. The women working in BioWare gave us a general understanding of what needs to be considered and done when making or planning a video game. They were able to show us all the work and preparation needed for the game to be made possible. Even the simplest game requires a great deal of planning.

We were given the opportunity to see what goes into making these games fun, exciting, and most importantly, what makes the game possible. We saw that these companies have numerous different kinds of programmers, level designers, and writers; all of whom play a large role in game making. The three women from BioWare were responsible for different aspects of game design. They explained to us exactly

what their contributions in the creation of the games are and shared with us with the educational paths they took to get to where they are today.

Prior to this seminar, I always thought that the criteria for any type of computer programming would include having to take all math and science courses. Now, I see that companies or programs such as BioWare need people with diverse educations. They

“The Women in Technology seminar broadened our outlook on the career paths that we can take.”

require people with qualifications in music, to program the audio for the video game; people with art backgrounds, to design the different characters and provide the aesthetics of the game; and people with English or writing skills, to incorporate the text and the ideas required in the videogame. This showed that there is not one specific

pathway into the making of technological programs such as BioWare, but the collective effort of several professions. While being educational and insightful, the Women in Technology Seminar was entertaining. The women provided understandable illustrations and gave examples in their explanations by showing us firsthand how to play their latest successful game, MASS EFFECT 3. The game was action-based, looked like heaps of fun and something to check out in our free time! One person was a writer for the game. She displayed a complex and intricate template used to program the text of the videogame. I have always wondered how that worked, how the game knew what to say or do according to your reaction or answer to a question or option given etc... And now I know!

The talented women gave us a new perspective on technology and the amount of work and collaboration it takes to create games that the generations of today engage in on a daily basis. Along with other seminars that WISEST has made it possible for us to attend, the Women in Technology seminar broadened our outlook on the career paths that we can take. It provided us with a knowledge that we can take into all our future endeavors.



MAKE THE WISEST CHOICE

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

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

WISEST in numbers:

14,000

grade 6 girls have attended the Choices Conference and discovered science is cool, relevant, and interesting

1,373

high school students have had paid, invaluable, work experience through the Summer Research Program

2,926

girls have learned more about careers in sciences, technology and engineering through the SET Conference

WISEST encourages diversity and you can help!

Bring your passion to the coming generation! Volunteer as role models in networking fairs for high-school students. Offer tours of your industry. Host an information booth at a WISEST Network industry fair.

Play 18 holes! Sign up a team of golfers for the Annual WISEST Golf Tournament. Take part in fun science activities and enjoy a friendly round of golf, supporting WISEST through your sporting participation.

Lend your support to this reputable, proven venture! Join leading corporations, foundations and research institutes in sponsoring WISEST programs and networking events.

Making the WISEST Choice makes good business sense. It benefits your industry, energizes your employees and strengthens us all in achieving successful diversity.

Donate


If you would like to make a tax deductible gift in support of WISEST, please contact us.



Contact WISEST at **(780) 492-1842**
By email at **wisest.ualberta.ca**
Donate on-line at **www.wisest.ualberta.ca**

Check out the WISEST website
www.wisest.ualberta.ca

STUDENT OPPORTUNITIES

An abstract background featuring a spectrum of colors (green, blue, purple, orange) with light rays and geometric shapes, possibly representing student growth or research.

WISEST students develop their leadership and academic skills in weekly Lunch 'n Learn sessions.

ORIENTATION TO THE **SUMMER RESEARCH PROGRAM**

By Delia Cormier

Excitement and nervousness flittered inside me as I approached the immense ETLC building. It was the first day, the beginning of an unknown journey, but it was not long before I felt comfortable to talk and socialize with the other summer research program students. After all, we were young high school students brought together by a similar interest and curiosity.

Kristy, the Assistant Coordinator, and Brittany, the Student Coordinator of WISEST led us through brilliant games that got the entire room smiling, laughing and engaged in chatter. That was when the official presentations started; WISEST Chair, Denise Hemmings started off with the question: “Why are you here?” I automatically thought; that’s a good question; one that could be answered in ways as diverse as the people sitting in this room. Many students responded saying that they wished to find out about a particular field in science and engineering to see if they liked that kind of research. Others like myself had never considered the research field they were about to be a part of, but were ready and willing to find out.

The next speaker was the kind hearted Dr. Margaret-Ann Armour, a practiced chemist and educator. Joy emanated from her as she spoke from experience and wisdom about the under-represented fields of men and women in the sciences. She asked us to think about what we wanted to have in the workplace when we grew up and achieved our careers. Slowly students started mentioning ideas like integrity, or maternity leave. I did not think maternity leave was related to the topic of science

and engineering, but Dr. Armour had a way of seeing how everything connected and expertly communicating it. After listening to her heart-moving discussion I felt a deeper appreciation for the efforts of WISEST and those who work to encourage gender diversity. I had not realized how much gender inequality existed in these fields. What was wrong with pursuing what you loved? It seems that society’s pre-judged expectations are still as prominent as in the past, a reason why Dr. Armour strongly believes in “dreaming the future”, as dreams seem far off and distant but have great potential. She concluded by emphasizing importance of listening to others no matter how much you disagree; being unified would help us to build a better society and ultimately a better world.

Just before the lunch hour, we were

sent on a scavenger hunt for buildings, landmarks and artifacts located all over North Campus. It was a confusing but adventurous way of getting familiarized with my surroundings. My group was moving swiftly and I tried to take in as much as I could while trying to follow the map. After lunch, it was time to meet our Principal Investigators and Direct Supervisors. Adopting my formal composure once more, I strode to the sign on the far wall with my PI’s name on it noticing that the signs spanned half of the Solarium. I wasn’t sure of what awaited me or what my research project would entail, but no matter what it turned out to be I knew that a good attitude would bring about the best results.



“WISEST Chair, Denise Hemmings started off with the question: ‘Why are you here?’”

SOCIAL SCIENCE CHALLENGE



by Hannah Zhang

Having only been in the program for three days, no one really knew what to expect at the first group activity: the Social Science Challenge. Various materials spread out on tables at the front only served to further pique our interest; what were we going to have to create?

It turned out that our challenge involved hydraulics! Divided up into teams of four, our mission was to create a crane using a system of hydraulics – two syringes connected by tubing and filled with water so that they can be pushed and pulled for movement – that would be capable of lifting an empty Styrofoam cup. In addition to the hydraulics syringes, other materials that were available included cardboard, tape, and fasteners – simple items that weren't very sturdy and so added to the difficulty of the task. We were also provided with a template to use as a guide, but it was also quite basic. Materials in hand after grabbing a bit of everything, we set off to plan and design our cranes, and try to make them our own.

The hydraulics challenge was an exciting way to get everyone collaborating in their teams; very soon after finding our groups, we had introduced ourselves and began

sharing our ideas. Everyone contributed their thoughts, and as we listened to each other's suggestions, we built off of the various ideas to come up with how our crane would stand and move. It was an excellent team-building experience, because everyone really came together to problem-solve and had fun while doing so. Many times along the way, we tested out ideas but then wanted to modify them; this was helpful (albeit frustrating at times!) because it meant we continually improved our structure as we worked. As a team, we worked through the struggles and celebrated each time we made progress. Slowly but surely, our cranes came together, better models than any that we could have come up with by ourselves.

Although, due to time constraints, some groups weren't able to finish the cranes in time to test them out, it was the process rather than the product that counted. Everyone agreed that it was a true Social Science Challenge: "social" in the team communication, "science" in the physics behind hydraulics, and a definite tough challenge! We had lots of fun while we worked and were able to gain insight into the ways in which hydraulics systems may be used. Also, taking a look at other

teams' designs near the end, we were able to examine the different approaches other groups had to the task. Most of all, we all enjoyed getting to know each other a little

"... the activity was a great icebreaker and paved the way to many lasting friendships throughout the program."

better; the activity was a great icebreaker and paved the way to many lasting friendships throughout the program. All in all, the Social Science Challenge was a wonderful way to end the first week of WISEST, combining pressure and teamwork into one fantastic afternoon that offered just a glance into the amazing summer that was to come.

UNIVERSITY OF ALBERTA Q&A



By Monica Takla

The sheer vastness of the institution can be intimidating when looking towards University. Therefore, it is always a good idea to meet with people who were in this situation previously. People who know what it is like to be finishing high school and coming face to face with some of the biggest decisions we will ever make. So, because WISEST knows what it is like to close one chapter of our lives and open another that is exactly what they did for us.

To kick off the Friday Lunch 'n' Learn

sessions, WISEST brought in a number of volunteers willing to answer the wealth of questions presented to them. High school teenagers have a lot of questions when it comes to university. Starting off, it was nice to have the Campus Ambassadors debunk common misconceptions of university life. Breaking into small groups, students then asked specific questions that weighed on their minds.

The volunteers came from a wide range of fields such as different disciplines of engineering, biological sciences, chemistry

and physics. Questions regarding AP and IB grades were answered as well as the different entrance requirements for various programs. It was interesting to note that within Sciences, there are even more choices. For example, Honors Programs and Specialized Programs depending on the branch of Science one was interested in. Information regarding the extra courses required if one chooses one program versus another one was particularly helpful.

Tuition was another source of discussion. We learned many people do not take advantage of scholarships, which are a great aid money-wise, and that the University of Alberta alone provides quite a large amount of money in scholarships. There are also financial advisors who provide advice and support during times of financial difficulty.

Another popular topic was the idea of applying to a program, being “stuck” in it and not being able to switch into another. At a stage in life where we are not 100% positive what we want to do with our careers, a natural fear is that of choosing something and then changing our minds but being unable to change our program or course. It was a huge relief to hear that this is not the case. It might take a little bit of work but it is definitely a feat humanly possible to accomplish.

We also discussed internships and different opportunities available to students looking to gain hands-on experience in their fields of study. For engineering students, the Co-op Program was discussed by one of the student volunteers. She explained how it was a great way for her to work out in the field and see some practical job applications to what she had done in the classroom.

The University of Alberta Question and Answer Session was a perfect way to ease the university jitters that possessed all of us. We learned amazing things about university life and the information helped chase away our fears and get us in excitement mode for the future.

“We learned amazing things about university life and the information chased away our fears and got us in excitement mode for the future.”

THE ART OF NETWORKING



By Maryam Osman

As young adults, we know that a crisp and professional conduct is what is expected while preparing to enter into the workforce. But how can this be achieved? What exactly is networking? How can we develop and improve on our communication skills? These were just a few of the questions buzzing around in our minds prior to the Art of Networking Lunch n' Learn.

Believe it or not, even the greatest of public speakers and networkers once had difficulties talking to new people. Though walking up to someone new and introducing yourself can be a bit frightening, our minds eased once we learned some of the reasons for networking. Upon hearing details like building new friendships, learning about opportunities and meeting new and interesting people, the heavy cloud of nervousness began to lighten.

Brittany, the WISEST Student Coordinator, walked us through a step-by-step session on how to talk to people for the first time. Hearing about her own networking experiences was very relatable and helped us gain more confidence about our own communication abilities. We would no longer be the odd one out standing in a room full of people but

feeling alone. One of the more challenging things to do is to ask questions. It's easy to listen to someone speak and to be an engaged audience, but when Q and A periods are met with a long and awkward silence it becomes just as easy to wish you disappear entirely. During our session, we learned what kinds of questions to ask and how to become better at keeping a

“... we learned what kinds of questions to ask and how to become better at keeping a conversation flowing smoothly.”

conversation flowing smoothly. We learned about the significance of having confidence and watched a fascinating video about body language. It was amazing to see first-hand how simply changing your posture can change your mood for the better!

The most important aspect we learned is to stay true to who you are. Through

your career, you will meet people who are of greater authority than yourself. Don't let this intimidate you. Be clear about your concerns and make sure to be yourself. Personality is what makes you stand out—don't pretend to be someone you're not! It is much easier to be yourself than to imitate the way you think someone else is. It was truly reassuring knowing that the role models we were going to meet, graduate students as well as women in varying fields of science, technology and engineering, were there to answer any questions we had and were more than happy to become our mentors. After all, these women had once been where we are right now and they know first-hand how intimidating the future can look. As we headed back to our labs after the Lunch n' Learn, I couldn't help but stand a little taller and hold my head up a little higher, ready to introduce myself to the world.

DESIGNING A RESEARCH POSTER



By Emilee Anderson

When I attended the SET conference in November, a former summer researcher spoke about her time in WISEST's Summer Research Program. I remember that she'd mentioned she had to make a research poster. At the time, having never seen a proper research poster, I thought that the research poster would involve cutting out of blurbs and pictures and sticking them to a big piece of cardstock with coloured construction paper and glitter glue. No. By the time I arrived for the summer research program myself, I figured that couldn't be the case – somehow glitter and a plethora of colours and shapes didn't seem properly suited to esteemed scientific research, yet I still didn't know what exactly was the correct format for a research poster. I learned from the posters I saw in my lab that what I would be making would involve sections similar to that of a lab report, but in a more simplistic arrangement on a BIG piece of fancy feeling paper. I still felt like I knew very little about the elusive "research poster" when I went into the Designing a Research Poster Lunch n' Learn, presented by Dr. Marilee Stephens, but I came out knowing exactly what was expected and

“Dr. Stephens explained what a research poster should include and how the information should be presented.”

feeling much less worried about the task of creating my own research poster.

During the Lunch 'n' Learn session, Dr. Stephens explained what a research poster should include and how the information should be presented. She went over an example of her own work so we could see what she was talking about. Dr. Stephens' way of presenting kept us focused and allowed for the information she was telling us to be absorbed. I would say this particular Lunch n' Learn was one of the most beneficial throughout the program as we learned about a valuable skill and gained the necessary knowledge to apply it. This is very important since our poster is how we are to show off what we've researched, and we want it to be as correct both in format and content as possible.

After the Lunch 'n' Learn I knew what a research poster was and how I needed to make one. It did feel like a lot to do, but knowing exactly what I needed to do allowed me to feel confident in my abilities to complete a proper research poster. I knew to include a title, introduction, methods, procedure, results, and conclusions sections. I also knew (more importantly) what was to be included in each of the sections and I had learned valuable tips about formatting (large and legible font, point form, lots of pictures) that would make my poster endeavor most successful. The session was very informative and helpful. Thank you to Dr. Marilee Stephens for sharing her knowledge about designing a research poster with us.

SHARING YOUR WISEST EXPERIENCE

By Mackenzie Burnett

Once everyone had settled in for our final Lunch 'n' Learn session, there was a comfortable and chatty atmosphere drifting throughout the room. As the program progressed we had all become increasingly close and now, with the final events within the next week, the atmosphere was tinged bittersweet as well. The summer had been an eventful one for sure, especially for me as I stayed in residence throughout the duration of the Summer Research Program. During the program several Lunch 'n' Learn Sessions were organized like the Art of Networking and Writing a Professional Report, as well as several Professional Development Seminars such as Research in Action and Exploring U of A Research. My evenings and weekends were occupied by trips to the mall, walks on Whyte Ave. and numerous festivals. As the program was coming to a close, we all took some time during our last Lunch 'n' Learn Session to reflect upon the memorable moments of our unforgettable summer and as well as what we learned.

The assignment was to form groups of eight and list things on a poster that we had learned or done that applied to the topic we chose. The topics that were available to discuss were professional development, opportunities to learn and interact with role models, university life, awareness of careers in science, engineering and technology and the impact of your fellow WISEST Students and being around like-minded people. My group, which mostly consisted of people who were in residence, naturally chose university life. During the time that we were given we reflected upon the various segments of the program that had prepared us for university life as well as what we had experienced at residence. Listed on our poster as components that prepared us for university life were the U of A Q&A, the Campus Tour, sessions in CAB, Exploring U of A Research and, of course, our lab work. Also listed on our poster, from experiences at residence, were the Street Performer's Festival, K-Days, concerts, observatory visits, Galaxy Land, shopping, movies, Taste of Edmonton



and much, much more. In the end our poster was a colorful and slightly hectic representation of our memorable summer. Next, we all took turns to present our

“we took some time to reflect upon the memorable moments of our unforgettable summer as well as what we learned.”

creations. As groups got up to summarize what they had reflected on, everyone in the room recalled the different mentors we

had met, the advice we had received and the events that had taken place. Someone mentioned they now knew how much walking they would be doing in University while another talked about how easy it had been to make friends and how, in the beginning, she didn't think that she would have made any. We all thought about how we had changed, how we were now better prepared for the future and how we would always remember this summer.

After a slide show of various images from throughout the program, I was hit by how symbolic it was of what would occur in the days, weeks and months to come. We emerged as close friends, reminiscing about our favorite moments of this unforgettable summer and although almost all of us were heading down a different path from that room, we knew for sure that we would see each other soon.

LIFE IN RESIDENCE



By Mackenzie Burnett, Abbey Peterson, Jessie Perrin, Courtney Heck, Sonja Waeckerlin, Dana Mraz, and Mercedes Liddicoat

Our summer at St. John's Institute was an eventful and memorable experience. When we first came to residence none of us really knew what to expect. We all came from different areas and backgrounds so it was a little weird at first meeting all these new people and knowing we were going to have to live together for the next six weeks. During our stay at residence all eight of us got to know each other really well and got a taste of what it would be like to live on our own. We would all highly recommend living in residence, especially in the newly renovated St. John's Institute, as you are guaranteed to meet several new people, make many friends, and have an unforgettable summer.

Throughout our stay at St. John's Institute, we embarked on many fun and entertaining outings together. You could always find someone who was willing to go out and take part in whatever activity it

was you wanted to do. Some activities we partook in included visiting the Edmonton Street Performers Festival, attending a variety of movies, and trips to the malls, including a particularly fun one to play a

round of mini golf at West Edmonton Mall. If we weren't out exploring Whyte Avenue and its bookstores and coffee shops, we might have been down in the recreation room of the Institute, playing pool, table tennis, foosball, or enjoying some television. We always had lots to do.

Danielle, our RA, is one of the main reasons our summer was so fantastic.

She was very friendly right from the beginning and we were already making new friends by the end of the first night. There was no need to worry because she told us "Danielle will always be your friend." Danielle was always up for hanging out, showing us around town and exploring really cool stores on Whyte Ave. She was constantly ready to help when you had a problem like you've run out of toilet paper or have locked your keys in your room. Danielle was a dandy darling dorm keeper and helped us to feel right at home.

Living in residence did not disappoint. We all became quickly adjusted to our

"To enable rural students' participation in the program, a residence close to campus provided accommodation for a limited number of students."

new homes, even though there were some bumps in the road. Our stomachs were always filled with the delicious food provided to us by the friendliest cooks possible. The staff always made sure we were having a comfortable stay and all the apartments were really nice. All of us in residence had an amazing summer and made memories we will cherish forever.

SPECIAL EVENTS

To mark the end of the 29th Summer Research Program, WISEST students presented high quality scientific posters to teachers, research teams, family members, program sponsors and government dignitaries.

TEACHER APPRECIATION DAY



By Maria Teresa Baclig

High-school teachers in the math and science subjects were invited to attend the Teacher Appreciation Day, a special event to thank the teachers for encouraging the grade 11 students to participate in the WISEST Summer Research Program. Teachers learned about innovative research and saw the WISEST students' scientific research posters.

The day began with Denise Hemmings, WISEST Chair, giving welcoming remarks and Kristy Burke, Assistant Coordinator sharing information about the WISEST Summer Research Program. Meanwhile, Hana, another WISEST student and I were sitting at the back of the room, awaiting our turn to speak on behalf of all WISEST students, and boy were we sweating. As our names were called and we made our way to the front of the room, the nerves started to set in even more but it suddenly dawned on me that I shouldn't be scared of our audience. They were teachers; my biology teacher was in the room, and she was probably my biggest supporter. Why was I worried? All these teachers were here to support their students, us. Of course our

speech could not have gone better; they laughed at our jokes, and congratulated us on our heartfelt words right after. In a nutshell, Teacher Appreciation Day started off with a bang.

Following the speeches and introduc-

“Teachers were milling around, asking questions and listening intently to the student presentations.”

tions, the teachers were split into groups and left for tours to different laboratories on campus. They also received a presentation from Jen Duffy, WISEST Aboriginal Outreach Coordinator, about the WISEST program for young Aboriginal girls called Tales of the Science Buffalo.

In the early afternoon the teachers flocked to see the work us WISEST students have completed these past 6 weeks. With

a range of different projects, from protein modeling, to the analyzing of birdcalls and the growing of fungi, there was so much to learn. Soon enough, teachers were milling around, asking questions, taking pictures and listening intently to the student presentations. The excitement was tangible in the room; both teachers and us, the students, had engaging conversations, and the sharing of research and findings were definitely flowing. For our first time presenting our work, we definitely exceeded expectations and were lucky to receive such a friendly and supportive audience. Following the poster presentations, teachers were able to visit and tour student laboratories. Finally, the day had come to a close, and we realized just how much we had grown over the past six weeks and after our very first scientific research presentations. As posters were rolled up, the sun shining down through the big glass windows of CCIS matched the smiles of the students. To us, the tired, but happy students, it was a perfect ending to a day that marked only the beginning of our careers and of course, the rest of our lives.

CELEBRATION OF RESEARCH

By Elizabeth (Sairah) Thomas

It feels like it was only yesterday that we were apprehensively waiting to meet our supervisors and the rest of the research team on Orientation Day. The past six weeks flew by so quickly. To end the past six weeks of exhilarating fun, research and learning, we have come to the final day of WISEST, The Celebration of Research.

The Celebration of Research gave each student an opportunity to share their new found knowledge and understanding to the different research teams, politicians, parents as well as sponsors. As each student presented, the whole atmosphere was filled with pride, and excitement, as the guests attentively listened to each student's poster and smiled in approval. It gave us the chance to share our enthusiasm and connect with others with the knowledge that we had gained. This was a great opportunity to witness the diversity of the different fields of Science, Engineering and Technology. It was more than a day to just share our knowledge and learning, but a

day to learn from each other as well.

We also had the opportunity to reflect and look back at this gigantic mountain of learning that we had overcome. As Dr. Denise Hemmings addressed the parents and delegates, and as Ripple Patel shared her experience on behalf of the rest of the student researchers, I don't think that each one of us could help but go back in time, and reflect on each step that we had taken

enthusiasm, encouragement, patience, was a driving force to continue on and work through the difficulties that we were faced with. WISEST has truly exceeded the limitations of ordinary work experience by impacting each one of us-our future goals, beliefs and confidence.

As the day draws to a close we all scramble to take pictures for last minute tangible slips of memory of a memorable

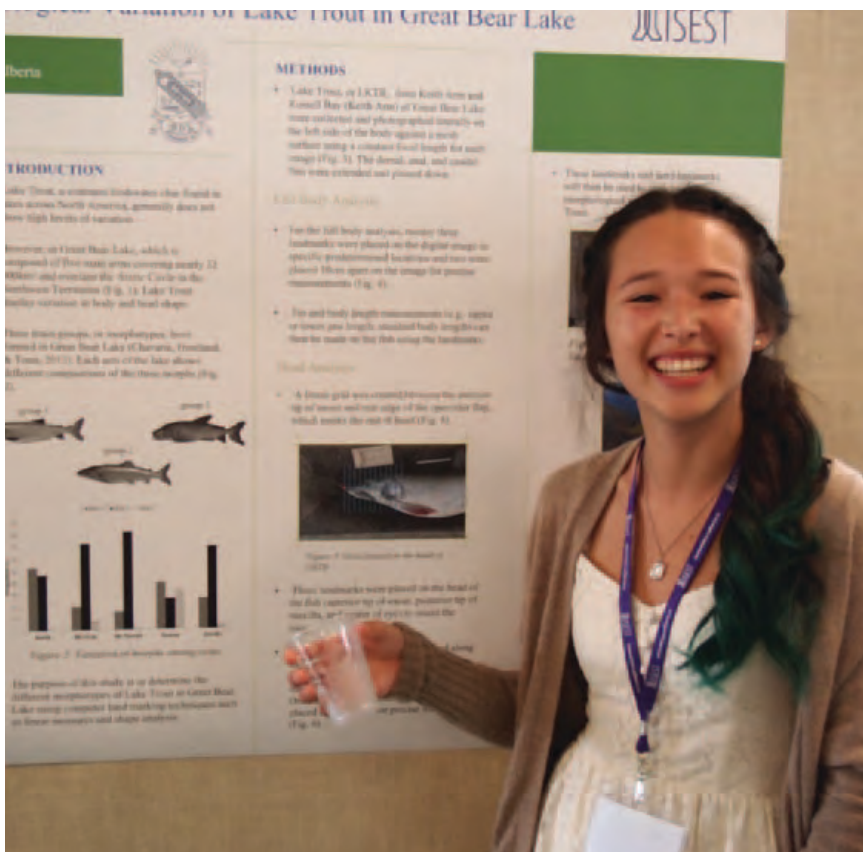
“... students shared their new found knowledge and understanding with research teams, politicians, parents as well as sponsors.”

to come this far. Parents, research teams, sponsors and the WISEST staff were a support network as we skydived into a world that very few high school students have had the opportunity to experience. Their

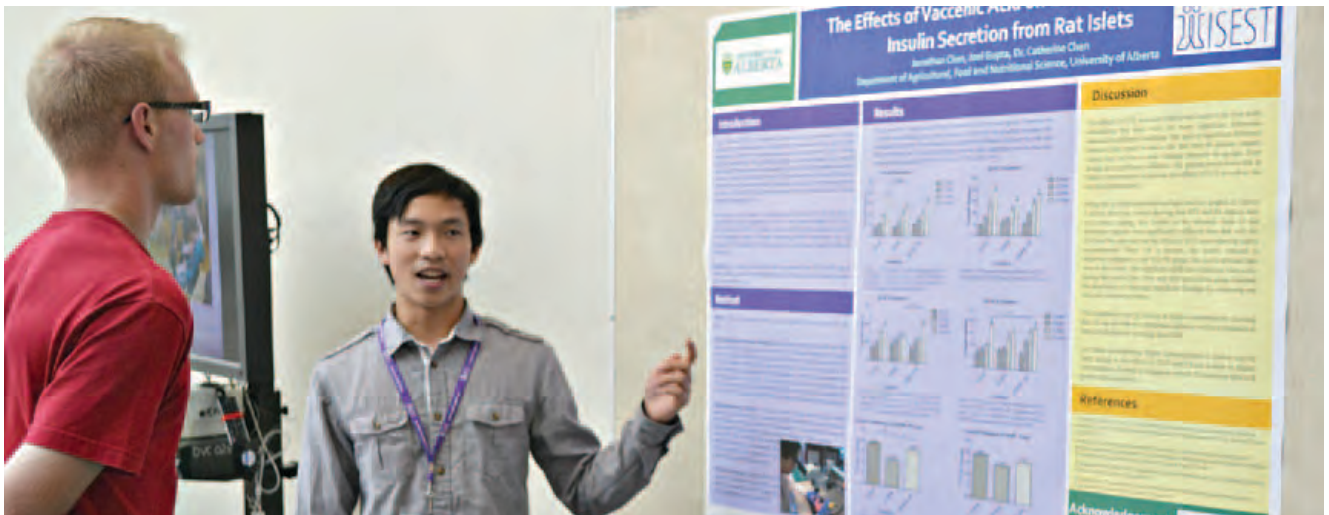
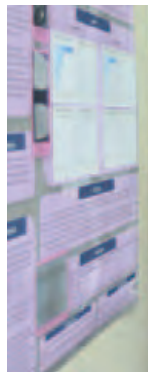
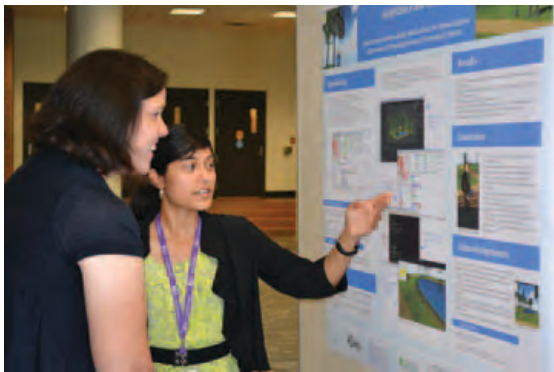
experience and amazing friendships. In mixed feelings we laugh and shed tears as we say goodbye to our friends, from as far south as Taber and as far north as Yellowknife, the only comfort is that we are able to communicate through Facebook and text messages. As we pack up, there is a bittersweet realization that there will be no more waking up early, musing through the problems with our devices, walks around campus, or eating lunch with amazing people in the quad, but from now on we will have the opportunity to enjoy what is left of summer. I am indeed sad to leave; I loved working with my research team, making amazing friends, and having that amazing support network but it has all come to end. However this is an experience that none of us will forget- a life-long memory. WISEST has impacted each one of us for the better. It has equipped us with the skills and experience that has the potential to take us into surprising avenues for post-secondary and possibilities for our future.

“The purpose of life is to live it, to taste experience to the utmost, to reach out eagerly and without fear for newer and richer experience.”

- Eleanor Roosevelt



CELEBRATION OF RESEARCH



STUDENT REPORTS



Student reports describe in their own words the breadth and depth of their research experience.

Abbey Peterson

Supervisor: Dr. John Shaw / Chemical and Materials Engineering

Sponsor: NEXEN

"I will never forget all of the great things I learned and saw, or the great people I had the chance to meet and get to know."



The time I spent in the WISEST Summer Research Program is a time I will never forget. It was a time filled with many great learning opportunities and experiences, through which I developed and acquired a number of skills that will help me in the future, and I am extremely grateful for that. Way back in October of 2012, when my chemistry teacher told me about this program, I was in awe. I found it hard to believe that such a program existed, and that I was eligible. I wanted to apply even before I learned that I would get paid. For me, the experience would be payment enough. I was beyond excited when I was told I'd been accepted, and I couldn't wait to begin. Like most of us, I had no idea what to expect; I was running blind. All I knew was that it would be incredible, and it turns out it was even better than that.

I was placed in a Petroleum Thermodynamics lab in the Department of Chemical and Materials Engineering for the summer. The majority of the students and researchers in my lab were experimenting with bitumen, a form of crude oil. Asphaltenes are a component of bitumen that aggregate in pipelines and block the flow of the oil. The purpose of my project was to imitate the aggregation behavior of asphaltenes using nanoparticles with defined surface proper-

ties in order to explain and control the aggregation of asphaltenes. In doing this project I learned about Calorimetry and nanoparticles, and how to use a solution calorimeter. We tested five nanoparticles in four solvents, as well as three different concentrations of asphaltenes in each of the solvents. Unfortunately, none of the results of the nanoparticles tests matched up with those of the asphaltenes. There are, however, many more tests that can be done in the future. I feel very lucky to have been placed in this lab and to have spent time with the amazing people who work in it, and to have been given a project that is so interesting and important in today's world.

Even though we spent a lot of time working in our labs, the WISEST coordinators still managed to squeeze in a few extras for us. Every Monday we attended a Professional Development Seminar, and these sessions included everything from talking with mentors, hearing from women role models, and touring research labs on and off campus. My favorite Monday session was the industry tour of Syncrude Canada, as it opened my eyes to all of the different possibilities, in regards to my future as well as the world's future. Another weekly event organized by WISEST was the Friday Lunch'n'Leads. These lunch hour

sessions focused on teaching specific skills that we used in the program, such as learning to make a poster and write a report. These sessions were all very informative, helpful and fun, as we got to meet some really great people, including the other WISEST students, and do some really neat things.

The entire WISEST experience for me is something that I will treasure and look back upon for helpful tips and information as well as laughs throughout the rest of my life. I will never forget all of the great things I learned and saw, or the great people I had the chance to meet and get to know. I would like to thank the WISEST coordinators for choosing me to share in this experience, as well as Dr. John Shaw, Mildred Becerra and Amin Pourmohammadbagher for so kindly inviting me into their lab. I would also like to thank all of the volunteers who gave up their time for us, as well as Nexen for their generous sponsorship. I may have other summer jobs in the future, but none will parallel my participation in the WISEST Summer Research Program.

Angeline Letourneau

Supervisor: Dr. John Vederas / Chemistry
Sponsor: Dow Chemical Canada Inc.



Coming into the WISEST Summer Research Program I wasn't really sure what to expect. I was coming into the program with a completely blank slate. I am happy to say that I was pleasantly surprised by my experience this summer.

In school, my favorite class has always been biology. I don't mind physics and high school chemistry has definitely been my least favorite. Needless to say, when I learned that my placement for the Summer Research Program was in Dr. John Vederas' lab in the Department of Chemistry, I couldn't help but be just a little freaked out with the uncertainty of whether it was going to be a fun summer or not.

I hadn't even been in my lab an hour when I discovered that there was nothing to worry about. Right from the start, everyone in my lab was supportive and helpful, eager to show me the projects they were working on or share a word of advice. I was very quickly able to feel like I was part of the group, instead of just an inexperienced high school student. My supervisor was very helpful in making sure I understood my project as much as possible, which really came in handy due to the intense nature of my project.

My lab focuses more on biochemistry as opposed to organic chemistry. The aim of

my project was to isolate two bacteriocins. Bacteriocins are proteins that are secreted by bacteria as they are growing that are actually lethal to bacteria once activated. Scientists are extremely interested in bacteriocins potential as antibiotics. The particular proteins we were focused on are found in the genome of *Enterococcus Faecalis 210C*. We were hoping to find their potential of being produced, their molecular structures and the types of bacteria that they might be active against. Our procedure involved inoculating and growing the bacteria and then running the sample through an amberlite resin column to catch the bacteriocins. We then washed the sample with varying strengths of isopropanol and water mixtures to remove the proteins from the resin. Then an activity test was done on each isopropanol wash to find out which fraction may contain the active bacteriocins. The active fractions were then again run through a column and washed with varying strengths of isopropanol for yet another activity test. Once the active fractions were pin pointed here, I worked to find where exactly the bacteriocins were in the sample and then concentrate them and purify them. Once isolated, I ran a scan of the samples to learn the molecular weight and see if it actually was some new



"Right from the start, everyone in my lab was supportive and helpful, eager to show me the projects they were working on or share a word of advice."

form of bacteriocin or one that had already been discovered. The whole project was very tedious but I gained so much valuable information from it that couldn't have been learned anywhere else.

I never would have been able to experience or learn any of this if it weren't for Dow Chemical's sponsorship of the WISEST Summer Research Program. I would like to acknowledge the wonderful job the program did in not only preparing me for post-secondary next year, but also for my career someday with Professional Development sessions focused on networking, university education and tours of labs and companies within various industries. The Lunch 'n' Learn sessions were also very helpful in preparing the students for their time in the Program. From Designing a Research Poster to a UofA Q&A there was always something new to learn. All in all, it has been a great summer and I have taken away so much from my short time here. I hope that many girls for years to come will be able to go through this program as well.

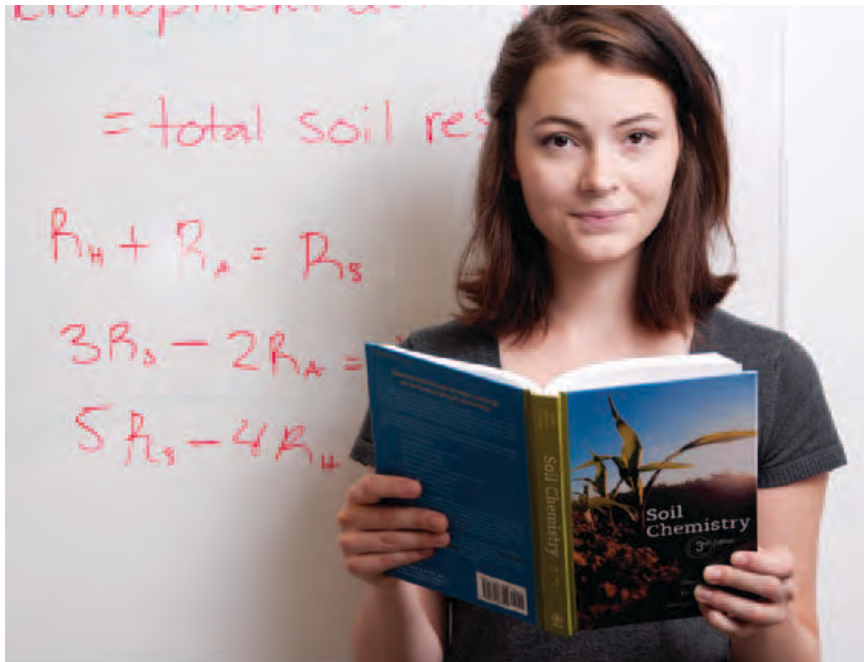
Annick Skrundz

Supervisor: Dr. Fangliang He / Renewable Resources

Sponsor: Edmonton Area Council, Beta Sigma Phi



"I've learned quite a bit over the last six weeks."



Getting the call from WISEST earlier on this summer I didn't really know what to expect, however I was pretty excited. I'd decided to apply to the WISEST Summer Research Program after meeting a former WISEST student as one of the science booths at the University of Alberta's Open House. The way she talked about WISEST it was obvious she'd had the time of her life, and that was enough to render me eager to apply.

I've learned quite a bit over the last six weeks. Some of which is applicable to my everyday life such as time management. My research this summer forced punctuality to become second nature because some of the equipment we used is electrical and thus cannot be exposed to rain. When we go out into the field and work in the small window we have before it starts raining, we have to go right away. This newfound skill is bound to help improve my life post-WISEST, however there are other skills that are not as transferable. For the duration of the WISEST program I had been placed in the Department of Renewable Resources with tasks that involve going into forests in Hinton. These opportunities in the field were my favorite because the trips were a few days long and, ignoring the work, felt like a mini-vacation. In the forest we

collected soil CO₂ flux data. This data is collected using certain machinery (Li-Cor) and programs that would be highly irregular to use outside of this specific research context. Although handling a Li-Cor will probably not take part in my near future, the problem solving when encountering malfunctions, or expanding my knowledge on different technology is irreplaceable.

My team's research was specifically on soil and the CO₂ that it emits, and being completely honest, going into this research I had no idea this was a phenomenon that actually existed. I've learned that soil is the second largest CO₂ pool and contributes 20-40% of atmospheric CO₂, which is a pretty good reason to invest this research. Having the opportunity to learn of different kinds of soil respiration and its impact on our atmosphere, and our environment, was really eye opening to me. I will come out of this summer job with a new respect and general awe at all of the environmentalists and research teams who dedicate their research studies, and sometimes their whole lives, towards our surroundings that many ignore.

Apart from all the research work these past weeks WISEST regularly holds two sessions each week. They are designed to educate us in a professional sense (networking

tips) and to improve our skills for designing a research poster, writing a report, and even presenting our research properly. The Professional Development Seminars and Lunch 'n' Learn sessions were really helpful as I had no idea how to do half of these skills before I participated in the Summer Research Program.

I'm very thankful for my sponsor, Edmonton Area Council - Beta Sigma Phi, who has been generous enough to make this whole experience possible. My research team has also been fantastic, my Principal Investigator Dr. Fangliang He, and my Direct Supervisor Jessica Akande. Jessica has been very inspiring and has shed light on the difficulties, but also on the rewarding side of pursuing a PhD, her present goal. The people I've met and had the pleasure to work with professionally have all been really great and very insightful towards possible education and career paths.

Arnie Entz

Supervisor: Dr. Kareena Schnabl / Laboratory Medicine and Pathology
Sponsor: Faculty of Medicine and Dentistry

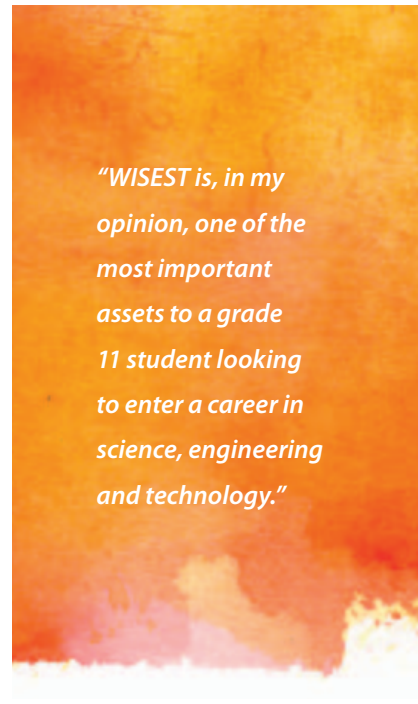


During my time in the WISEST Summer Research Program, I was placed in the Newborn Metabolic Screening and Biochemical Genetics Laboratory (NMS/GBL), in the Department of Laboratory Medicine and Pathology at the University of Alberta Hospital. I was trying to develop a new procedure to detect sugars in urine and stool samples using Benedict's reagent and validate that it can be used to replace the Clinitest, as the Clinitest was discontinued. I did everything from measuring out and making reagents, to testing urine and stool samples for sugars and typing up SOPs (Standard Operating Procedures). My favourite part of the research was mixing the Benedict's reagent with the patient sample, and watching it turn different colours depending on the amount of sugars present. Everybody that I was working with was always supportive and encouraging. I loved what I was doing and that made me look forward to going to work every day.

This has been the best summer of my life, and I am very thankful that my science teacher encouraged me to apply for the Summer Research Program. Coming to the lab, I had no idea what to expect, but I was hoping to learn lots of new skills. When I was told that I was accepted into the program, I thought, "Oh good, this will

look very great on a resume". After the first week, however, it became clear to me that this was more than just something that looks good on a resume. I knew that this was a once in a lifetime opportunity, and I'd be darned if I didn't give this my best shot, and got the most out of what the program had to offer. I learned the importance of good safety habits and wearing proper personal protective equipment. I learned how to make a poster and use PowerPoint and Excel.

WISEST is, in my opinion, one of the most important assets to a grade 11 student looking to enter a career in science, engineering and technology. WISEST has been one of the greatest things that has happened to me, and has given me lots of great tools to succeed, not only in the remainder of high school, but also as I look to post-secondary education. The Professional Development Seminars and the Lunch 'n' Learns were some of the highlights of the summer. WISEST prepared myself (and the rest of the student researchers), very well for everything that was to come, including how to create a research poster, and how to be a leader in the work force. The Networking Fair hooked me up with some great role models who were only too happy to attempt to answer my millions of questions



and the Research in Action industry tours were a great opportunity to see the applications of research outside of a university setting. Speaking of role models, having the chance to talk with Dr. Margaret Ann Armour was, without question, my favourite part of the whole summer. Dr. Armour passed her wisdom and her knowledge on to us during a lunch set up for this purpose. I think that everybody should have the chance to experience all that WISEST has to offer, as they would benefit greatly from it.

My deepest appreciation goes out to my sponsor, The Faculty of Medicine. I know that without this sponsorship, I would not have had the opportunity to be part of this amazing opportunity. And finally, a special thanks to Dr. Schnabl, Jolene Yuen-Jung and the amazing staff at NMS/GBL for taking the time to work with me, and helping me with everything I needed assistance with.

Bianca Angotti

Supervisor: Dr. Ali Bayat / Civil and Environmental Engineering

Sponsor: Edmonton Area Council, Beta Sigma Phi

"From office work to networking and discovering possible career options, I have learned a lot about engineering."



The WISEST Summer Research Program has been one of the most valuable experiences I have ever had. From office work to networking and discovering possible career options, I have learned a lot about engineering. Initially, I was excited about working at The University of Alberta, yet wary about working with a research team. Immediately, I was embraced with profound hospitality. It was an absolute pleasure to meet such hard working students that were eager to teach me about Civil Engineering. They were all eager to explain their individual projects to me, and were very competitive in promoting their own individual projects as the most interesting and relevant projects to complete.

The Friday Lunch 'n' Learns and Monday Professional Development Seminars provided me the opportunity to explore women in sciences and engineering outside of the lab. I now understand how integral networking is in the workplace. One of my favorite seminars would have to be "Women in Technology," where we had the chance to meet three fascinating women from BioWare. Each of them are members of the "Dragon Age" and "Mass Effect" teams. Having the ability to create videogames and fix bugs as a programmer, level designer and writer gave me a tremendous amount of

respect for these successful career women. I was also extremely honored to meet a visionary in the field of Chemistry. Her name was Dr. Margaret Ann Armour, and she was a remarkable and beautiful inspiration.

Roads. I am certain it is not one of the most exciting words. Yet in the geography of Edmonton, building effective roads is an integral part of our society's well being. There are potholes to consider, and safety in making our roads durable. Dr. Bayat leads the research at the Integrated Road Research Facility (IRRF), and the purpose of the research is to test the feasibility of alternative aggregate materials for road construction. My interest in the project increased when I learned how shredded tires were used to construct part of the road, and there were 262 geotechnical and pavement sensors installed to monitor pavement behavior.

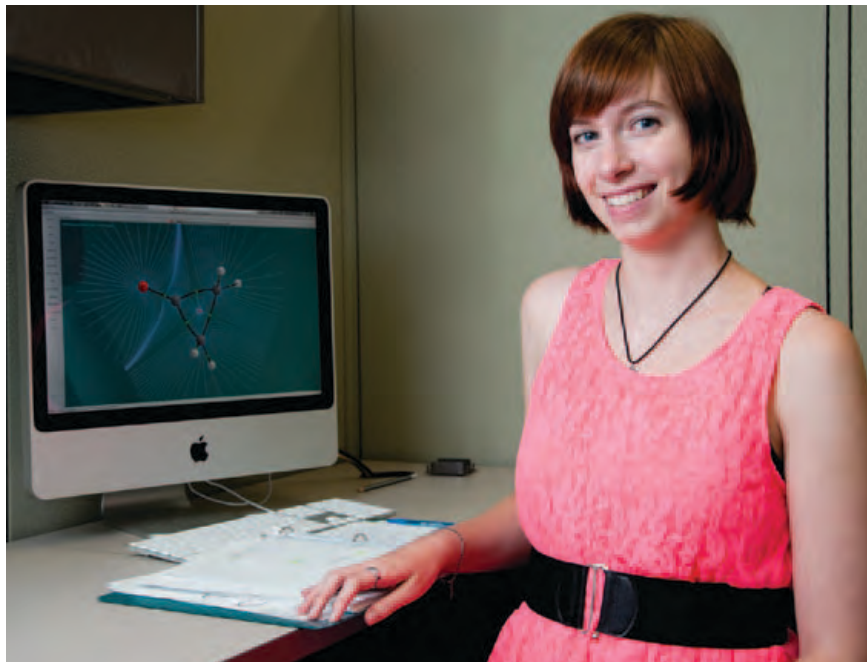
The focus of my research project was thaw weakening in base and subgrade for asphalt pavements. During winter months, the sub-layers in the road freeze and reach peak stiffness. When spring comes, thawing begins and the pavement water content rises, which results in pavement weakening. By using a falling weight deflectometer (FWD) to measure deflection at the road surface and Evercalc® to backcalculate the

elastic moduli of each layer, we are able to estimate the structural strength of the road during different seasons. After the collection of data from four test dates, we could see that minimal variation exists in the average base and subgrade moduli, implying that the pavement had already recovered from the thawing period. The effect of thawing was not properly captured during testing for this project. For future testing, FWD tests need to be performed when thawing is just beginning, in order to have more thorough results on the effects of thawing.

I would like to thank Dr. Bayat for welcoming me into his research team and giving me the chance to work in a professional environment. Sincere thanks to Dr. Nassiri who has been a mentor to me in exemplifying an outstanding work ethic. Her attention to detail and encouragement throughout the project has inspired me to continually improve my skills. A special thank you goes to WISEST and the generous donation from Edmonton Area Council - Beta Sigma Phi. Without them I would not have been able to have this amazing opportunity to learn about the Engineering Field.

Celeste Chiasson

Supervisor: Dr. Mariusz Klobukowski / Chemistry
Sponsor: Faculty of Science



“Extraordinary people were brought in and we were given a chance to learn about their careers and how they got there.”

I honestly cannot remember how I first heard about the WISEST Summer Research Program. I do, however, remember my dad encouraging me to apply. Actually talking to people at a university event who were already studying in the scientific fields furthered my interest, so when it came time to apply, I put my name down. I was overwhelmingly excited when I got the call informing me I'd been accepted! I went in not fully knowing what to expect, but I came out of the program extremely glad that I'd taken this chance.

I was placed in a computational chemistry lab under the supervision of Amelia Fitzsimmons and Principal Investigator Dr. Mariusz Klobukowski. The research I participated in ultimately amounted to the prevention of radon poisoning. Up until recently, it was thought that the noble gases were inert, meaning they were completely unreactive and were impossible to bond with other elements. More recently was it discovered that the compound model HRgF (Where Rg – meaning rare gas – is xenon or radon) is stable for radon, when it was thought to be stable only for xenon. Other compound models were found to be stable for xenon, so my job over the summer was to understand the effect of substituting radon for xenon in those

compound models. Because the research was conducted entirely on a computer, I had to learn how to use the programs, which was fairly simple. However, a lot of the science behind what I was doing was extremely complicated. Amelia and Dr. Klobukowski explained as much as they could, as best they could without giving me 4 years of chemistry education. Because the things I learned here were so complicated, I'm now able to apply the knowledge I've gained to my future studies to get a better understanding of what I'm learning. They made my workspace as comfortable and supportive as it could be, and I'd be ecstatic to work with them again if ever given the opportunity.

The WISEST Summer Research Program not only gave me a summer job, but also gave me the opportunity to develop useful skills, like how to make an effective report or presentation. Developing those skills will certainly help me in the coming school year! We were also given the opportunity to talk with current university students to get a better idea of what university life will be like. Another thing I gained from the WISEST experience was to learn about future career opportunities. I had no idea that some of the careers they showed us even existed! Extraordinary people were

brought in and we were given a chance to learn about their careers and how they got there. We were able to ask questions of those people and network with them so we could contact them in the future. WISEST not only gave me work experience in a research lab, but also opened up a plethora of career opportunities for my future.

If I were given a chance to do the whole Summer Research Program again, I certainly would. Without the sponsorship from the Faculty of Science, my experience here would not have been possible, and for that, I'd like to thank him. I met many amazing people, both students like me and people already living their dreams. I now have a much better idea of where I want to take my career, and I have the WISEST Summer Research Program to thank for that.

Courtney Heck

Supervisor: Dr. Erin Bayne / Biological Sciences
Sponsor: NSERC PromoScience

"Not only have I gained significant experience and scientific knowledge, I have also met many fantastic people and I have grown as an individual."



I was very intrigued when I was told about the WISEST Summer Research Program. It sounded like it would be such a fantastic experience and I knew it was something I would love to be a part of. I am very interested in science and math, and I plan on pursuing a career as a veterinarian. I felt that through the WISEST Program I would gain valuable research experience and scientific knowledge. I have now learned that the WISEST Program offers and provides students with much more than that. Not only have I gained significant experience and scientific knowledge, I have also met many fantastic people and I have grown as an individual.

I had the opportunity this summer to work in Dr. Erin Bayne's lab in the Department of Biological Sciences. My main job in the lab was to analyze recorded video footage of Ferruginous Hawks (*Buteo regalis*), and enter the behavioral information I observed into a database. This database is then used by the many researchers studying these hawks. This species is a species at risk and understanding them is important for their conservation and recovery. Along with studying hawks, I was also able to experience some hands on field work with Dr. Erin Cameron. In only my second week of working in the lab I got to visit a

site near Fort McMurray, Alberta with Dr. Cameron and two other researchers to excavate earthworms. Among many other things, I learned that earthworms are an invasive species originally from Europe, and Dr. Cameron is studying the extent of their spread and their impact on the environment. After returning from field work, I was further involved with Dr. Cameron's studies as I got to assist her counting and preserving the earthworms she had collected. I had a spectacular summer working in the lab, and I thoroughly enjoyed being part of a research team.

Along with offering me the chance to work in a research lab, WISEST also organized multiple sessions, tours, and plenty of alternative learning opportunities. By attending Monday Professional Development Seminars and Friday Lunch 'n' Learns I was able to gain knowledge that was beneficial to me in the workplace. They also kept me prepared for different aspects of the Research Program, and gave me the tools necessary to become a more successful and productive woman in society. The research tours were one of the favorite things that I encountered during the program. I toured both the Observatory on the University campus and Quantum Technologies. I found both to be extremely interesting and

educating. I was able to interact with other women in scientific fields, which significantly impacted my knowledge of careers that I didn't realize existed until attending the WISEST Summer Research Program.

This experience has been both eye opening and all around extraordinary. I am extremely grateful to have been given the opportunity to take part in the Summer Research Program. I have learned so much and have had fun in the process. The WISEST Summer Research Program has also helped me gain confidence, life experience, and friends and I am overjoyed that I was able to take part in it. I would like to thank NSERC PromoScience because without their sponsorship I would not have been able to attend this program. I would also like to thank my Direct Supervisor, Justine Kummer, and my Principal Investigator, Dr. Erin Bayne, for allowing me to work in their lab this summer and be part of their wonderful research team. Thirdly, thank you to Janet Ng and Cameron Nordell for all your patience and knowledge while assisting me in my research. And lastly, thank you to everyone on the WISEST Team, and my Residence Advisor Danielle, for making this summer possible, as it was a life changing experience that I will never forget.

Dana Boe

Supervisor: Dr. Kevin Beach / Physics

Sponsor: NSERC PromoScience

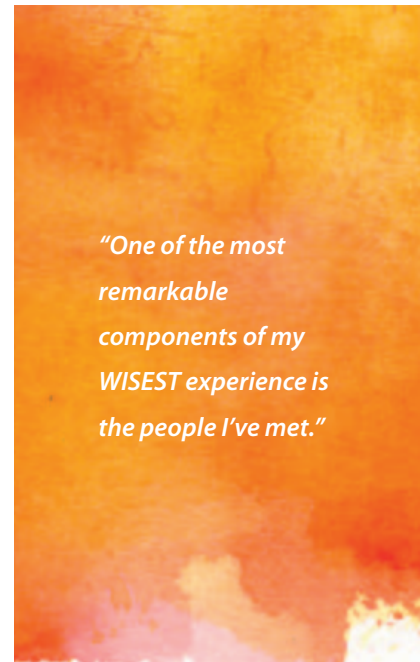


Some of the best advice I've been given is "Try as many things as possible, never miss out on something that could've changed your life". WISEST is one of the more exceptional examples. Since I was small, I knew I wanted to have a career in science, but until WISEST I was not aware of how many diverse and remarkable careers were available.

This summer I received the opportunity to work with Dr. Kevin Beach and Dr. Piyush Jain in the Department of Physics. A week spent in the lab made one thing clear; the learning curve was steep compared to high school. I spent the first days reading papers written on protein research, and discovered it was a very extensive subject, of interest to many universities and medical labs around the world. My research project involved using the python and C++ coding languages to write programs to simulate protein folding. Coding language was something I had no previous knowledge of, and learning to understand the logic behind how computers 'think' was fascinating. After the programs were written, I worked on manipulating the force, time, and running length of the program to generate data that could be turned into statistics of the folding. Protein folding is also experimentally researched through Force Spectroscopy or optical tweezer experiments; this is done

by trapping of one end of the protein, while manipulating the other end. Experiments such as this take place in the National Institute for Nanotechnology at the University of Alberta. The research is used to gain understanding of the mechanics of how the protein folds into its specific shape, as shape determines the protein's function. One of the long term goals of protein research is to eventually have a better understanding of protein related diseases, such as cancer and Alzheimer's. Protein research is an amalgamation of physics, biology and computing, on a microscopic level that can have major effects.

Professional Development Seminars and Lunch 'n' Learn Sessions provided invaluable opportunities to speak with graduates, engineers, and physicists, all women in the workplace. The Networking Fair was an amazing opportunity to listen to successful women working in non-traditional roles. Many of them spoke of being confused when entering university, and shared their stories of how they discovered which career path was right for them. I've reinforced my belief that experiencing as many things as possible can be the greatest tool on the road to success. One of the most remarkable components of my WISEST experience is the people I've met. Throughout these workshops, lunches,



and tours, I've made many excellent friends, who I can talk, laugh, and share my thoughts with. Finding people who share the same passion for science, learning, and exploration gives one a wonderful sense of belonging.

My WISEST journey would not have been possible without a few extraordinary people, and I would like to extend my thanks to them. Firstly, to my fantastic teachers, Ms. Rehmann and Mr. Schroeder for helping me to apply and be accepted to WISEST, encouraging my interests in Chemistry and Physics, and being a role model to myself and many other students. To the coordinators at WISEST, for organizing tours, discussions, and the opportunity to connect and network with remarkable individuals. I would like to thank NSERC PromoScience for making my participation in WISEST possible. Lastly, I would like to thank my Principal Investigator, Dr. Kevin Beach, and my supervisor, Dr. Piyush Jain, for allowing me the privilege of working with them in their lab, their patience, time, and their incredible support throughout these six weeks. I will remember the efforts of these people and my time at WISEST, and hope that one day I can inspire others the way these people have inspired me.

Dana Mraz

Supervisor: Dr. Jason Carey / Mechanical Engineering
Sponsor: WISEST Guest Lectureship

“One of the biggest lessons I took away from the program is how to problem solve and work through problems coming up with creative solutions.”



Applying for the WISEST program I was extremely nervous. I was scared to live away from home, and I thought I would make so many mistakes in the lab. However, my mom convinced me to apply anyways and I am very grateful that she did. I expected to learn how to use a few new machines, gain experience working with lab equipment, and learn what a university lab is like. I never expected this program to be so influential in my life and so much fun. The program was so much better than I ever could have anticipated.

I worked in a biomedical lab in the Department of Mechanical Engineering under Principle Investigator Dr. Carey. The project I was involved in is developing a computer model of the spine to help improve technique in spinal manipulation therapy (commonly used to treat back pain). My job in the lab was to build the thoracic spine on SolidWorks, and then test the model using ANSYS Workbench by applying loads to different spots on the model. This project was extremely rewarding for me because I know that my work will eventually go towards helping people directly and improving their life. During the program I also worked on a side project building a water bottle rocket, which was very fun but also challenging. One of the biggest lessons I took away from

the program is how to problem solve and work through problems coming up with creative solutions. Also to never get discouraged and quit because something is hard. I have learned so much from working in the lab, such as writing professional reports, improving public speaking skills during presentations, about how the spine works and spine anatomy.

Working in the Department of Mechanical Engineering, my perception of what mechanical engineers actually do completely changed. Before starting the Summer Research Program I believed that mechanical engineers build car engines and that's it. I have learned though that mechanical engineers can be involved in anything from applying a coating to a material with a flame torch, to developing new prosthetic arms, to building fuel cells. Having the opportunity to tour many different labs in the mechanical engineering department has broadened my horizons to realize all the cool things that you can be involved in as a mechanical engineer.

The Lunch 'n' Learn Sessions and the Professional Development Seminars were really helpful to me. I was able to ask all my questions about university to students going to the U of A and all my questions about jobs to actual women working in engineer-

ing and science. I was truly inspired listening to a presentation by Dr. Margaret-Ann Armour. She taught me that you can dream your future and anything is possible. I had the opportunity to tour the Nanofabrication Lab at the University of Alberta and Gilead Sciences, which were particularly special experiences to see the amazing work that people are doing on a daily basis and to see potential places I could work. Both tours exposed me to jobs that I had never thought about before and were incredibly interesting. Going back to high school I can take back the information I learned on being a leader in groups for projects, and how to make good presentations, which will be really helpful.

I would like to thank WISEST, my family for their love and support, my Residence Advisor Danielle, my sponsor Dr. Elizabeth Croft, my Principle Investigator Dr. Carey, and all of my supervisors, especially Nathaniel Maeda for making this experience possible. Their efforts allowed for me to have a fantastic time, and be a part of a life changing experience that I will never forget.

Delia Cormier

Supervisor: Dr. Duane Szafron / Computer Science
Sponsor: Process Solutions Canada



It's amazing how powerful a word of encouragement can be. I realize my journey with the WISEST Summer Research Program would not have been initiated without the encouragement of a teacher who strongly believed in me. He gave me the courage to apply for something as prestigious as WISEST, so that I would not miss this rare opportunity that practically pays you to learn. After being accepted I still didn't really know what was ahead of me. I often pictured myself in a white-coat lab, conducting sophisticated experiments using state of the art equipment. I may not have worn a lab coat but my experience was just as valuable.

Until the WISEST Summer Research Program I had never been introduced to Computer Sciences. I worked in Dr. Szafron's lab with the Believe research team in the Department of Computing Science. Their workspace was a humble computer lab but the research was far more fascinating. The Believe team was in the process of developing a video game designing tool called ScriptEase II, a software that allows non-programmers to create their own games. There I observed the complex language of programming and learned that it takes a lot of time and practice to master it. ScriptEase offered a simpler, more user-friendly way

of scripting a complex story-based video game, which can be used with multiple game engines. My role in their research was to test ScriptEase II with the Unity game engine, a game engine that had never been used with ScriptEase before. Working alongside one of the team's interns, I built a simple video game using Unity and ScriptEase II. This was the first time I was looking at video games from the creator's side as well as the player's side. Throughout the six weeks we both struggled and succeeded to make characters walk, sit, run and pick up items in a park setting created by my supervisor. We also added our own ideas and tested them to see if they were possible to create with ScriptEase II, eventually creating a simple cohesive story.

I thoroughly enjoyed this project, but for the first few weeks I wondered about its significance. The work didn't feel very scientific and lacked any structured procedure. Later on I understood that research can take various forms and range from very simple to very complex. My project was a small piece of a larger project. Aside from my project I witnessed other video game-based research projects in action. My supervisor was researching the addition of emotions to non-player characters, and another member of the team was looking at the alterations of

characters' schedules. I saw how they built their experiment, tested it and analyzed the raw statistical data to see if these factors enhanced the game experience.

WISEST guided me through my first paying job. Sessions like the Networking Fair taught me about the workplace setting, and Research in Action and Women in Technology got me thinking about possible careers. I gained a broader awareness of the underrepresented fields in science and engineering, as well as many lifelong messages applicable to everyday life. I gained new confidence in speaking to professionals, but most of all I learned that it's ok to change the course I thought was mapped out for me.

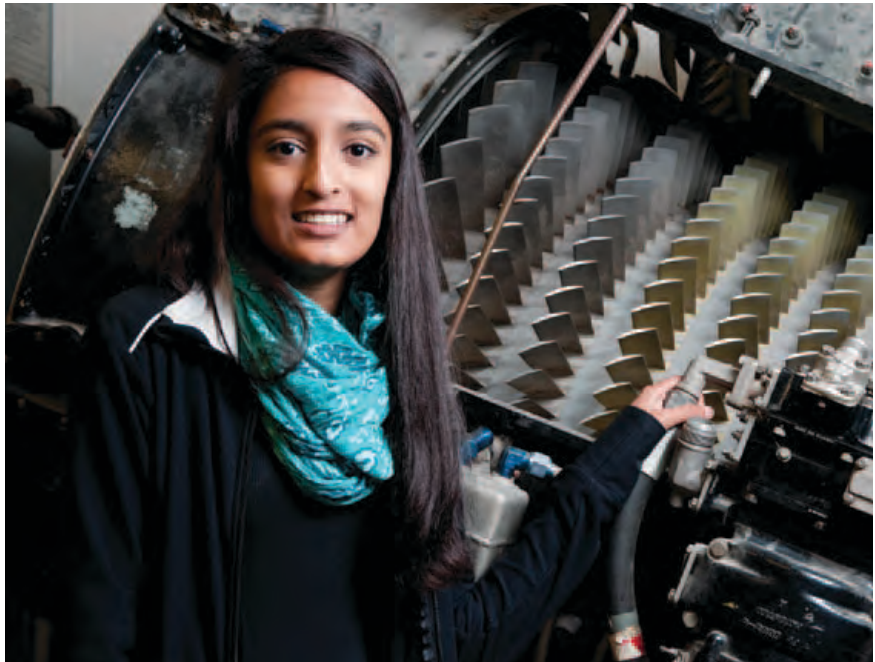
Working alongside the people in my lab was a great experience. Thank you Neesha Desai and Dr. Duane Szafron for letting me be a part of your research team. Thank you Jessica Yuen, Kevin Schenk, and Richard Zhao for being a great support in the lab. A huge thank you to Kirsten Svidal for working patiently with me on this project. Thank you Process Solutions Canada, and the WISEST team for giving me this valuable opportunity. Finally, thank you Mr. Tachynski, Ms. Taylor, Dr. Phillips, Ms. Coleman and Mr. Gartke at Ross Sheppard for your ongoing support and encouragement.

"Later on I understood that research can take various forms and range from very simple to very complex."

Disha Patel

Supervisor: Dr. Jason Carey/Mechanical Engineering
Sponsor: Alberta Innovates Health Solutions

"The questions I had about engineering and about university were answered by both my research team as well as the WISEST Team."



Now that the Summer Research Program is completed, I have a sudden sense of accomplishment that I have rarely felt before. During summer vacation, I would normally have long sleepy days that would pass by unproductively. As I began working at the WISEST Summer Research Program, I understood the importance of waking up early and getting something exciting and adventurous out of the day. For the first time in my life I felt like I was making a difference in the research lab I worked at. For the first time, I became independent and was responsible for my own work. I will truly remember this experience for many years to come.

Before working in the WISEST Research Program, I never got the opportunity to develop knowledge about the vast choices of careers offered at the University of Alberta. The field that I have loved the most has always been engineering, thus I was extremely excited to be a part of Dr. Jason Carey's research lab in the Mechanical Engineering Department. I have enjoyed every day of the past six weeks with my supportive supervisor, Jonathon Schofield, and my encouraging co-worker, Garrett Melenka. I got the opportunity to test the properties of a plastic filament known as *Poly Lactic Acid Filament* for its ability to withstand

stress. I was able to create a computer aided design of a dumb-bell on a software called *SolidWorks*. Later on, I was able to 'slice' the dumb-bells and print them out using the 3D printer. However, the complete testing began when, I, with the help of my co-worker, pulled these samples apart using an *MTS Tensile Machine*. My goal was to test which combination of layouts would be able to withstand the greatest amount of stress. The results gathered were quite accurate although further research will be done so that a prosthetic arm could be created by my supervisor later on in the research process.

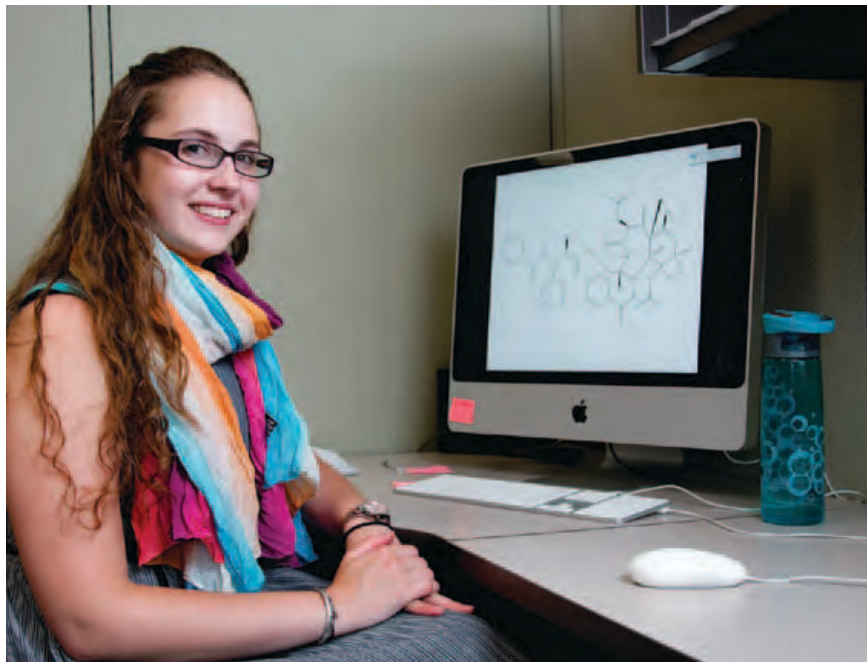
Apart from my work, WISEST offered Professional Development Seminars on Mondays and Lunch 'n' Learn Sessions on Fridays, where I learned the importance of having a mentor, how to properly network, how to create a research poster, how to write a report and last but not the least about the various careers options present for me, as an under-represented gender in the field. These sessions also included tours of the diverse labs present at the university. These sessions were informative as well as interesting, further adding to my knowledge of university life and the various summer research projects. With the help of these sessions, I became capable

of fulfilling my supervisor's high expectations. These sessions will definitely enhance my work ability in the future as I head towards grade 12 and university. Besides WISEST, the members in my research team also organized tours of the different labs in the fields of Biomechanical Engineering and Computing Sciences, where we were introduced to other research projects like robotics, orthodontics among others.

My original hope for the WISEST Summer Research Program was to gain knowledge about the fields that I was interested in and also about what being a researcher is like, but I gained a lot more than just that. The questions I had about engineering and about university were answered by both my research team as well as the WISEST Team. I am extremely grateful to WISEST for allowing me into this summer research program, Alberta Innovates Health Solutions for sponsoring me, without whom this would not be possible and to Dr. Jason Carey and his research lab for providing me with knowledge about biomechanical engineering and preparing me as a researcher for university. Jonathon Schofield made every day adventurous and I would like to give him and Garrett Melenka a very big thank you for mentoring me and for making this experience truly amazing.

Emilee Anderson

Supervisor: Dr. Mariusz Klobukowski / Chemistry
Sponsor: Edmonton Area Council, Beta Sigma Phi



When I first heard about the WISEST Summer Research Program I thought there would be no way I would ever give up my summer to live in a different city without family, friends, or hopes of a holiday. Then I thought about what the experience had to offer and realized that it would be a helpful, unique opportunity. Even though it wouldn't be a typical summer, it would give me the possibility to learn about what I can do after high school – something I'd been avoiding thinking about. It is true that my summer hasn't been typical, but it has been an amazing experience and I'm glad that I took the initiative to apply. I have gained much more experience in the realms of engineering, science, and technology, and I've even begun to think about my post-secondary life with some degree of confidence.

My Summer Research Program adventure has taken place in the computational chemistry lab of Dr. Mariusz Klobukowski's group. I worked on a computer to run calculations and interpret results, as part of the PhD research of Cassandra Churchill. The calculations I was managing dealt with an anti-cancer drug (Taxol) and water and sodium ions – as found in the body. The objective was to discover how interactions between Taxol and water/sodium ions alter

the arrangement of Taxol. I compared the original, crystal form of Taxol to its conformation after it had interacted with water and/or sodium ions in order to determine the degree of variance in geometry before and after it had interacted with the other entities. To do so, I used binding energies between Taxol and water/sodium ions and a weighted root mean square deviation value, which indicates the degree of similarity between two conformations. I used another program to simulate 3D versions of the Taxols to visualize changes in conformation. My project fits into the entire research because it will allow for a more accurate assessment of how Taxol will work when in use.

The experiences I've had in the lab have introduced me to a different realm of work. I have also been exposed to other new areas through the Professional Development Seminars and Lunch 'n' Learn Sessions. Throughout the summer I've had the chances to learn what networking is, as well as begin building my own network. I've learned about different, expanding areas of research and seen firsthand what a job in nanotechnology could look like. All of these experiences are far beyond what I could ever experience without WISEST (or would have thought to experience) and

"I've learned about different, expanding areas of research and seen firsthand what a job in nanotechnology could look like."

have given me the opportunity to explore the vast number of opportunities out there for me. Every opportunity I've had through the SRP has helped me to see that there are many fields in the areas of my interests to choose from, and that I don't need to worry about not knowing where I want to end up yet.

Though I was a bit hesitant to apply for the WISEST Summer Research Program, it has been an experience that I will always remember as being an amazing and informative way to spend a summer. In my application I expressed that through the program I hoped to gain more insight into what I can do after high school. I still don't know what I want to end up doing as a final profession; however, through my time this summer I have gained the valuable knowledge that it is okay to not know and that it is okay to change my mind – many times. Through it all I can say that I do have a stronger idea of the direction I hope to go after high school. Had it not been for WISEST, as well as Dr. Klobukowski, Cassandra Churchill, and Edmonton Area Council, Beta Sigma Phi I would not have had such an enriching summer and I would still be a very confused seventeen-year-old girl.

Hana Golightly

Supervisor: Dr. Larry Unsworth / Chemical and Materials Engineering

Sponsor: Edmonton Glenora Rotary Club

"Through these sessions we developed professional skills, challenged our perceptions of scientific fields, and networked with women working in science."



There is a large discrepancy between being good at something and loving it. Likewise, the difference between fostering a fascination with a subject and having the desire to work in that field is exponential, and can be hard to figure out until you have experience with the daily tasks that a job entails. My preconception when applying to the WISEST Summer Research Program was that it would help me figure out if I was simply enamored with the idea of science and engineering, or could commit myself to a lifetime of exploring a career in those fields. I thought that the program would ensure that I knew exactly what post-secondary program to apply to, that it would give me the chance to expand my knowledge of engineering and, in doing so, point me to a single faculty and program that called my name the loudest. However, in broadening my definition of what engineering is and opening my eyes to a plethora of fields I previously hadn't known existed; it did exactly the opposite. While my love of science and desire to work in a scientific field has been cemented, I am conscious of the innumerable amount of information to be learned concerning the fields that interest me. I still have no idea what program to apply to, and have confirmed the fact that every scientific field

contains enthralling aspects!

This summer I was lucky enough to be placed in the lab of Dr. Larry Unsworth at the National Institute for Nanotechnology. The project that I worked on involved synthesizing a compound called BrTMOS, a preliminary step in the synthesis of an alkoxyamine initiator used for a polymerization reaction. In the long term, the final product of the reactions will be used in order to make biomaterials more biocompatible. This is done by allowing the reduction of nonspecific protein adsorption experienced in surface interactions, making the product less likely to induce an immune rejection from the body.

While I found the research that I worked on very gratifying, it was wonderful to learn about what it takes to get into scientific careers during the Lunch 'n' Learn Sessions and Professional Development Seminars. We developed professional skills, challenged our perceptions of scientific fields, and networked with women working in science. We also given attended a talk with Dr. Armour, one of the founders of WISEST and the Associate Dean (Diversity) in the Faculty of Science, who passed on many words of encouragement and imparted some of the wisdom she has gained along the road to her current

position.

Throughout the program, I aimed to absorb as much information as possible, and found that the people were willing to pass on as much as they could, given that I expressed my interest. It was a wonderful thing to be able to learn so much on a daily basis; the challenge for me was adapting to university level chemistry and trying to remember it all!

I would like to express my gratitude to the hard working people that brought this opportunity to life for me this summer. The long list to which I extend my thanks includes the Edmonton Glenora Rotary Club who generously sponsored me, Dr. Unsworth and his research team, my direct supervisor Alejandro, the National Institute for Nanotechnology, and the National Research Council. Without these people or organizations, I would not have been able to take part in the WISEST Summer Research Program, and would not have been exposed to the amazing life changing, has given me learning opportunities far beyond the classroom, and can be described as exhilaratingly eye-opening and overwhelming in the best possible way.

Hannah Zhang

Supervisor: Dr. Eleni Stroulia / Computer Science

Sponsor: Dr. Eleni Stroulia, Professor, Computing Science

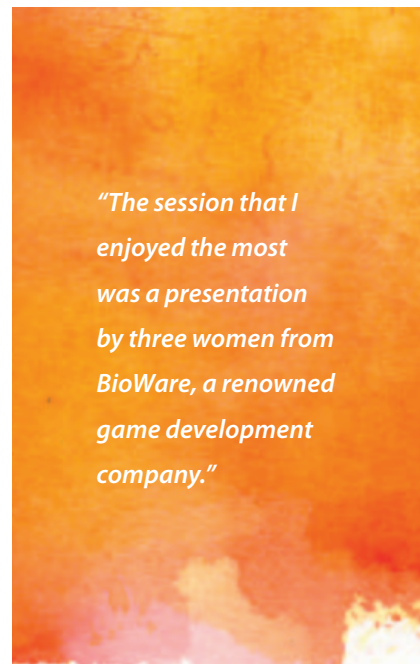


When I think back to the very first day of the WISEST Summer Research Program, I remember two emotions: nervousness and excitement. At Orientation, I was nervous to meet the other researchers and my own research team, but excited nonetheless for the summer to begin. The anticipation had been slowly rising over the weeks leading up to the first day, and I couldn't wait to find out about my project and start learning. As I got to talk with other students in the program and saw everyone's shared enthusiasm and anticipation, I knew that this summer would become one spent doing amazing things.

I applied for the WISEST program wanting to explore Computing Science because it was what I was considering studying in post-secondary school, but I was really open to any field. Fortunately, I was placed in Dr. Eleni Stroulia's Computing Science lab, under the supervision of Victor Guana and working with two other high school students. Our project was to develop an electronic game that would educate players about contraception. We used the software GameSalad®, a drag-and-drop tool, to create our game because it didn't require previous programming experience. In the six weeks, the three of us learned how to use GameSalad® and developed four levels

of the game, with new information regarding sexual health introduced in each level. We later titled the game *Under Control*, and although it is still a prototype, we all felt a strong sense of pride reflecting on what we had managed to accomplish.

However, WISEST was about so much more than just working in a field of science; we also had many opportunities to discover and discuss with mentors the many options that lay ahead in future education and career choices. Through the many Professional Development Seminars and Lunch 'n' Learns that were held, we experienced everything from networking with successful professionals in various science fields to designing our own research posters to display our summer's work. I was also able to take part in a tour of Quantiam Technologies, a company that specializes in nanotechnology; we got to see many of the machines that they worked with and learn about how their work relates to chemistry and nanofabrication. The session that I enjoyed the most was a presentation by three women from BioWare, a renowned game development company. For me, the best part was when they demonstrated how their work looked in-progress compared to the final product in the finished game, because we were able to look at



"The session that I enjoyed the most was a presentation by three women from BioWare, a renowned game development company."

the mechanics of what makes the game work. They also exposed us to the variety of positions that are available in Computing Science, which was very insightful. All of the different WISEST activities throughout the summer spread one inspiring message: don't let underrepresentation in a science or technology field stop you from pursuing your dreams. The message really resonated with me for the entirety of the program.

There are many people whose support was essential in making my amazing summer possible. I would like to thank Dr. Eleni Stroulia for being my sponsor in the WISEST program as well as welcoming me into her lab. I am grateful to Victor Guana for guiding us through the project expectations, as well as my research team for sharing ideas and working together to develop a fantastic game. Thank you so much to the WISEST coordinators for being there for us and working hard to make the program a success. This summer has been an unforgettable opportunity, and the plethora of valuable lessons that I learned will remain with me for a lifetime. Being a part of WISEST has opened my eyes to the world of science and technology, but most importantly it has taught me that the sky's the limit for finding and doing what you truly love.

Iryna Roever

Supervisor: Dr. Tom Etsell / Chemical and Materials Engineering

Sponsor: NSERC PromoScience

"My favourite session was the Networking Fair because I was able to talk to professionals in science and engineering fields."



This summer I worked in a Materials Engineering Lab. For the WISEST Summer Research Program I my focus was on Fabrication of Solid Oxide Fuel Cells. A Solid Oxide Fuel Cell (SOFC) is an electrochemical conversion device that produces electricity directly from oxidizing a fuel. My research consisted of fabricating fuel cells with different forms of a material called Yttria-stabilized zirconia (CYSZ), a variety in the percentage of nickel oxide and different cathode materials. (All of these are materials that make up a fuel cell.) By following a very specific and complex procedure I fabricated twenty – two fuel cells. However, only two of my fuel cells could be tested and to my surprise I had positive results. My success was very rewarding after long days of fabricating the fuel cells, which is a very tedious job that is heavily swayed by uncontrollable variables.

Through this experience I learned about communication skills and how to work under pressure; these skills became very useful as time went by because I was under a strict schedule in order to obtain fuel cell performance results. Not only did I learn life skills, but also how to write research lab reports, how to use new types of lab equipment and the science concepts that are associated with my project. By being in-

involved with the research project I changed my idea of research from a long drawn out process that never comes to a conclusion to a process that is able to receive important results in six short weeks.

The reason I applied was because I believed the opportunity would have influenced my life in many positive ways such as gaining a greater insight on science, applications of knowledge in real life, and learning from those around me. The application of knowledge that I could have acquired would have been beneficial to me because it would give me a more rounded perspective. I believed I would undergo personal growth as well, such as acquiring research skills, communication skills, teamwork, confidence, problem solving and critical thinking. I also thought that I could acquire a group of friends and mentors. I was confident that I would receive all of these benefits from the Research Program. Now looking back at what I accomplished most of my hopes were fulfilled.

The Summer Research Program does have a huge focus on individual research, but Professional Development Seminars and Friday Lunch 'n' Learns Sessions provided everyone with the skills necessary for success. My favourite session was the Networking Fair because I was able to talk

to professionals in science and engineering fields. This session allowed me to discover how each individual got to their position and what steps they took. The piece of advice that everyone gave me was to take the risk even though I could crash and burn, but I could also discover what I love to do. Other valuable lessons were to do as many presentations as possible, to ask questions and to talk to everyone. I concluded that I had to become outgoing, not shy. This advice has encouraged me to tackle challenges and to try something new. These sessions also taught me about leadership, the importance of communication, courses and departments at the University of Alberta, making a research poster, writing a professional report, and effective presentation skills.

My summer was full of discovery, adventure and frustration, but it was the best way to spend the summer. Therefore, I would like to thank NSERC Promo Science for their sponsorship, Amir Reza Hanifi, Nina Chen, Thomas Etsell, WISEST staff, WISEST volunteers and industry volunteers. These individuals and organizations gave me this amazing and beneficial experience that I will never forget.

Jessica Guigon

Supervisor: Dr. Dennis Hall / Chemistry
Sponsor: NSERC PromoScience



“Something about steps, doors and adventures.”

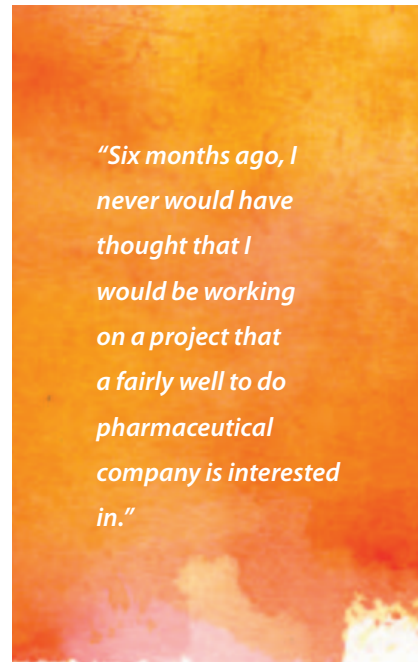
—Marissa Clapson

This, my friends, is what my supervisor came up with when asked for help with my introduction. I believe the quote she was trying to cite was from J.R.R Tolkien's *Lord of the Rings*, when Bilbo tells his nephew “It's a dangerous business, Frodo, going out your door. You step onto the road, and if you don't keep your feet, there's no knowing where you might be swept off to.” Although this quote may not have been quite as motivating as had been intended, it can be interpreted in a way that relates to my time at WISEST.

Upon hanging up the phone after being accepted into the WISEST Summer Research Program, my initial reaction was “I just sold my soul to a university a year early.” I regret to admit that this mentality didn't disappear until the first day of the program. Luckily, the moment I stepped into Orientation, I found myself in a room full of bright students my age, who were actually excited to be spending their summer doing research, my mentality changed to one of pure excitement. I suppose you could say I have a bad case of hive-mindness.

My six-weeks in the Summer Research Program were in the Dr. Hall Laboratory, under the supervision of Marissa Clapson, studying the behaviours of boronic acids in water. This loosely translates to a lot of NMR reservations (Nuclear Magnetic Resonance, think MRI for chemicals). Boronic acids are the next big thing in the pharmaceutical world, and plenty of companies, namely Anacor Pharmaceuticals, are very interested in them. After being submerged in water, the acids will either stay open, or they will close and become benzoxaboroles. Depending on whether they are open or closed, they have different chemical and biological properties, and react differently in a human's metabolism. Currently, boronic acids are being used for anti-fungal creams, such as Tavaborole. Six months ago, I never would have thought that I would be working on a project that a fairly well to do pharmaceutical company is interested in. In fact, six months ago, I never would have thought I would be working in an organic chemistry lab, after taking zero organic chemistry courses.

WISEST may be about introducing students to non-traditional gender roles, but it also introduces students to the fact that there are hundreds, if not thousands of jobs out there to discover. From engineer-



“Six months ago, I never would have thought that I would be working on a project that a fairly well to do pharmaceutical company is interested in.”

ing to computer science to chemistry, if you look for it, you'll be able to find it. I learned that it's okay to not know exactly what you want to spend the rest of your life doing. That is what life is about, discovering new things to explore. I would like to thank my sponsor, NSERC PromoScience for funding my position. I would also like to thank everyone in my lab, including Marissa Clapson and Carolynne Ricardo, my supervisors, as well as Dr. Dennis Hall, my Principal Investigator.

This may have been a tough six weeks, between learning the basics that I needed to understand my project, understanding that I wasn't going to understand everything right away, and getting used to a forty-minute commute, however, I feel as though this is an opportunity that should never be passed up. If I had given in to my negativity and not participated in this program, who knows how I would have spent my summer. I, for one, am glad I took the step out of my door, and I am glad that I kept my feet enough to participate in this program, because this is an experience I will never forget.

Jessie Perrin

Supervisor: Dr. Heather Bruce / Agricultural, Food and Nutritional Science

Sponsor: NSERC PromoScience

"Working in the lab is a difficult, fun and rewarding experience."



Living in the country you don't often get the chance to learn about careers in science or university life. That's why the Women in Scholarship, Engineering, Science and Technology (WISEST) Summer Research Program sounded like the perfect opportunity for me. I would get to learn about both at the same time! I have always been interested in science and math but I didn't really know what careers involved the two subjects. The WISEST Summer Research Program has allowed me to learn about many careers in science and what it's like to live away from home.

At first I was really nervous about starting the research program. Not only was I going to be starting a new job in a university research laboratory, I was going to have to live on my own with a group of people I had never met before. My fears were soon laid to rest as everybody at residence and in the laboratory were very pleasant and friendly. I have made many friends over these six weeks and hope that I will be able to stay in contact with them. There is always something to do or someone to hang out with in residence, I am never bored and have loads of fun exploring Edmonton or playing pool in the recreation room. Living in residence is a blast and I encourage all future WISEST students to consider living

in residence for their Summer Research Program.

Working in the lab is a difficult, fun and rewarding experience. During the first week of the program I felt like I was drowning in information, Maryam (another WISEST student) and I basically took a crash course in Meat Science and tried to remember as much as we could. I am extremely grateful that our supervisors took the time to simplify many concepts throughout the program so we could better understand them. Dr. Bruce's lab is trying to find the relationship between how tender a steak is and the collagen crosslinks found in that steak. Thus we literally start with a whole beef muscle, measure how tough it is, and then separate it into the different collagen containing tissues. From these tissues we try to isolate the crosslinks using hydrolysis, a roto-evaporator and a hydroxyproline assay. The evaporating process uses so much ice that by noon we have to go to other floors for ice because we have used all of the ice in our machine. We frequently have to raid the ice machine on the fourth floor so we have enough ice for our roto-evaporator. I have so much fun working in the lab and learn something new every day; it is definitely an unforgettable experience.

Professional Development Seminars are

always beneficial; they can involve anything from touring research facilities on campus to networking with professionals already in the field. The Friday Lunch 'n' Learns are especially valuable as they always contain useful information for our current projects and our future ones. I get endless amounts of useful advice from the research team, much of it comes from my supervisor, and I hope that I will be able to remember at least half of it for the future. The best part of the program was seeing the positive attitudes held by many of the role models. Hearing Dr. Armour speak made it hard for me not to look at the world in a positive way, I always leave her speeches feeling like a world of opportunity has just been opened to me.

I would like to thank NSERC PromoScience for funding my position, contributors to the Margaret-Ann Endowment Fund for making my participation possible, the WISEST coordinators for a great six weeks, and the research team for allowing me to work with them. A special thank you goes to my supervisors for all their advice and to Danielle for keeping residence life interesting.

Jonathan Chan

Supervisor: Dr. Catherine Chan / Agricultural, Food and Nutritional Science
Sponsor: Faculty of Agricultural, Life & Environmental Sciences



"The WISEST program expanded my perspectives and increased my curiosity for scientific endeavors."

I first learned of the WISEST Summer Research Program through the ambassador program at my school. Realizing that WISEST was a one-time opportunity for Grade 11 students and I am extremely grateful that I applied. Not only did I learn more about science, I gained invaluable skills for the years to come. Truth be told, I was very anxious at the start of the program. I was not sure of exactly what would be expected of me, and I had many unanswered questions. My research supervisors eased my transition to work in a University lab environment through their friendliness and patience. The summer research program allowed me to learn about the social dynamic of working in a lab, as well as the technical skills that are required.

In order to maximize our development of skills and knowledge, WISEST also incorporated events including the Friday Lunch 'n' Learns and Monday Professional Development Seminars. Many different speakers came to illustrate important skills that are beneficial for our futures. These events were not only educational and informative, but engaging as well.

I have always been interested in Type II Diabetes, since it is essentially incurable. A number of my own family members also suffer from Type 2 Diabetes, so I have

witnessed its effects firsthand. But since the mechanisms of insulin-producing islet cells are still mostly unidentified, the scientific frontier of diabetes is still wide open. Therefore, it was very exciting and interesting to conduct research in this field. This summer, we researched the effects of Vaccenic Acid (VA), a naturally-occurring Trans-Fatty Acid (TFA), on Glucose Stimulated Insulin Secretion in islet cells from Sprague-Dawley Rats. Islets were separated four groups, each consisting of different treatments: a control group with a vehicle, a group with Streptozocin (STZ) and Palmitic Acid (PA), a third group with STZ, PA and VA added simultaneously (diabetes prevention), and finally, a 4th group with VA added 30 mins after incubation with STZ (diabetes treatment). DMEM solutions of different glucose concentrations were then added to stimulate insulin secretion. Radioimmunoassays quantified insulin levels from the Totals and Releases. The amount of insulin in the sample was measured by using a standard binding curve.

At higher concentrations, the effects of STZ were evident, considering that there was a trend showing that STZ and PA induces beta cell stress, causing less insulin to be released. This meant that our method for inducing diabetes worked

correctly. At the 16.5mM concentrations with VA present, the insulin released was improved compared to the STZ/PA group, but insulin levels were still not at the level of the diabetes-free control group. Therefore, this test demonstrated VA's potential as a preventative as well as a therapeutic agent in beta cell dysfunction resulting from T2D. These results are interesting, considering that synthetic TFA are related to cardiovascular disease and other ailments. Our results show that, natural TFA could be beneficial for remedying Type II Diabetes.

Ultimately, WISEST is a program that both prepares and broadens career paths for post-secondary educations. It expanded my perspectives and increased my curiosity for scientific endeavors. I was able to gain experience and learn skills that would not be possible in a high school environment. This could not have happened without the Faculty of Agricultural, Life and Environmental Sciences, for whose funding I am extremely grateful. I would also like to thank WISEST for the unique opportunity to undertake this project, as well as everyone in the Chan Lab for their support and kindness.

Katarina Bohaichuk

Supervisor: Dr. Fangliang He / Renewable Resources
Sponsor: WISEST Golf Tournament

"WISEST has opened doors and left me the skills and confidence to explore what is behind them."



I could not have been more thrilled when I received the call from WISEST telling me I had been accepted into the program. They told me I would be doing fieldwork, measuring soil CO₂ efflux around Hinton and Jasper. I did not know what soil CO₂ efflux meant at the time but that just made it more exciting. I had been looking forward to joining WISEST ever since I heard about it and could not think of a better way to spend my summer than exploring science and doing research. And outdoors too!

And what a summer it was! For six weeks I had the honour of working in Dr. Fangliang He's lab with Jessica Akande on her project researching soil respiration and its environmental controls. We travelled to different mixed wood forests of various ages and that have been harvested in different ways. The purpose of our project is to investigate the effect that climate change and forestry practices will have on the release of CO₂ from soil organic matter and plant roots. Forest soils contain a vast amount of carbon and the release of this carbon due to forestry and rising temperatures because of climate change will only further contribute to global warming. I spent the summer in Hinton and George Lake using a LI-COR 8100 portable

infrared gas analyzer to measure soil CO₂ emissions (or efflux) from the soil. We also identified and measured the diameter of all the trees in our plots. The days were long but very rewarding. Prior to joining this project I had no idea that the soil played such an important role in our global carbon cycle.

WISEST however, is much more than research. It's about making connections. Before I knew it, I was entering a room full of forty unfamiliar faces as well as those of my research team. It would have been rather daunting but I realized we all had something in common: our love of science. Soon I was making friends and valuable connections. If there is one thing I would really take back with me from my experience this summer it would be that WISEST has showed me that there are other people just like me, women interested in science who went through or are going through the same things as me. If I ever need help there are people I can talk to. I had hoped that the Summer Research Program would help me decide what I want to take in university. I was wrong; WISEST has instead taught me that it's ok to be unsure about what you want to do and has provided me, through our various Professional Development and Lunch 'n'

Learn sessions and tours, the tools and insight to explore careers and options and how to network with people to get the answers to your questions. WISEST has opened doors and left me the skills and confidence to explore what is behind them.

The WISEST Summer Research Program has been an amazing experience, from the overnight trips with my research team, the hard work and good times to the invaluable lessons I learned from the WISEST seminars. Overall this has been an incredible experience and I would like to thank WISEST and the WISEST Golf Tournament for accepting and sponsoring me. Also I would like to thank my research team, Dr. Fangliang He and Jessica Akande for including me in their project and giving me an insight into what fieldwork and research is all about. And last but not least I want to thank my family and friends for supporting me, and my sister for introducing me to WISEST. I would not be here without all of you so thank you!

Kelsey Tamura

Supervisor: Dr. Bill Tonn / Biological Sciences
Sponsor: Edmonton Area Council, Beta Sigma Phi



“My WISEST experience has taught me about pursuing your dreams and career ambitions, and has given me the confidence to do so.”

I first heard about WISEST through one of my teachers. He encouraged me to apply for the Summer Research Program, but I was a little intimidated. The idea of spending my summer working in a university research lab was a little nerve-racking but sounded thrilling and challenging. After this summer I've learned not to let hesitation stop you from exploring any interests or pursuing any goals. When I found out I would be spending six weeks in Dr. Bill Tonn's lab researching morphological variation of Lake Trout, I was so excited. I knew although it would be hard work, I would not only gain some great work experience, but I would learn about the endless areas of science and engineering to think about after high school. Little did I know it would be so much more. My WISEST experience has taught me about pursuing your dreams and career ambitions, and has given me the confidence to do so. On top of that, I've had the privilege of meeting some incredible role models, and made some great friendships.

In the Department of Biological Sciences under the great supervision of Dr. Bill Tonn and one of his graduate students, Louise Chavarie, I started looking at trout diversities in Great Bear Lake, Northwest Territories. It is the largest lake entirely within

Canada and known for producing trophy sized trout. My job in the lab was to place landmarks on digital fish images for body and head shape analysis. We were looking to determine the number of different morphotypes in the lake and what causes this. I also got the chance to do some hands on work in my first few days measuring gill arch lengths and going through stomach content of Lake Trout and Lake Whitefish. It was crazy to be immersed in university level research so quickly (being only a grade 11 student), but I think motivation and curiosity that young students bring is what drives success in the program.

Some of my favorite experiences this summer have been from the Professional Development Seminars on Monday afternoons. It was always exciting to meet up with our friends, and head to wherever we were to meet, without much knowledge of what great experience we would be partaking in that day. In particular one of my favorites was the Networking Fair. I think we were all a little nervous to meet such accomplished, professional women, but talking with them and hearing their stories was very inspiring. I felt so fortunate to get the chance to chat with them about their journeys and challenges they have faced. Each one of their stories opened my

mind and got me thinking about potential careers for my future. Another one of my favorites was Exploring U of A research. My choice along with a few other girls' was to tour the Nanofabrication Lab. We got to dress up in full bunny suits before entering the lab and get a taste of nanotechnology, which I didn't have much knowledge about. Once again I was introduced to an area very new to me and got to think about what a career in nanotech would be like.

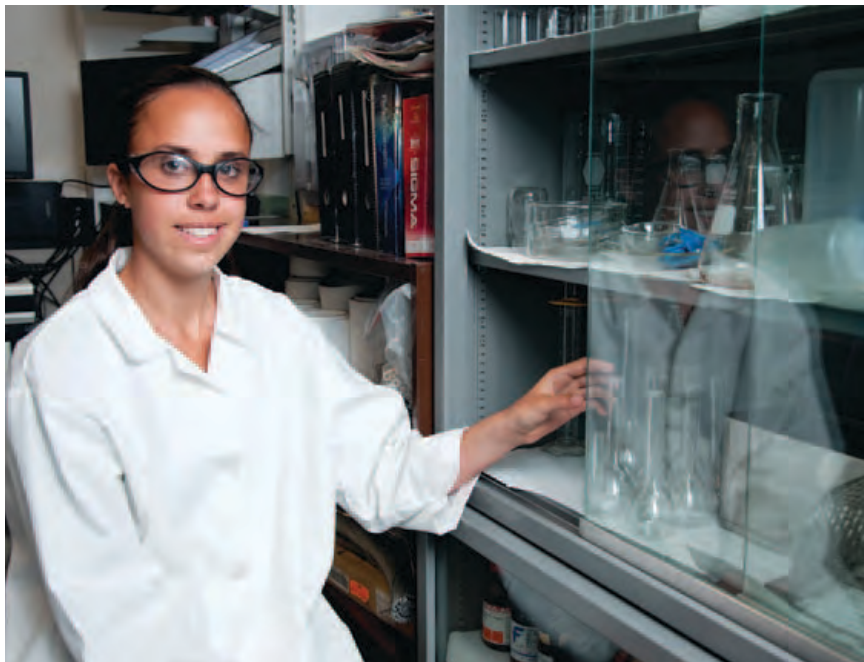
The knowledge and experience I've gained this summer, not to mention great friends I have made, have made it one I wouldn't trade for anything. I've learnt to go into anything with an open mind because you never know what you can uncover. I'll also take with me the courage to follow my dreams and face the challenges put in front of me. I'd like to acknowledge and thank my research team and the WISEST team for providing me with this amazing opportunity. Also thank you to my sponsor, Edmonton Area Council - Beta Sigma Phi, for making the Summer Research Program possible!

Kendra Carlson

Supervisor: Dr. John Nychka / Chemical and Materials Engineering

Sponsor: Dow Chemical Canada Inc.

“One of the most valuable sessions for me was the industry tour.”



When I first heard about the WISEST Summer Research Program, I knew that it was something I wanted to be a part of because of all of the opportunities I would have to explore careers in the areas of science, engineering and technology. When I received the call informing me that I had been accepted, I knew that I was in for a summer unlike anything I have done in the past. It has definitely been a unique opportunity and an amazing way to expose myself to different career paths I could pursue in the future.

I had the opportunity to work in Dr. John Nychka's lab, in the department of Chemical and Materials Engineering, researching dental ceramics. At the beginning of the summer, I had no idea what I was getting into or how engineering could even be related to dentistry. In the first few weeks, I quickly learned that I would be researching how different conditioning treatments affect the flexural strength of a zirconia based ceramic, used to make dental restorations like crowns. The first part of my summer was spent preparing my specimens. I had to cut, sinter, and polish them. Then I had to chamfer the edges and sandblast them using different particles and particle sizes. Some of my specimens then underwent a heat treatment at the end of their preparation. I then proceeded to test the flexural strength,

to determine which preparation method was the best. This method can eventually be used to prepare the surface of these ceramics, so that they can be effectively used in Dentistry. Throughout the summer, I found it very interesting to learn why different treatments could cause such differences in the properties of the same material, and enjoyed being in a work environment that encouraged me to ask questions and continue learning.

Working in a research lab all summer taught me a lot. Not only did I get to learn specifically about my project, but I also gained some practical work experience. The Professional Development and Lunch 'n' Learn sessions WISEST held each week were also very valuable in developing practical skills that I can use in the future. I learned how to create a research poster, the importance of mentorship and networking, and many other things that I can use as I enter into grade twelve and beyond. One of the most valuable sessions for me was the industry tour. It showed me what it would be like to work in industry and the different positions and jobs that are available; some that I didn't even know existed. Some of the employees also shared how they got where they are today and what they love about their jobs. This was very beneficial to me as I decide what I want to pursue in the future.

Additionally, I had the opportunity to learn what is happening in industry today and see the facilities where this research is taking place.

The WISEST Summer Research Program has truly been an amazing and unique opportunity that I was privileged to be a part of. I have met so many incredible people throughout the six weeks, who have become great friends and who have taught me much. I would like to thank my supervisor, Dr. Sheila Passos, for all of her time and guidance this summer and all the other members of my research team who have provided support and direction. I would also like to acknowledge my sponsor, Dow Chemical Canada Inc., for their generous support of this program and of my WISEST experience. Finally, I would like to thank WISEST for putting so much time and effort into making the summer research program a success, it is something that I will never forget.

Mackenzie Burnett

Supervisor: Dr. Fiona Bamforth / Laboratory Medicine and Pathology

Sponsor: Weyerhaeuser



“While I’m sure that my path in life will take me on a winding road with plenty of detours, I can finally answer the question “what do you want to be when you grow up?””

When I was younger, my career aspirations consisted of either becoming an author or a hair dresser. Despite my resolve that my future lay in one of those options, I was always reluctant to answer when asked “what do you want to be when you grow up?” All my plans changed when I was assigned to the classes of a series of incredible science teachers, each seemingly more enthusiastic than the last, who awakened my interest in science. During one particular grade 10 science class, a friend of mine was given a WISEST pamphlet from one of my many influential teachers, which was how I learned about SET Conferences and the Summer Research Program. I knew that this program was exactly what I needed to boost my confidence and independence, to give me an idea of what a career in science might be like and to also prepare me for that career. If the program would be anything like the SET Conferences, which greatly broadened my horizons, then I knew I could expect great things. In many ways, the program did fulfill my expectations and in many ways, it exceeded them as well.

My project consisted of evaluating a quantitative test for a rare disease called Porphyria in order to replace the old method, which wasn’t very sensitive, that is

used at the University of Alberta Hospital. Porphyria is caused by a deficiency of one of the enzymes in the heme biosynthesis pathway. My role involved repeating the test several times for the purpose of establishing its repeatability and the range of concentrations it can detect, amongst other things, to see if it would be beneficial to implement. The results were promising, but further evaluation will be done before it is put in practice. Throughout the six weeks I spent as a research assistant I learned numerous things, one of them being that although research can be a bit mundane at times, it can be exceptionally rewarding when it is in a field that you are passionate about.

Of course, research was not the only thing that I did all summer. I participated in several sessions like Writing a Professional Report, Leadership in the Workplace, The Art of Networking and Research in Action, which were all memorable, fantastic learning experiences. Amongst all the planned events, I think that my favorite ones must have been the Social Science Challenge, the Networking Fair and the Research in Action tour. Along with living in residence, which allowed me to experience the city and living on my own, the Summer Research Program ended up being like a

crash course in the rest of my life.

I would like to thank my Direct Supervisor Carol Shalipay and my Principal Investigator Dr. Fiona Bamforth for the work that they did so I would have this amazing opportunity and my sponsor Weyerhaeuser for making this program possible. If I had to choose one piece of advice to share with others, it would have to be concerning the importance of dreaming your future, which was given by the founder herself, Margaret-Ann Armour. That piece of advice made me realize that my future was already in my own hands and that it was up to me to decide what I would do with it. While I’m sure that my path in life will take me on a winding road with plenty of detours, I can finally answer the question “what do you want to be when you grow up?” I want to become an individual who fulfills their dreams. Whether that is through working on a cure for a disease, researching new forms of renewable energy or returning forests to their original state, I do not yet know. One thing I know for sure, is a quote by Neil Armstrong, “Every human has a finite number of heartbeats. I don’t intend to waste any of mine.”

Madison Proulx

Supervisor: Dr. Rajender Gupta / Chemical and Materials Engineering

Sponsor: NSERC PromoScience

"Working in the lab I not only got to learn about the research I was doing but I also got to learn about all the other types of research going on in the lab."



I've always been interested in the sciences and when I entered high school, I found that my favourite classes were Physics, Chemistry and Math. When I heard about the WISEST Summer Research Program from my school's career counsellor, I knew it would be the perfect learning opportunity for me. I expected to learn about different careers that may be less traditional for women, and to gain experience working in a lab. I have to say that my expectations were exceeded, I have learned about so many different careers and opportunities. It's impossible to fit all of the knowledge I've gained over these past six weeks into this report and I know that it all will be extremely valuable when I enter into post-secondary.

Not knowing much about Chemical and Materials Engineering I wasn't sure what to expect. Once I found out that I had the opportunity to work in the C5MPT (Canadian Centre for Clean Coal/Carbon Mineral Processing Technologies) I was thrilled. I worked under the supervision of Dr. Rahman, Ebrahim Azimi, Komal Dhankhar, and Nitya Iyer, all who have helped me tremendously throughout the six weeks. My research was to reduce GHG (Green House Gas) emissions and mercury emission from coal. This was done by

using a fluidized bed to separate the coal from the ash (heavy metals and minerals). I helped conduct the experiments and had a couple of opportunities to run some experiments on my own. Working in the lab I not only got to learn about the research I was doing but I also got to learn about all the other types of research going on in the lab. I have gained a lot of knowledge about coal but I've also got to learn what it's like to work in a research lab.

WISEST has so many opportunities for us to learn outside of the lab. Every Monday afternoon we would have Professional Development Seminars where we were taught about many different things that will help us not only in university but also when we enter into the working world. My personal favourite seminar was the Research in Action. I was able to go on an industry tour of Syncrude, there I got to really see research being put into action. It gave me insight into what research looks like for a large industry such as Syncrude. We had the opportunity to talk to women working there and ask them questions about their experiences and the research they're working on. The Friday Lunch ``n`` Learn sessions taught me so many new skills, and gave me the opportunity to meet the other WISEST Student researchers. It

was great to meet different students with the same interests as you and also learn about the research they were doing. One of the sessions was all about designing a research poster, this was extremely helpful since from the very beginning I was terrified of the idea of having to make a research poster since I've never made one before. The session gave me all the necessary information to be able to complete my poster. This information will most definitely come in useful when I'm in university along with the numerous other things I have learned from these sessions.

The WISEST Summer Research Program was an absolutely amazing learning experience that I will surely never forget. I'd like to thank NSERC PromoScience for sponsoring me and making all of this possible it's truly appreciated, thank you Dr. Gupta for opening your lab to me and I'd like to give a huge thank you to all of my supervisors for teaching me all about Chemical and Materials Engineering.

Maria Baclig

Supervisor: Dr. Larry Unsworth / Chemical and Materials Engineering

Sponsor: Faculty of Engineering



“Not only did I learn much about what research looks like, but I also met many inspiring people.”

Rarely can a regular high school student say that she or he has been involved in groundbreaking research in the field of Biomedical Engineering at the National Institute for Nanotechnology (NINT). Fortunately, because of the WISEST Summer Research Program, I am one of those lucky students. I expected to find what I wanted to do for the rest of my life, or at least come closer to that goal. Instead of discovering that there was only one path for me, I learned that there are so many possibilities, so many ways of getting there, and that there isn't only one end goal. In fact, Dr. Margaret-Ann Armour, one of the founders of WISEST, told us that planning was impossible because we were meant to do something greater. We had to dream big.

Dreaming started with my research. We worked on developing a drug-delivery system that was more efficient and allowed for drugs to be accepted with fewer complications into a host. Specifically, we mass-produced an alkoxyamine initiator that self-assembling polymers could attach to and form more biocompatible surfaces. At first, a protocol written by Sinoj Abraham and Dr. Larry Unsworth was followed as a guideline, however, changes and alterations were made to the procedure based on the availability of equipment, for mass

production, and to improve results and purity of the product made.

We started by synthesizing BrTMOs, filtering and purifying this compound as a preliminary step to the alkoxyamine initiator. Next was grafting it onto silicon wafers. Finally, we characterized the products and were able to determine the structures of the products we had made using several techniques such as Nuclear Magnetic Resonance (NMR) Spectroscopy and Isometric Titration Calorimetry (ITC).

The summer started with the reading and studying of both simple concepts from Wikipedia and more complex scientific articles. Then, Hana, another WISEST student, and I were brought into the laboratory where we were extremely nervous about breaking or touching anything toxic; we watched with great intensity each and every step taken. Notes were religiously taken in our lab books, including detailed descriptions and drawings of the different setups. With each day, we became more comfortable with the whole procedure. By the end of the second week, we were working almost independently in the laboratory: calculating values and volumes, running multiple syntheses, and troubleshooting problems.

Not only did I learn much about what re-

search looks like, but I also met many inspiring people. Dr. Margaret-Ann Armour was an absolutely incredible woman, telling us we could be and do whatever we wanted. I would like to thank my supervisor, Dr. Unsworth who constantly challenged and took care of us. I also must acknowledge the people in my research team: Alejandro, Lei, Kyle, Marklan, Christopher and Maryam who were always more than willing to give up their time to sit down with us and become our personal teachers, explaining a certain concept, giving tips, or showing us their own amazing research. They treated us like we were one of them: people with useful ideas, capable of completing good work, and of course, able to bring entertainment and joy for science either by singing, dancing or pure enthusiasm.

There is no doubt; my summer in the WISEST program has been one of the most rewarding experiences of my life. I am so grateful to my sponsors, the Faculty of Engineering at the University of Alberta, for giving me this opportunity. I hope programs like this continue to flourish, and most importantly, change lives by empowering women and encouraging young students of today to dream.

Maryam Osman

Supervisor: Dr. Heather Bruce / Agricultural, Food and Nutritional Science

Sponsor: Allard Foundation

"I had the amazing opportunity to gain valuable knowledge and skills working in the lab of Dr. Heather Bruce."



As my time spent in high school continued to progress- so did my anxiety about what I wanted to study in university. I knew that I enjoyed math and the sciences, but my knowledge of possible careers was very limited. With all of my relatives pursuing education in fields away from science, engineering and technology; it was very difficult to muster up the courage to pursue a degree in a non-traditional field. When I heard of WISEST I decided to attend their Science, Engineering and Technology (SET) conference immediately. The interaction with women in non-traditional fields inspired me to challenge myself and to overcome obstacles many face when pursuing a non-traditional area of study. With my rekindled confidence and determination, I applied to the Summer Research Program and was accepted.

I had hoped to gain experience working in a lab and to learn more about the different types of careers available to me. After learning that I was placed in the Department of Agricultural, Food and Nutritional Science in meat science studying collagen cross-links, I was excited and ready to learn about a field completely new to me. I had the amazing opportunity to gain valuable knowledge and skills working in the lab of Dr. Heather Bruce.

I worked diligently with my supervisor Jennifer and post-doctoral fellow Dr. Bimol

Roy in studying the mature cross-links Pyridinoline (Pyr) and Ehrlich's Chromogen (EC) in meat and their contribution to toughness. Collagen, a protein found in connective tissue, is a determining factor of meat toughness not only because of its triple helical shape but also due to the cross-links found both inside and in-between collagen molecules. These cross-links are non-reducible and are very difficult to breakdown, and previous research has shown that the amount of these cross-links increase with age. Furthering this research, we isolated collagen and calculated the amount of both cross-links of cattle that were two different breeds and were given growth implants and ractopamine feed or not. The purpose of this research was to determine the best practice of raising cattle for beef that would best yield tender meat by decreasing the quantity of Pyr and EC crosslinks. We began with separating the three types of connective tissue found in beef; Perimysium, Sub-Perimysium and Endomysium. From this we began to isolate collagen from Perimysium where it is found in most abundance. Our methods included adding hydrochloric acid to our meat samples, using a Rotary Evaporator to evaporate the acid and using different methods to purify the collagen including size exclusion. The precise measurement was

given by absorbance using a spectrophotometer. We had found that cows fed the ractopamine feed had a decreased amount of the Pyridinoline cross-link while cows not given growth implants had an increased amount of EC.

While our work in the lab helped us develop many skills, the WISEST program allowed us to learn more about ourselves and the opportunities available to us in very unique ways. Sessions for Professional Development and Lunch 'n' Learns allowed me to grow professionally and make new friends. The tours had a positive impact on my perspective of science, engineering and technology and the lunch with Dr. Margaret-Ann Armour gave me a huge amount of inspiration. I would like to thank the Allard Foundation for funding my position in the WISEST program and to Dr. Heather Bruce and Jennifer Potter for being outstanding and kind role models. I am very grateful to be a member of such an exceptional program and hope to become an inspiring individual and mentor, as I have been blessed to have met so many in this summer.

Melissa Wheatley

Supervisor: Dr. Uwe Hacke / Renewable Resources
Sponsor: NSERC PromoScience



“Every Monday and Friday was an opportunity to learn something new and help advance our futures that much farther.”

When I first heard I had made it into the WISEST Summer Research Program it was the first real opportunity to break out my “happy dance”. I applied in the hopes of kick starting my future in science and when I received confirmation it gave me the confidence I needed to seriously consider this as a path for myself. The thought that I was going to do something no one has ever done before was thrilling. This realization became more apparent as the weeks in the program moved on. Orientation introduced us to the next stage of our lives with a welcoming compilation of speeches and slide shows explaining to us our duties, what to expect, and the opportunities we should take advantage of during our time at the university. This orientation, and the program itself, set up a foundation we could build upon for the next six weeks and for the rest of our lives.

During the program I worked in the Tree Water Relations laboratory of Dr. Uwe G. Hacke researching the physiological traits of two very different types of birch plants. This required my first day to be a field trip to collect samples at the Wagner Natural Area. So, rubber boots in tow we battled the mosquitoes in the name of science. This was a fantastic first day! Going in I had the expectations of a very strict and intense

environment, but I am pleased to say that my lab was exactly the opposite. The atmosphere was very welcoming and this made me feel at ease. Throughout my weeks I logged an impressive amount of time in front of the microscope and became familiar with the lab centrifuge. I had a wonderful time working in my lab learning hands-on what it is like to work in research. I now have laboratory skills I will take with me wherever my path may go.

Other than a wonderful lab experience, WISEST provided fantastic Lunch ‘n’ Learn Sessions and Professional Development Seminars to help us in understanding more about the world of science, engineering, and technology. The first session was a “Hydraulic Challenge” where we had to construct a fully functional hydraulic robot arm out of cardboard, syringes, and tape. My first thoughts were, “Pfft. Yeah. This is going to be interesting.” I am proud to say that my group and I had successfully held our own. Every Monday and Friday was an opportunity to learn something new and help advance our futures that much farther. We had speakers come in and we had a chance to go on tours. I participated in the Syncrude tour and the Greenhouse tour. With these tours we were able to explore behind the scenes more in depth than we

would have been able to on our own. The sessions and seminars provided me with some valuable professional tools along with lessons of what to expect in my coming years. It really opened my eyes to what opportunities are out there for me, as well as connected me with a number of mentors who were able to answer my questions. My expectations of this entire experience were exceeded and it has left me with know-how I can take with me on my career journey. WISEST taught me it is okay to be uncertain in what you want to do, just don’t narrow your ideas based on preconceived notions.

I would like to thank WISEST for orchestrating such an elaborate and amazing experience, as well as all the people of the Tree Water Relations laboratory and the generous sponsorship of NSERC PromoScience. Without all of you this would not be possible.

Mercedes Liddicoat

Supervisor: Dr. Christopher Sturdy / Psychology
Sponsor: Alberta Education

"I was overjoyed with where I was placed in the program, since I had expressed an interest in biology and behavioural studies in my essay."



The simple question, "What do you want to be when you grow up?" was one that made me internally run and hide. I felt as though I had hardly seen the opportunities out there that I could pursue. Additionally, I am only beginning to learn the different interests I have and what I am truly passionate about, so having to choose a lifelong career seemed a bit premature to me. These reasons led me to apply to the WISEST Summer Research Program, with the intent to discover fields of work I never thought possible and to allow myself the chance to better understand what I really want to gain from my future career.

I found out I would be working in Dr. Christopher Sturdy's lab under the supervision of Allison Hahn in the Department of Psychology. I was overjoyed with where I was placed in the program, since I had expressed an interest in biology and behavioural studies in my essay. Being from a small town, I was also going to be staying in residence at St. John's Institute. I thought I knew what the six week journey ahead of me would have in store and that it would be relatively predictable... I was wrong!

My supervisor Allison escorted my WISEST lab-mate, Shawna, and me to our lab which—somewhat to my surprise—didn't look like a CSI laboratory, but instead

more like an office. Having an interest in behavioural analysis, I chose a project that focused on finding out how female chickadees responded to playback of various male chickadee stimuli. It was then that I learned that chickadees had a dominance hierarchy, meaning there were dominant and subordinate males. My project involved audio recordings that were taken before and after a female chickadee was exposed to either a subordinate, dominant, or reverse-dominant feebee song. I went through and counted the different types of vocalizations the female made in response to the different stimuli. This required having to learn what the different chickadee calls looked and sounded like, which was really interesting. It was always exciting to discover a new call I hadn't heard before! Shawna and I also fed the birds their supplements. This was my favourite task, since I loved being around the birds and listening to them in person rather than just in a recording.

WISEST also organized different activities outside of the lab that exposed us to even more fields of research. I partook in the U of A Observatory tour, which was absolutely fascinating and has definitely piqued my interest in astrophysics. WISEST Chair Denise Hemmings states that

the WISEST program is about "doing and watching, listening and asking questions," and the Professional Development seminars helped us do just that. One of the most influential seminars for me was the Networking Fair. The mentors that were there to share with us their experiences in pursuing careers in less-traditional fields were truly amazing. To my surprise, I was told more than once that it is okay to change my mind when going to school and that I didn't need a set career path! Many of my fears about life after high school have been alleviated and myths dispelled due to these seminars and the program overall.

This unforgettable summer wouldn't have been possible if it weren't for the amazing people that made this program a success. I'd like to express my utmost gratitude to my sponsor, Alberta Education, for giving me the opportunity to participate in WISEST, along with the coordinators for all their hard work. Also, a huge thank-you to my supervisor and mentor Allison Hahn, my Principal Investigator Dr. Christopher Sturdy, and students John Hoang and Lee Vilinsky for the best summer ever.

Monica Takla

Supervisor: Dr. Kim Chow / Physics
Sponsor: WISEST Golf Tournament



“Not once did I feel the people in my lab tired of my questions.”

My experience during the WISEST Summer Research Program is one I would not trade for the world. Not only did it provide me with a valuable peek into the world of research but also I grew and learned so much about myself through spending time with people and being on campus every day for six weeks. My summer was fruitful and gave me a huge advantage over other students my age.

I came to know of WISEST by way of my chemistry teacher who encouraged me to apply for the Summer Research Program even though I felt my chances of being accepted were rather slim. Luckily though, I did or else I would not be here writing this today.

I was placed in the labs of Dr. Chow and Dr. Jung with their collaborated research groups. We studied the effects of Aluminum doping on the magnetic transition of perovskite manganites using an Alternating Current Susceptibility (ACS) machine. My job was ensuring the operation of the ACS machine ran as smoothly as possible. I learned how to identify at which temperatures a sample was paramagnetic and when it transitioned to become ferromagnetic as well as plotting their graphs.

Understanding basic theories crucial to the research, such as Faraday's Law of

Electromagnetic Induction, was a challenge and it did not help that I thought I was lacking the basic knowledge that I should already know. The evolution from high school to university was a steep learning curve and it took me a while to adjust. As I became more comfortable with the research team, however, I found questions popping out of my mouth without my realizing it. Not once did I feel the people in my lab tired of my questions. They seemed eager, and glad that I was asking questions and they were always willing to answer me. They explained concepts multiple times until I was positive I could explain to others what my project was about.

Apart from the research in the lab, WISEST organized several activities to familiarize us with other students in the program as well as gain the most from our summer. The Professional Development Seminars held every Monday helped us further ourselves professionally. We toured different research labs on campus, such as the Nanofabrication Lab. In addition, role model volunteers came and shared their experiences as science students and professionals. One thing that really stuck with me was it is okay to change my mind. It is all right to decide one thing, but then switch and try another. The Lunch 'n' Learn

sessions on Friday helped us gain more insight into university life itself. Because many of the activities required group work, I ended up meeting lots of other students and I found a lot of them have the same interests as I do.

WISEST is a once in a lifetime opportunity only a few lucky ones get to experience. This year I was one of the 40 lucky ones. The knowledge I gained, the experience I have been through, the remarkable people I have met, and the wonderful friends I have made are aspects of the program that I will cherish forever. I could never have received all this anywhere else. I am extremely grateful to my chemistry teacher without whom I would have never known about WISEST, Dr. Chow and Dr. Jung for accepting me into their lab and their patience in explanations, Ms. Mary Narreto for showing me the ropes of the system and her patience and her tireless responses to my questions. I would also like to thank everyone who works at WISEST for running this fantastic program and my sponsor, the WISEST Golf Tournament for giving me this opportunity. This is one summer I will never forget.

Raylene Boake

Supervisor: Dr. Mohamed Al-Hussein / Civil and Environmental Engineering
Sponsor: WISEST Golf Tournament

"Thinking back to six weeks ago, I could not have imagined how much knowledge and experience I would gain during my time with WISEST."



From a very young age, I have always loved to challenge myself. That is exactly what the WISEST Summer Research Program has been for me this summer; a challenge.

When I first heard of the program I wasn't very interested, because there was just no way I was going to give up six weeks of the summer. However, I eventually realized that WISEST could help me with a career decision, so with that in mind I applied. When I learned that I would be working in the Civil and Environmental Engineering Department I was extremely excited and extremely nervous. I had no idea what to expect from the job, nor from the Program, so I was very intimidated coming in on the first day. However, within an hour of Orientation I had already made friends and listened to some incredibly inspiring women speak. I already loved it!

After Orientation was over Dr. Mohamed Al-Hussein and Sang Han brought me to my lab. Once again I found myself extremely nervous, and when I saw what I would be doing, very intimidated. The project given to me was part of a bigger project that involves undergrad students. I was to learn a 3D modeling program called 3DS Max by watching tutorials, and then model the storage area of a modular manufacturing factory called IGLOO. It was

definitely a challenge trying to learn the program, but it was all worth it when I got to visit the factory and start my project. The IGLOO Factory is a residential modular construction factory where entire houses are built. In order to find errors in productivity, the manufacturing process is visualized in digital 3D models. This is where Building Information Modeling (BIM) and programs like 3DS Max come in. I was given papers to read about BIM, and found that there are many components in it that are used to integrate all the information needed to describe the making of buildings. The visualization of a project is very useful to detect errors in design early.

Thinking back to six weeks ago, I could not have imagined how much knowledge and experience I would gain during my time with WISEST. WISEST offered a chance for all forty of us to gain skills and knowledge at the seminars every Monday and the Lunch 'n' Learns every Friday. During these sessions we were able to learn how to write reports and research posters, and interact with professional women in engineering and science. One of my favorite sessions was the Social Science Challenge, where we had to build a hydraulic arm out of cardboard, syringes and tape. It incorporated my favorite parts of this program;

being able to meet girls my age who have similar interests and enthusiasm, as well as meeting a challenge. I can easily say that the thing I will miss most about WISEST is the lunches with all of the girls. Throughout the rest of the program we were able to go on tours, and I was lucky enough to be a part of the Nanofabrication tour and the Quantium Technology tour, which were both extremely interesting. It was great seeing how women in science work, and it has since inspired me to work harder.

To conclude, I would like to thank all of the people who made my time here enjoyable and possible. My research team, Adriana Hernandez, Michelle Ting, and Devyn Rudd, and my supervisors Sang Han, Mana Moghadam and Emilia Koukouvanova for answering any and all questions I've ever had. As well, I am very grateful to my Principal Investigator Dr. Mohamed Al-Hussein and my sponsor, the WISEST Golf Tournament, without whom I would not be here! This was an incredible opportunity, and I know that I will benefit from it in all my future endeavours.

Rebekah Cavanagh

Supervisor: Dr. Steven Strelkov / Agricultural, Food and Nutritional Science
Sponsor: NSERC PromoScience



"I think the biggest benefit of this program for me was the push it gave me to step out of my comfort zone."

I only knew one person who had participated in the WISEST Summer Research before I applied for the program. My sister was a participant and she came back with stories of interesting new discoveries and great new friends. As the time for application approached I began to read through the Journals of Student Research from the years before. I read about experiences I knew I didn't want to pass up, so I decided to apply. Soon after I was accepted into the program, I contacted my Principal Investigator and Direct Supervisor and learned that I would work in a plant pathology lab focusing on sclerotinia stem rot, a fungus which grows on canola. When I was packing up to move two hours away I wondered what I was going to spend the summer doing. The idea of this leap into the unknown terrified and thrilled me all at the same time.

Right from the start it was a whirlwind of learning and fun. At Orientation I met great people who were interesting and easy to make friends with. On the first afternoon, I saw a lab full of machines I had never seen and was exposed to field work. I thought all my relationships in the lab had to be formal and professional. My supervisor showed me that you can be productive and, at the same time, have fun with the people you work with. She was very patient and didn't

expect me to understand everything the first time it was explained to me. I was excited to learn a lot of things hands on, by working with someone else or doing it myself, with constant instruction and supervision. The WISEST Summer Research Program had so much more to offer me than I could have imagined.

In my lab, I worked with *Sclerotinia sclerotiorum*, a fungus that grows on canola and causes yield loss. There is a fungicide that can be sprayed to kill the disease before it affects the crop but it is expensive and sometimes not economical depending on the level of disease infestation. A new method for the forecasting of sclerotinia levels is being developed to enable farmers to spray more selectively. I was involved in testing the accuracy of this method. Working in the lab, I learned how to form relationships with people who didn't necessarily have similar interests to me. I learned to take responsibility for my own work.

I think the biggest benefit of this program for me was the push it gave me to step out of my comfort zone. I came into the program not knowing anyone, so I had to make friends. I was really nervous about this, but I found myself enjoying meeting new people. Within a couple hours

of meeting a few of the girls I knew I was forming lasting relationships. In my lab, in the networking session, in the Professional Development sessions, and around campus in general I had to make conversation with adults I didn't know very well or at all. I've become more outgoing over the course of the six weeks. It was a great opportunity for me to grow up and get ready to move out in a year. The WISEST Summer Research Program helped me grow as a person and explore new areas of science.

Thanks so much to everyone in my lab for being so patient and supportive. Thanks to everyone who works behind the scenes and to all the sponsors, especially NSERC PromoScience, without whom the Summer Research Program would not be possible. Lastly, thanks so much to all the other participants who made the program unforgettable!

Ripple Patel

Supervisor: Dr. Mohamed Al-Hussein / Civil and Environmental Engineering
Sponsor: Syncrude Canada Ltd.

"All these different opportunities gave a more definite shape to my thoughts regarding the acceptance of science and technology as a career path."



WISE students take a break from their textbooks and enjoy their summer with video games, family trips and hanging out with friends. However, WISEST students do all those fun things along with a valuable learning experience; they not only play video games but also learn the process of creating one, they go on field trips as far as Fort McMurray to learn about different species of worms and they hang out with motivating mentors who nurture and provide them with hands on experience in different fields of science.

This summer, I was given the opportunity to work under Dr. Al-Hussein in his Civil and Environmental Engineering lab and was mentored by Mana Moghadam and Sang Hun. My project involved designing and creating a 3D model of a house for Igloo Prebuilt Homes using computer software called Autodesk Revit. Before my work began, I was toured around the factory and shown the different processes involved while making an entire house in the warehouse. Given only a layout, I had to start making the house from scratch. I would have had to focus on each detail with patience because if even the slightest thing went wrong, it would create great confusion for the builders. I had to take care of the construction of walls, ceilings,

roofs, installment of windows, doors and appliances/utilities, plumbing fixtures, electrical wiring and the selection of the materials used for all the various objects in the design. At times it got really overwhelming but I was able to figure things out myself. However, when Dr. Al-Hussein came to check on my work and said he was pleased that I had completed a project that would take a regular graduate student four months to finish, I was motivated to make it even better. Along with Autodesk Revit, I made time to also learn another 3D modeling software, 3Dstudio Max, for personal interest. I also learned a lot more life skills from the graduate and undergraduate students in my lab. Thanks to those students, I had a better idea of my future career options and university interests.

We were offered professional development and various other opportunities to explore the field of engineering besides from our work in the labs. I enjoyed the Leadership Seminar, tour of the mechanical engineering facility, Networking Fair and trip to Gilead. All these different opportunities gave a more definite shape to my thoughts regarding the acceptance of science and technology as a career path. Another memorable event was the interaction with Dr. Margaret-Ann Armour, a lady

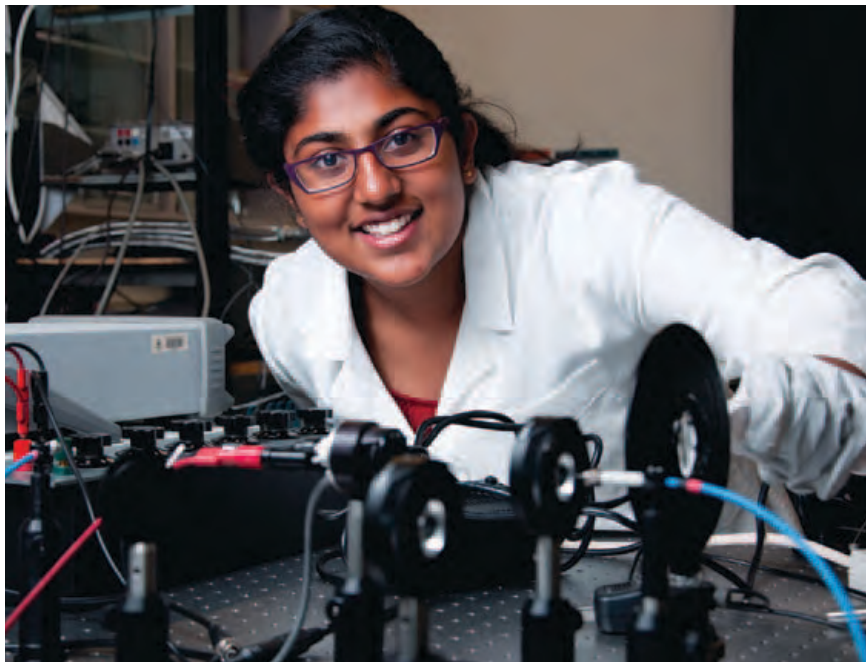
whose passion for her work motivates you to do the same in your life. Like Dr. Armour, I am a big fan of the word "DREAM." That one word gives me courage to believe that I can fly to any peak I want if I have wings made of faith and perseverance.

Living in residence was also a fun and worthwhile experience. The late night movies, experience cooking for the first time in life, the initiative to clean and look after myself and my friends has trained me for life in university. In these six weeks, my friends became my family.

When I first got here, I came with two bags and a handful of dreams, now I am going back with a treasure chest full of valuable life skills, friendships, new experiences and even bigger and better dreams. I would like to thank Syncrude Canada for generously sponsoring my incredible learning experience. I would also like to thank Dr. Al-Hussein's research team for accepting me in their lab. I appreciate the WISEST Coordinators Kristy and Brittany for their constant willingness to help me. A big thank you goes out to Danielle, my residence advisor, for making sure I enjoyed my stay at residence. Most importantly, I would like to thank my family for encouraging me to follow my dreams.

Sairah Thomas

Supervisor: Dr. Jan Jung / Physics
Sponsor: WISEST Golf Tournament



The mission of the WISEST Summer Research Program is to give high school students the opportunity to explore less-traditional fields of study in science, engineering and technology. Intrigued by this lofty goal I applied to the Summer Research Program to broaden my scope of the possible occupations and fields that I would like to endeavour in. The Program not only granted my wish, but it went above and beyond. Not only has it provided me an opportunity to “wet my feet” in the field of Solid State Physics, but I have gained hands-on experience in the “outside” world by working alongside a professional research team.

I was quite excited with this placement in the Department of Physics. I was able to study different compositions of manganites that could be used in cellphones, sensors and hard-drives in the near future. Manganites possess both insulating and magnetic properties. It has been found that at higher temperatures it is ferromagnetic; the electrons align to create north and south poles, so that the material becomes magnetic. However from another experiment conducted to test the metallic-insulator transition temperature, it was noted that there were sharp phase changes between ferromagnetic metallic

(FMM) and ferromagnetic insulating (FMI) at certain doping levels. The purpose of my study was to investigate the electron-transport properties like thermo-power, and resistance to figure out whether the Activation Energy of electrons, could be the cause of these sharp changes. Activation Energy is the hopping ability of electrons which results in the ability to conduct electricity.

It is amazing to have that feeling of belonging and understanding when other members of the research team are talking about possible solutions and you are able to give valuable input and participate. My supervisor, Mr. H. Serhat Alagöz, was extremely patient and understanding. He thoroughly answered my queries and helped me not only to understand our project but also the other ongoing projects as well. It was a pleasure to work alongside Serhat to analyze the data. It was an exhilarating feeling to know that the data of samples that I experimented with is being used to draw conclusions.

WISEST Professional Development Seminars and the Lunch N’ Learns Sessions, were also an interesting part of this program. I was able to learn important skills, gain understanding, and had the opportunity to explore different fields.

“It was an exhilarating feeling to know that the data of samples that I experimented with is being used to draw conclusions.”

The industry tours were one of my favorite Professional Development Seminars. It was awesome to be able to explore the opportunities of possible careers outside the University campus, and understand the courses that could be taken to get into that career. The Lunch N’ Learn Session on how to make a research poster was so beneficial because it taught me skills that I will be able to take with me into the future.

Overall, I found the WISEST experience very character-building. It was an experience of a lifetime. Every moment of learning, experimenting, collaborating and researching during these six weeks was an absolute blast and honor; I would not trade my summer for anything else. I was surrounded by the supportive enthusiasm of H. Serhat Alagöz, Dr. Jan Jung, Dr. Kim Chow, and the rest of the research team and it was truly a thrill. I want to thank WISEST Golf Tournament, because it is only by their support that I was able to take part in this fantastic program. I am walking away with such insight and passion for Physics, and with so much more than I came with.

Sally Moon

Supervisor: Dr. James Harynuk / Chemistry
Sponsor: NEXEN

"Being a part of a dedicated research team and learning from their expertise was an invaluable experience."



At the mid-point of high school, I was stuck before a crossroad, unsure of which direction to go to in regards of my future career. I was interested in science and engineering, but my exposure to those careers was limited to the school environment.

I was also intimidated about pursuing a career in science and engineering because they were traditionally male-dominated fields. Upon hearing my dilemma, a high school senior and former WISEST student introduced me to a WISEST program that allows students to explore non-traditional fields for their gender, such as science and engineering for women. Encouraged by her excitement for the program, I applied and was accepted as a research student in the department of Chemistry. Walking into WISEST, I had expected to have a great work experience. Yet walking out of it, I realized that I had gained something much more valuable.

As a member of the Harynuk Group research team, I investigated the behaviors of alkyl phosphates using Gas Chromatography. The overarching goal of the research was to find a way to separate alkyl phosphates from crude oil. As I have learned, alkyl phosphates are used as gellants during the fracturing

process, but the traces of alkyl phosphates remain throughout extraction and cause problems such as premature breakdown of the machines and poisoning of catalysts. Investigating the behaviors of standard alkyl phosphates using Gas Chromatography would help identify the types of alkyl phosphates present in crude oil, and prevent the damages they cause in oil extraction. Being a part of a dedicated research team and learning from their expertise was an invaluable experience. I felt passionate about my duties in the lab, knowing that my effort will contribute to improving problems in the real world. Every day I was challenged to push the boundaries of my knowledge a little bit further. Unlike school, there was not always an answer available to all my questions. However, the process of experimenting and discovering potential solutions to my questions was the most rewarding experience because it allowed me to reach beyond my limitations.

Aside from my research, WISEST offered many eye-opening opportunities. Having the opportunity to learn from mentors of diverse careers truly inspired me to keep my options open, and broadened my outlook on potential career choices. I gained many life-long assets such as the

ability to network, communicate as a team, and think critically and creatively to find solutions to problems. I interacted with other students who were also striving to accomplish their goals in science and engineering. The connection I made with fellow WISEST students was most meaningful, and it is something I look forward to develop further in the future.

With that being said, my WISEST experience certainly would have not been possible without the support of key contributors. I am grateful to my research team, the Harynuk Group, for allowing me the opportunity to join their team. The support of my supervisor, Brandon Weber, along with all the other members of the team strengthened my confidence to work in a professional environment and made my work experience fun and engaging. I also appreciate the sponsorship of Nexen Inc. Their support established my position at WISEST, and their investment laid the foundations of my future goals and aspirations. Above all, I would like to thank the WISEST program for the difference it has made in my life. Much more than a summer job, WISEST was a stepping stone, my first step into the journey to discover who I really can be.

Sara Kardash

Supervisor: Dr. Cynthia Paszkowski / Biological Sciences
Sponsor: WISEST Golf Tournament



“There were chances to speak with inspiring women who do what they love in various areas of science, engineering, and technology.”

Applying for the WISEST Summer Research Program was a daunting task. From what I had heard, it was a once-in-a-lifetime opportunity that gave grade 11 high-school students a chance to grow and learn. It seemed like something I would be interested in trying. Learning that I had been accepted peaked both my excitement and anxiety – this would be my first summer job, and as a student researcher to top it off!

Biological Sciences - with its strange hallways and rumored doors that lead to nothing – became my home for the six weeks. I worked in the lab of Dr. Cynthia Paszkowski under the supervision of PhD student, Arthur Whiting. The focus of my research project was to look at the differences between natural and constructed wetlands in terms of bird and amphibian diversity. We wanted to see if incorporating native-species of plants could make a difference in animal abundance and diversity. My assignment in this project was to listen to recordings from four different artificial and natural wetlands from around the city. Two sites were constructed-neighborhood ponds, one was a natural pond, and the fourth was a constructed pond that incorporated native plant species.

Recordings from these sites were loaded into a program called Song Scope that features a spectrogram display of sounds according to frequency and time. The recordings featured different bird and amphibian species calling throughout the day. Over time, I was able to recognize different birdcalls and compile a list of 37 different bird species.

While every site had birds, what was interesting was that the constructed pond site with native-plant-species had the most bird species in common with the natural site. This suggests that incorporating native-species of plants can either bring or keep away certain species of birds. Not only does this promote diversity, it also provides greater carbon-storage and natural resilience to invasive plant species.

Aside from working in the lab and listening to birds, WISEST had a lot to offer through the Professional Development Seminars. There were chances to speak with inspiring women who do what they love in various areas of science, engineering, and technology. The sessions also helped prepare us for the large gap between high school and post-secondary education. We were taught things from professionals that many undergraduate students must somehow learn on their

own. I know that I will take and share what I have learned from the sessions with me wherever I go.

I would like to thank my Principal Investigator Dr. Cynthia Paszkowski and my Supervisor Arthur Whiting for supporting and encouraging me throughout the program. They also showed me how to catch frogs! A big thank you goes out to the WISEST Golf Tournament for making this opportunity for me possible - it has changed who I am as an individual. Last, but definitely not least, I would like to extend a huge thank you to the members of the WISEST team. Their dedication and passion are the main reason why this program continues to succeed and gives high school students the chance to be recognized, respected, and believed in.

I applied to WISEST hoping to gain knowledge and experience. Never in my wildest dreams would I have realized all that WISEST had to offer! From the research to the seminars to the people, I will never forget this summer. It challenged me in ways I would not have expected and gave me a chance to explore who I am. I still cannot believe that six weeks have gone by so quickly, and if I could, I would do it all over again – every single part!

Sarah Yemane

Supervisor: Dr. James Harynuk / Chemistry

Sponsor: Weyerhaeuser

"I was very grateful for the simple fact that everyone was very eager to help and teach me what they know."



Malcolm X once said, "Education is the passport to the future, for tomorrow belongs to those who prepare for it today." This quote describes my outlook on schooling and education throughout the years. I have come to realize that, acquiring a good education is the key to success in later years. When first hearing that I got accepted into the WISEST program, I was very excited and thrilled that I had been provided with an opportunity that would become a huge stepping stone regarding what I would do for the rest of my life. I knew that this program would benefit me by assisting in finding the areas in which I excel, and enjoy.

This summer, I was situated in the Analytical Chemistry lab of Dr. James Harynuk and under the direct supervision of Paulina De La Mata. The research that I was involved with had to do with retaining information of how to obtain different sorts of methods to analyze the effects that different analytes (such as nonanol, alkane, and aldehyde) have on polyester. The reason for this research was to see the conditions that cloth (such as polyester) could undergo, and if the tip used on a micropipette required extensive cleaning between using other analytes to avoid cross-contamination. The second part of my research revolved around being able to distinguish the properties of differ-

ent fruit juices by using the HS-SPME and GC-FID technique (Headspace-Solid Phase Micro Extraction and Gas Chromatography equipped with a Flame Ionization Detector). The purpose of this research was to learn about what really goes into the juices that we consume on a daily basis.

Working with my Direct Supervisor and research team has been a blast and a great opportunity to see what it would be like working in a graduate laboratory. I was able to get to know some amazing and knowledgeable people. I was very grateful for the simple fact that everyone was very eager to help and teach me what they know. Also, I was very appreciative of Dr. Harynuk taking the time out of his day to purchase an incredible amount of juice samples! I would like to take a special thanks to my Direct Supervisor Paulina, for spending endless hours with me educating me and sharing her knowledge with great patience. She was both a mentor and companion, and I will always be incredibly grateful for that. During my WISEST experience, I was also able to meet some amazing girls with the same interests and thirst for knowledge. Prior to Orientation, I had doubts about being able to make friends, and assumed the worst, believing that I would be incredibly lonely for the next 6 weeks. Now as I look back on

that moment, I realize that I had absolutely nothing to worry about. My confidence has been boosted greatly and I have benefited exceedingly from it!

Gaining acceptance into the WISEST program and being able to work at the University for the majority of the summer has helped broaden my career choices. The seminars and Friday Lunch n' Learns that I attended have been very useful and enlightening, not to mention enjoyable! They helped me explore different fields of science and education and I was very interested to get in-depth information about some of those fields. One of the Lunch n' Learn sessions that I found very helpful was when the WISEST staff prepared us for the Networking Fair, providing us with questions we could ask, and building our confidence so that we could ask those questions. When it came time for the Networking Fair, I believe that I was very prepared, and had a good opportunity to ask and learn about the different fields that Women in Science and Technology were working in.

WISEST has been amazing. I experienced tons of educational fun and would not change this summer for anything in the world.

Shawna Dawson

Supervisor: Dr. Christopher Sturdy / Psychology

Sponsor: NSERC PromoScience



"Working in Dr. Christopher Sturdy's laboratory was amazing and I wouldn't trade my experience there for anything."

The moment I heard about the WISEST Summer Research Program during the SET Conference I knew that it would be a wonderful experience that I had to apply for. The chance to work in a research laboratory, tour other laboratories on and off campus and talk to people working in science and engineering? It was everything I hoped and more.

Working in Dr. Christopher Sturdy's laboratory was amazing and I wouldn't trade my experience there for anything. My work in the laboratory mainly consisted of cutting and measuring songbird vocalizations to be used as stimuli in a later experiment. Using SIGNAL analysis software, I went through recordings done in the laboratory and in the field and cut out a specific call that is similar in black-capped chickadees, chestnut-backed chickadees, tufted titmice and zebra finches. I then went through the files that I had cut to measure various aspects such as the duration and the frequency. The files will now be used in an operant conditioning experiment that will examine black-capped chickadees' and zebra finches' perception of the calls. In addition to our main work with computers, Mercedes, the other WISEST student in the lab, and I also gave the black-capped chickadees, society finches and zebra

finches their daily supplements of either superworms or eggs and greens. Although my work was at times quite tedious, it is really exciting to know that what I did this summer will be useful to the lab and that the stimuli used in an experiment will be largely stimuli that I cut.

In addition to our main laboratory work, WISEST also gave us many opportunities to explore other aspects of careers in science and engineering through Professional Development Seminars every Monday and Lunch 'n' Learn sessions every Friday. One event that I found particularly interesting was the Mechanical Engineering campus tour. It was fascinating to see the various applications Mechanical Engineering has. It also gave me a better idea of what mechanical engineers actually do, which is useful as I am considering pursuing engineering. Another event that was particularly memorable was the Networking Fair. We were able to ask women currently attending university or working in science or engineering questions about what they do and how they got to where they are. It was very insightful to hear about daily life in specific science and engineering careers and about more general topics such as how they achieve a work-life balance.

The WISEST Summer Research Program

has given me some wonderful opportunities that I will never forget and that will be assets to me as I continue into university and then into the workplace. Now the thought of university and a career in science or engineering seems less daunting and more like something that is actually attainable. I would like to give a huge thank you to Allison Hahn, Dr. Christopher Sturdy, John Hoang and Lee Vilinsky for allowing me to work in their laboratory and for being awesomely chill people. I would also like to thank WISEST, the University of Alberta and my sponsor Natural Sciences and Engineering Research Council of Canada (NSERC) for allowing me to have this wonderful opportunity. And I cannot forget my teachers Mme. Belzile and M. Toukam whose classes helped inspire my love of science and whose reference letters helped me get accepted into the program. I have learned more than I thought possible in these six weeks and I am eternally grateful to everyone who played a part in allowing me to have this opportunity; I will never forget it.

Sonja Waeckerlin

Supervisor: Dr. John Nychka / Chemical and Materials Engineering

Sponsor: NSERC PromoScience

"I found it very interesting to be able to see the application of the work I was doing in real world environments."



Never having worked in a lab before, I had no idea what to expect, but I was eager and willing to give anything a try. I have always had the desire to learn and discover and be challenged, so I knew I wanted to pursue a career in the sciences, although I was unsure of what areas were available. Therefore, the Summer Research Program was very appealing to me, being able to get hands on experience, knowledge on different career paths, and meet inspiring women in the science and engineering fields. To me, this was the ideal way to spend my summer: going to work every day in a science lab, doing experiments, and constantly learning, all while getting paid and having fun, plus, it would look great on my resume.

Within the program, I was placed in the lab of Dr. John Nychka in Chemical & Materials Engineering. While waiting to start my main project, I completed small tasks in the lab, such as labelling biocomposite plastic specimen, preparing samples to view under the microscope, and recording data from a pycnometer, used to calculate exact densities using controlled and consistent pressure and temperature. Also I cut a variety of cross sections from injection molded biocomposites to vary the surface area to volume ratio. I then began work on

what was supposed to be my main project. For this project, the task was to determine factors that influence the strength of dental ceramics, however due to delays and complications; focus was shifted back to my work on biocomposite plastics. Using the plastics I had previously cut, we performed an experiment to determine absorption rates. The purpose of this experiment was to help find the ideal fibre to volume ratio for these biocomposites in order to maintain strength and have approved biodegradability to be practical in order to take the place of plastics in everyday use.

WISEST also held informative Lunch 'n' Learn and Professional Development sessions to reinforce tasks we faced throughout the program, and tasks we would face in our futures. I particularly enjoyed the industry tour, as I went to Quantiam Technologies, where the majority of their work is chemical and materials engineering. I found it very interesting to be able to see the application of the work I was doing in real world environments. Other sessions opened my eyes to the vast opportunities and careers that I had no idea about. These opportunities allowed me to meet people in these different careers, and talking to them was very intriguing. The sessions also helped me to meet other students

with similar interests and situations to me, allowing me to gain different perspectives on research and learn about the fields they took part in.

For me, being able to participate in the WISEST summer research program was a very rewarding experience. I would do it all over again any day. I am very grateful for having been granted this opportunity. I would like to thank NSERC Promo Science for sponsoring me, as well as the WISEST coordinators for organizing the program and accepting me as a research student. I would also like to acknowledge my Principle Investigator, Dr. John Nychka, and my supervisors, Dr. Sheila Passos and Nicole Lee Robertson, for their patience and support during difficulties throughout endeavours in the program. Without all this support, the program would not be what it is, and students such as myself would be deprived of the amazing experience. I am very grateful to all those that have contributed to the WISEST Summer Research Program.

Tess Lamer

Supervisor: Dr. Michael Li / Mathematical and Statistical Sciences
Sponsor: Faculty of Science



Being a part of the WISEST Summer Research Program has been a life changing experience. This summer I worked in the lab of Dr. Michael Li in the Department of Mathematical and Statistical Sciences and have been a part of the CIHR and Health Canada funded DTT project led by Dr. Richard Long. For three days of each week I worked in the Information Research Lab in CAB. For the other two days I got to go to the Tuberculosis (TB) Program Evaluation and Research Unit. My Direct Supervisor Betsy Varughese also brought me to her work at Alberta Health to learn more about epidemiology.

Between 2006 and 2010 there were 545 people diagnosed with TB in Alberta. Of these, 37 are considered 'potential TB transmitters' meaning that they were Canadian-born, culture-positive, and over 14 years of age. All transmitters had filled out both qualitative and quantitative questionnaires that we had documented on spreadsheets in Microsoft Excel. My project involved developing a 'transmission score' for these transmitters in order to identify risk factors concerned with TB transmission in Alberta. This score was constructed by adding together the number of secondary cases associated with each transmitter. There are five different types of secondary

cases. Each was assigned a value from 1-5 based on criteria connecting them to the transmitter (5 being for the most closely connected, whereas 1 was for the least connected). In this way, the most infectious transmitters would have the highest scores. From this information we looked at trends in the people behind in the highest transmission scores. I spent most of my summer sifting through large spreadsheets with hundreds of variables. Although it may sound tedious, it really was very interesting and discovering patterns in the data was very gratifying. Unfortunately, 37 transmitters really are too few to conduct a thorough statistical analysis and therefore I ended up looking more at descriptions of the results. Some of the patterns we found included a trend of higher transmission scores to people who had symptoms of TB for a long time before diagnosis. My research team will repeat this study for Manitoba and Saskatchewan and then can later look at trends in data across all Prairie Provinces.

Some of my favorite parts of WISEST did not occur in the lab however. I received some really great information about university from current undergrad students in the University of Alberta Q&A Lunch 'n' Learn session. I got to network with some suc-

cessful women currently pursuing careers in different fields of science and ask them questions in the Networking Fair. I think my favorite WISEST session was the field trip to Gilead Sciences. Gilead is a research-based biopharmaceutical company that develops drugs for various diseases. It was interesting to meet the women working there and learn about their educational backgrounds and current jobs. Working on the University campus was awesome. I know that when I come back in a year to start my studies I will be comfortable navigating myself around campus.

I would like to thank WISEST for accepting me into the program and for organizing all the awesome events this summer. As well, I would like to thank my sponsor, the University of Alberta's Faculty of Science, for providing me with the opportunity to participate in WISEST. I would also like to thank Dr. Michael Li and Dr. Richard Long for welcoming me into their labs and assisting me in my research this summer. Finally, I would also like to thank Betsy Varughese and Zhimin Su for taking me on this summer and being such wonderful mentors. Their hard work and commitment made my project intriguing and exciting; I really cannot thank them enough.

"I know that when I come back in a year to start my studies I will be comfortable navigating myself around campus."

Tiana Sinnatamby

Supervisor: Dr. Rajender Gupta / Chemical and Materials Engineering

Sponsor: Faculty of Engineering

"My experience was very enjoyable because I was able to help out with some experiments and sometimes run my own."



My WISEST experience has been an amazing chance to meet people who have similar interests to me as well as gain experience in a field that I was interested in. I was always interested in math, chemistry, and physics in school so I thought a career in engineering would interest me although I did not know much about it. The WISEST Summer Research Program has helped me develop a better understanding of different fields in engineering and has given me a better idea of what engineering is all about.

Over the course of the 6 weeks I was working in Dr. Rajender Gupta's lab called C5MPT (Canadian Centre for Clean Coal/ Carbon and Mineral Processing) in the department of chemical and materials engineering. The lab focuses on clean coal, mineral processing, and carbon capture. My supervisors were Dr. Moshfiqur Rahman, Komal Dhankhar who is an undergraduate student, and Nitya Iyer who is currently pursuing a Master's of Science in Chemical Engineering. The project that I was assigned to was a part of the Sustainable Energy Development Field and is trying to turn waste coffee into a valuable energy resource. After working on this project I realized that we can create energy with no waste production. The waste residue from the experimental procedure can be used as

a valuable fuel as well as to trap hazardous gases from the atmosphere. My experience was very enjoyable because I was able to help out with some experiments and sometimes run my own. I also had the chance to ask many questions about the research project I was helping out with as well as the different research projects of the many people working in the same lab as me. This gave me an idea of the different projects that can be done with chemical and materials engineering.

Before coming to the WISEST Summer Research Program I was terrified of having to leave high school and go to university because I didn't know what to expect. Participating in the WISEST program this year has helped me become more comfortable with the thought of going to university. One thing that helped a lot was the University of Alberta Q & A Lunch 'n' Learn. During the session I was able to learn about the various university experiences of different students at the U of A. I came out of that session feeling much more confident about leaving my comfort zone in high school and going into university. There were Friday Lunch "n" Learn sessions every week that taught me how to network, make a research poster, write a report and much more. Monday sessions were also provided

which helped me get an even better idea of what engineering and science is all about. During one of these sessions we toured industries. I visited Syncrude which I found enjoyable as we got to go from the smaller labs to the pilot-sized labs where they tested the methods that were developed in the smaller labs. This helped me see how ideas developed in small labs can be used in real world applications. Other Monday Professional Development Seminars included a Networking Fair to develop connections with women involved in scientific and engineering careers and Exploring U of A Research labs which I enjoyed because I got to go see the mechanical engineering lab which interested me a lot.

I would like to thank the Faculty of Engineering for giving me this opportunity by sponsoring me. I am also grateful to Dr. Gupta and the C5MPT lab for welcoming me into their lab. I would also like to give a huge thank you to my supervisors for guiding me in my work and teaching me all about chemical and materials engineering. Overall the WISEST Summer Research Program has been a valuable experience that will remain with me as I go on to university and out into the world.

Victoria Pearson

Supervisor: Dr. Maya Evenden / Biological Sciences

Sponsor: WISEST Golf Tournament



"The six weeks of the WISEST Program were packed with opportunities to learn and grow as a person."

When I first heard about the WISEST Summer Research Program I was in my grade 10 classes when one about WISEST came on and I was immediately interested. I found out more about WISEST and when grade 11 came along, I applied and was accepted. I was offered a position to work with moth larvae. Everyone I told was very excited for me, until they heard about the moth larvae. Then they cringed. I didn't care. I was so excited to start working. I expected to be looking through a microscope all day, just sitting in a lab. Little did I know that my days would be spent running from the growth rooms with the plants, to the growth chambers with the larvae, to the lab, doing that all again the next day. There was more than one day that I almost fell asleep on the way home.

The purpose of my experiment was to study the relationship between the Bertha Armyworm moth and the canola plant. There were 5 types of plants grown; the regular Q variety, a pesticide-coated Clearfield variety, an uncoated Clearfield variety, a pesticide-coated Roundup Ready variety, and an uncoated Roundup Ready variety. I was looking to see whether the pesticide-coated seeds were more effective than the uncoated seeds, in terms of pest control. I had quite an active role in my

project. My summer consisted of planting seeds, watering, and fertilizing the plants. I also had to collect moth eggs, make diet for the larvae to eat as they grow, and change diet cups to prevent mold growth and bacteria. While working in an entomology lab I have learned many new things. For instance, the moth larvae will spit green or brown saliva if you press them too hard and the colour of the saliva will correspond with what food they have been eating. I have been able to view the growth of larvae first hand and can confidently say that they grow much faster than I had anticipated.

WISEST was not only about the research but also about building professional skills that the students can take back to high school and beyond. We had two types of mandatory sessions. On Monday afternoons we attended Professional Development Seminars. These included a Networking Fair, tours of university labs or industries around Edmonton, and tips on how to give effective presentations. Fridays were a bit different for us. Those days had Lunch n' Learn sessions for one hour at noon. These sessions were usually for background information about the following Monday sessions. In these Lunch n' Learns, we were taught the art of networking, how to design a research

poster, and how to write a good report. Some other activities throughout the summer included optional activities in the quad at lunch on Tuesdays and the Social Science challenge where teams of four had to build a hydraulic arm.

The six weeks of the WISEST Program were packed with opportunities to learn and grow as a person. I have met many great new people and I hope to keep in touch with all the new friends I have made. I would like to say a big "Thank you!" to the WISEST Golf Tournament for sponsoring me because my time here would not have been possible without their generous contribution. I would also like to thank my Principle Investigator Dr. Maya Evenden for welcoming me in to her lab, my Direct Supervisor Mr. Chaminda Weeraddana for guiding me and teaching me the functions of a university lab, and all the other members of the Evenden lab for welcoming me and helping me along.



MAKE THE WISEST CHOICE

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

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

WISEST in numbers:

14,000

grade 6 girls have attended the Choices Conference and discovered science is cool, relevant, and interesting

1,373

high school students have had paid, invaluable, work experience through the Summer Research Program

2,926

girls have learned more about careers in sciences, technology and engineering through the SET Conference

WISEST encourages diversity and you can help!

Bring your passion to the coming generation! Volunteer as role models in networking fairs for high-school students. Offer tours of your industry. Host an information booth at a WISEST Network industry fair.

Play 18 holes! Sign up a team of golfers for the Annual WISEST Golf Tournament. Take part in fun science activities and enjoy a friendly round of golf, supporting WISEST through your sporting participation.

Lend your support to this reputable, proven venture! Join leading corporations, foundations and research institutes in sponsoring WISEST programs and networking events.

Making the WISEST Choice makes good business sense. It benefits your industry, energizes your employees and strengthens us all in achieving successful diversity.

Donate

If you would like to make a tax deductible gift in support of WISEST, please contact us.



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