



Journal of Student Research 2010



women in scholarship, engineering, science & technology

WISEST

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Our Beginnings:

While attending a seminar on microprocessors in early 1982, Dr. Gordin Kaplan, University of Alberta Vice-President (Research), noted that there was only one woman among the 150 participants present.

This triggered the formation of WISEST – with a mandate to investigate the reasons why few young women were choosing careers in science and engineering, to take action to alter the situation, and to work to increase the percentage of women in decision-making roles in all fields of scholarship.

Where are we now?

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

How is WISEST advancing its goals?

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

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

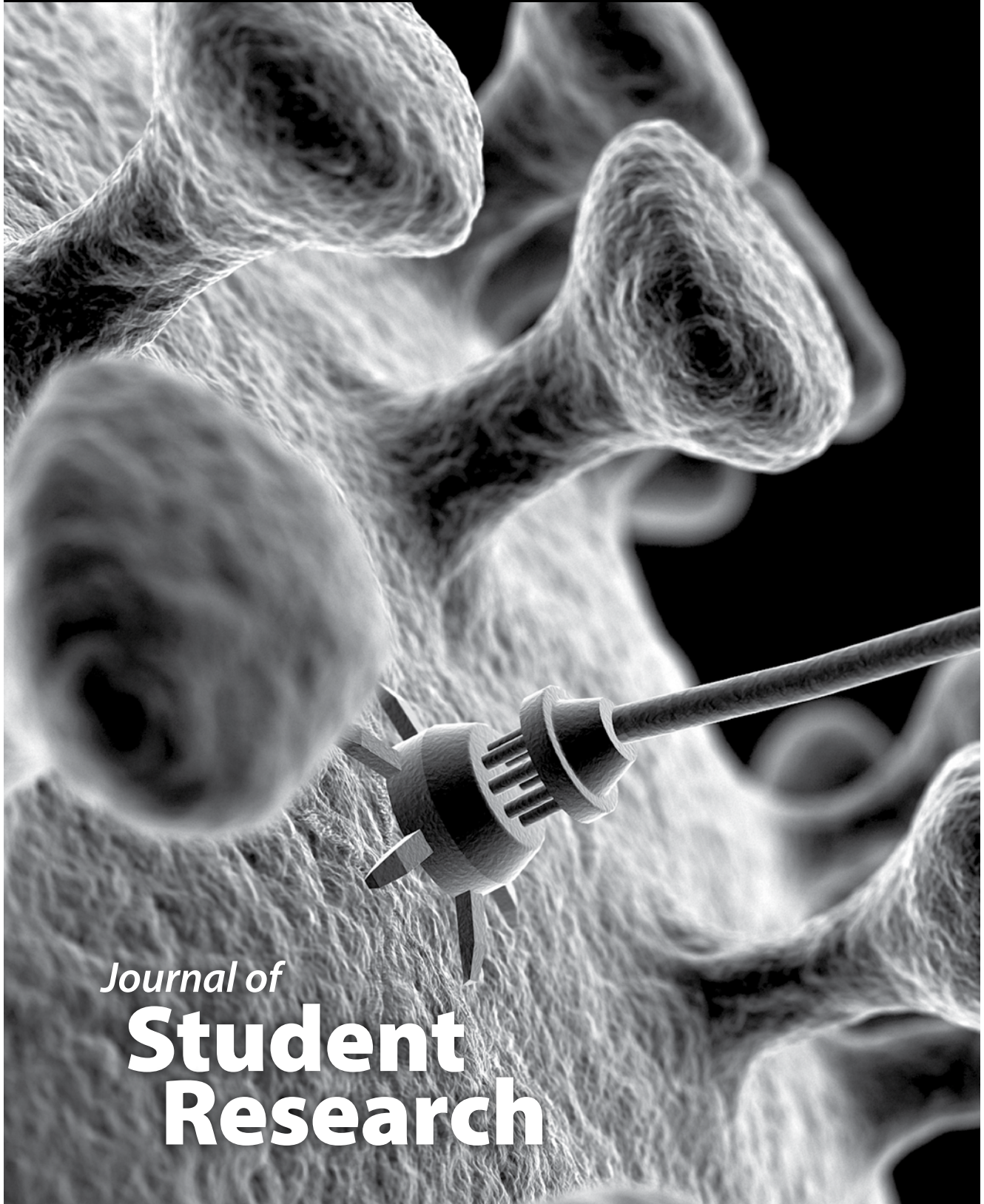
- Choices Conference: *a day of science activities for 600 grade 6 girls and their teachers.*
- SET Conference: *a one-day experience for 200 female high-school students.*
- Summer Research Program: *a paid, hands-on research experience for Grade 11 female and male students.*
- Meet-a-Mentor: *a live videoconferencing series designed for junior-high students, featuring science, engineering and technology role models and experiments.*

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

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

WISSEST

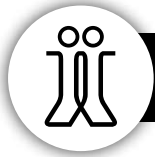
Summer Research Program 2010



Journal of
**Student
Research**

Students from the 2010 WISEST Summer Research Program





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The Annual WISEST Summer Research Program



Denise Hemmings

By Denise Hemmings (WISEST vice-chair)

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

One of the first major initiatives was the WISEST Summer Research Program, a valuable six-week research experience at the University of Alberta for high school students who are making decisions

about their future fields of study and career paths. Students (both young women and men) who have completed grade 11 spend six weeks working as a member of a research group within disciplines less traditional to their gender. For young women, these areas include engineering, science, and technology, and for young men, the areas of nursing, nutrition and human ecology.

Under the supervision of their scientist mentors and fellow research team members, the WISEST students learned first-hand about cutting-edge research, the techniques and types of research being conducted, the research career opportunities available, and they gained an introduction to academic and university life. A variety of Professional Development sessions gave the students even more information about non-traditional areas of study.

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

to explore their interests.

WISEST would also like to acknowledge the financial support given by many local industries, philanthropic groups, the Provincial and Federal governments, and the University of Alberta. We were especially excited to accept a donation from a WISEST alumna who wanted to ensure that the amazing opportunity that she had experienced was made available for younger students. Sponsorship from all of our Partners and Contributors allowed WISEST to pay the students an hourly wage and give them a variety of resources and experiences. Each sponsorship allowed WISEST to recruit one more student to participate and gain valuable life experience from the Program. A detailed listing of the WISEST Partners and Contributors is included in this book and on our web page www.wisest.ualberta.ca

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

An Introduction to the WISEST Summer Research Program



By Grace Ennis (WISEST Coordinator)

This summer, 60 students participated in the WISEST Summer Research Program and thus became part of a 26-year tradition of young women and men working in non-traditional areas of research. The young women worked in research labs in areas such as Engineering, Biological Sciences, Chemistry, Physics, Mathematics, Medicine, and Computing Science; while the young men worked in Nursing and Nutrition.

The WISEST Summer Research Program is much more than a job – it’s a chance to learn about science, engineering and technology; to experience research hands-on in a University lab; and to develop the skills needed to succeed in a non-traditional role. The Program is designed to give students experience in all these areas and we expected students to take advantage of every opportunity provided.

Throughout the program, WISEST aimed to:

1. Provide learning opportunities about the techniques and types of research being conducted in different fields of study.
2. Provide hands-on experience with trailblazing research.
3. Broaden awareness about fields of study and career options in science, engineering, technology, and medicine.
4. Provide an introduction to academic and university life at the University of Alberta.
5. Provide opportunities to meet and be inspired by successful women and men in the fields of science, engineering, technology, and medicine.
6. Provide opportunities to meet other young people with similar interests in science, engineering, technology, and medicine.

7. Assist in the development of key professional skills.

The students’ articles in the following pages outline how well these goals were achieved. In addition to their descriptions of their valuable experiences in the research labs, the students reflect on the diverse learning opportunities that they participated in as a required part of the Program.

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

There were also Special Events in which students shared their knowledge and experiences with the broader community. Teachers Appreciation Day gave high-school science teachers exposure to trailblazing research through labs in SET. The Research Team Thank You and Celebration of Research gala events with government and university dignitaries, family members, Program sponsors, principal investigators and research team members showcased the students’ research posters and gave witness to the WISEST students’ enthusiasm and broadened awareness of careers in non-traditional fields.

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

WISEST 2010 Partners and Contributors



Partners

- Alberta Advanced Education and Technology
- Alberta Education
- Alberta Employment and Immigration (STEP)
- Alberta Innovates - Health Solutions
- Alberta Innovates - Technology Futures
- Alberta Women's Science Network (AWSN)
- Allard Foundation
- Canadian National Railways
- Dow Chemical Canada Inc.
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- University of Alberta
 - Faculty of Agricultural, Life and Environmental Sciences
 - Faculty of Engineering
 - Faculty of Medicine and Dentistry
 - Faculty of Nursing
 - Faculty of Science
 - Department of Civil and Environmental Engineering
- Weyerhaeuser
- WISEST Golf Tournament
- WISEST Guest Lecturer Sponsorship in the name of Hon. A. Anne McLellan, P.C., O.C.

Contributors

- Anonymous Donors
- BPTec-DNW Engineering
- Esther Ondrack
- New Paradigm Engineering Ltd.

MAKE THE WISEST CHOICE

Empower women in science, engineering and technology

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

Problem

There is a growing concern that Alberta has the lowest postsecondary participation rate of all provinces in Canada, with only 17% of the population aged 18-34 enrolling in postsecondary in 2009. Though the number of female undergraduate students has grown sharply over the last ten years, few women study science, technology, engineering or math (the so-called 'STEM' fields). The gender imbalance continues into the Canadian work force with 31% women in the physical sciences; 26% in computer and information systems; and 12% in engineering (Canadian Census 2006). There is still much work to be done in retaining women in the workforce and advancing them to the boardroom where they can combine their talents with men in change management. Diversity is important for business.

Solution

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

Your Impact

WISEST Summer Research Program

\$3,000 provides a six-week intensive hands-on research experience in STEM fields for a high-school student.

Multiply your Impact:

Number of students: *(provide for one or more)*

Term of your impact: *(three years two years one year)*

Margaret-Ann Armour Endowment Fund for Rural Students

Donation promotes diversity in the Summer Research Program by facilitating the participation of students who would otherwise be unable to attend.

Networks for early-career women in STEM

\$600 supports a monthly network session for early-career women in science, engineering, technology and math

Donate

Thank you for supporting the WISEST way.



Contact WISEST at **(780) 492-1842**

by email at **wisest.ualberta.ca**

or donate on-line at **www.wisest.ualberta.ca**



Professional Development



Science Methodology



By Marjorie Mallare

The stairs of the Central Academic Building were filled with soft murmurs as the WISEST students, all eager to converse about their first week in the program, made their way to their first Professional Development Seminar. Mr. Nathan Stelnicki, the guest presenter for this session, introduced everybody in the room to his presentation about Science Methodology. This presentation was an opportunity for the WISEST Research Students to improve their lab writing skills, and to learn about the proper way of conducting a scientific experiment which could be beneficial in critiquing a research paper, either in their own labs or at school.

The students were asked to test if a piece of potato has the capability of lighting up a bulb. Mr. Stelnicki showed that when the light bulb that was connected with electric wires to a piece of potato on a plank of wood, light was created. However, the students were challenged to figure out if what they have observed can be scientifically proven or not. Materials were provided such as voltmeters, electric wires, transformer and batteries, then each group came up with their own set-ups on how to prove their hypothesis. After each group have done their desired number of trials, some groups claimed that it is possible for the potato to be lighting up the bulb while others agreed that it is not. Eventually, it was revealed that there is a battery below the potato which was the actual source of energy that lights up the bulb. This revelation challenged the groups of students with the wrong conclusion to learn to evaluate scientific study results and papers open-mindedly.

The seminar also covered the basic principles of conducting and making a write-up for a scientific experiment. Such task that includes having a question, conducting some research, formulating a hypothesis, performing the experiment, and formulating a conclusion based on the acquired results, would be beneficial for those students who are planning to take a science focused career. It also informed the WISEST students of the different biases a science paper may contain, as well as how to know to what extent scientific data are to be trusted.



Research In Action: EMD Serono Canada Inc.

By Julisa Binet

EMD Serono Canada Inc., originally based in Geneva, Switzerland, is a pharmaceutical company that has roots dating back to 1668. It was also one of the two tours available to choose from on July 19th as part of the WISEST Research in Action, where students went to discover new career options and explore Edmonton's science research industry. The event started off with researchers Janice Huber and Leanne Gadowski giving the students a brief presentation on EMD Serono and its role in pharmaceuticals, chemicals, and consumer health care all over the world. With more than 33,000 employees worldwide, EMD Serono specifically works with the creation of new drugs and vaccines that have helped with the treatment of Multiple Sclerosis, cancer, and many other illnesses. Even now researchers at the Edmonton branch are currently designing and testing a vaccine that can slow down the process of lung cancer.

The presentation was followed by a tour around the faculty, with students being fully prepared wearing lab coats and safety glasses. Two individual labs were visited, with each lab serving its own purpose for research. In one lab we were introduced to Karen Hisset and Mimi Back, two researchers who explained in detail what life was like working in the lab. "The most important thing to find as a researcher is balance with work and home life," said Karen Hisset, "It can be challenging to find the time to work and to also raise a family." In the other lab, the steps to designing and testing drugs and vaccines were discussed. "There are many steps when creating a new drug, from the preliminary designs, to testing in a lab and finally beginning treatment with patients. It is a long process, and it is not uncommon for a drug to take 12 years to make from start to finish." said Janice Huber.

Throughout the tour the students asked many questions that were readily answered, and learned what it was like to be a part of the pharmaceutical company EMD Serono. It was a worthwhile and beneficial visit, and it is likely that the most valuable lesson the students learned is how there are many job possibilities out there that science has to offer. "Be sure to find a job that you are passionate about," says Karen, "Doing research with cancer vaccines is very rewarding, and I have not regretted taking this job ever. Find a job that connects with you, and you'll love it." From all the WISEST students, we thank the speakers who took time to give us a tour around the faculty. It was an amazing visit, and a wonderful part of the WISEST experience.



"It was a worthwhile and beneficial visit, and it is likely that the most valuable lesson the students learned is how there are many job possibilities out there that science has to offer."

Research In Action: Schlumberger Canada Ltd.



By Nadia Shardt

About half of us had the opportunity to visit Schlumberger Canada Ltd. in the South Edmonton Common Research Park to discover what the company is involved in and tour its lab. We were all excited as we boarded the bus for our brief ride to Schlumberger.

As soon as we had assembled in the DBR Technology Center, we were welcomed by five friendly employees of the company who would be our tour guides – Shawn, Mila, Jenna, Natalia, and Merlyn. They each shared with us how they got to be part of Schlumberger, and it was remarkable to see the diversity of their backgrounds. In fact, one of the outstanding characteristics of the company is its diversity; there are over 140 nationalities represented in this company of 80,000 people across 80 countries! We also learned about the history of the company from when it was founded in 1926 by the Schlumberger brothers in France. Schlumberger's role in industry was to make measurements to find out what exists underground, whether water, oil, or sandstone, and then determine the best way of extracting the oil. Not only is the company today involved in oil extraction, but it also provides water services and develops tech-

nology for storing carbon dioxide in reservoirs underground. The DBR Technology Center we visited was named after Donald Baker Robinson, who helped develop the Peng-Robinson Equation of State. To capitalize on this one equation, he founded a company that was later purchased by Schlumberger.

After being warned to follow safety precautions and told about the remote possibility of a hydrogen sulphide leak, we donned safety goggles and lab coats to enter the laboratory. With several different rooms, each for a specific purpose, surrounding the main lab area, we saw numerous machines involved in extracting oil and testing new equipment. Our tour guides provide detailed explanations about the purpose of each machine; they were also very willing to answer our questions and share their knowledge about the company. As souvenirs, we received frisbees and short books about Schlumberger's history in Canada. Most importantly, though, we were exposed to possible careers in chemical engineering, geophysics, and geochemistry; we saw a glimpse of what working in these areas would be like.

Networking Fair



By Jaskiran Sandha

The WISEST Summer Research Program has a multitude of valuable opportunities to offer, and one of these was the Networking Fair on July 26. The event was an opportunity to meet with role models from professional fields and to openly discuss with them the plethora of possibilities to be considered when pursuing a career.

The networking session would not be able to take place without the incredible role models who graciously volunteered their time to attend the event. Over fifty professionals from a variety of fields such as engineering, medical research, and information technology came out to share their wealth of experience and knowledge with us. Not only did they talk to us about career options in science, and the obstacles and successes they came across in their own career paths, but they also encouraged us to ask questions, which they willingly answered. They also considered that we were high school students very early on in our career paths, and conversed with us accordingly. They encouraged us to contact them at any point in our careers, and offered to give us support whenever we required it.

The diversity of role models in a networking session is very important and was very well coordinated. Role models in the same group, for the most part, were in different professions and from different walks of life. In one example, there was both a retired chemist and an undergraduate pharmacy student. There were individuals who came from a city background, rural areas, or even other countries. This wide variety of role models provided students with several perspectives on important questions when considering career options, such as maintaining a work-life balance. The students were

able to see which professions were better suited for having a family, or which careers offered many chances to travel. Students with backgrounds similar to some of the role models were able to relate to the expectations they faced, and could ask for advice on how these individuals overcame these challenges.

The WISEST Networking Fair was an extraordinary learning opportunity for both the students and the role models. The role models learned almost as much from each other as we did from them. We students are so fortunate to have had this opportunity to build a support network before we even enter post-secondary schools. It is a truly unique gift and will be valued for many years to come.



Tour of Research Facilities – On Campus



By Ashley Brown

The on-campus tours gives up a chance to explore some of the many labs at University of Alberta. We are exposed to new opportunities and new fields that may spark our interest. The tours span many different fields from 3-D technology, nanofabrication, pharmaceuticals, plants, engineering, bacteria, and physics.

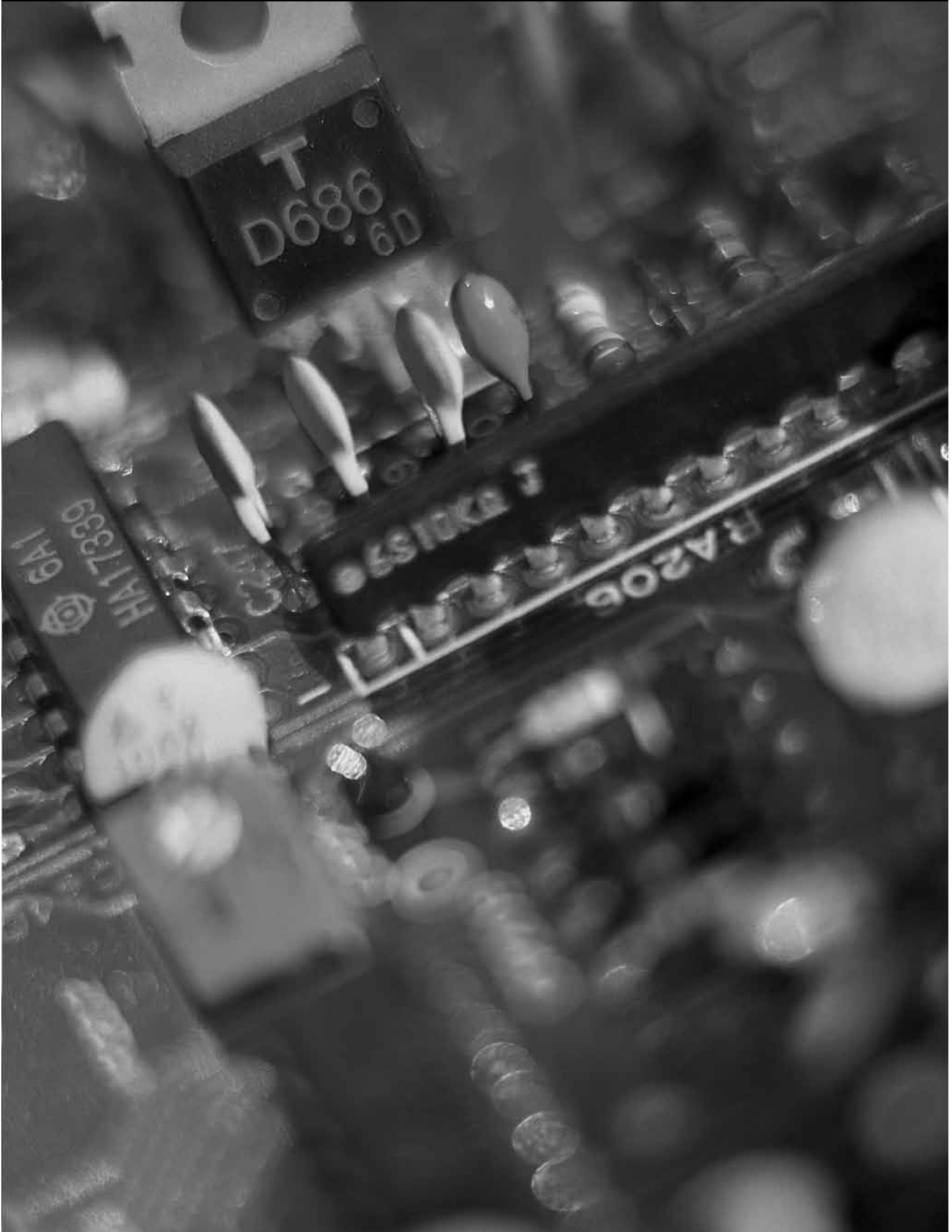
I had the chance to tour the nanofabrication lab. The nanofab lab works on developing parts for objects such as computers were size is an issue. The nanofabrication lab can create component that take up less space and function more efficiently. It also tends to be cheaper than other forms of fabrication. For our tour we were dressed up in "bunny suits" and toured through the clean room, where we learned about the work people can do using nanotechnology. We went into the room used to work on UV sensitive components and UV sensitive chemicals. The UV sensitive rooms can be use to print chemicals and component on to each other by passing them other the UV light. We even had the chance to see the electron beam they use to cut thing that need to be smaller than a micron.

One of the other tours went through the Advanced Man Machine Interface lab (AMMI). The AMMI tour showed the Summer Researches a three walled device that computer generated images are projected on (a CAVE). With the use of special 3-D glasses, the CAVE can place users in virtual environments. The CAVE is very useful when touring through virtual realities, to display 3-D views of objects that have been scanned on to a computer, and to display motion capture.

It is truly amazing to ponder the diversity of research topics at the University of Alberta. These on campus tour gave us an incredible opportunity to see what is available for us.



Student Opportunities



Science Olympics



By Veronica Meston

WISEST is known for its innovative approaches to genders within science, but few know about its unique form of entertainment; the Science Olympics! This academic amusement was an excellent way to break the ice and get the students excited about the summer that lay ahead of us!

July ninth was the day that saw these trials take place, our fourth day of WISEST. All the students met in Quad, calling each other to our teams A, B and C. The atmosphere was definitely one of excitement and companionship! Nobody knew what the Science Olympics would be like, but we were all looking forward to finding out! And find out we did!

After all the WISEST students assembled ourselves into the teams, with much friendly rivalry adding to the festivity and energy of the day, volunteers led each of the teams away to one of three challenges; science charades, improvisation plays and a tower building contest.

The science charades were undoubtedly an event to put our non-verbal communication skills to the test while becoming comfortable with each other. Each student was to draw out a scientific term from a bag and try to get the others to guess what the word was by acting it out. Needless to say, you can imagine how silly the acting could become as words like evolution and longitudinal wave cropped up! Everyone got right into it though, with friendly encouragement and humorous guesses flying! Each correct guess got a point for our team, so you can imagine the speed at which we guessed and acted! At the end of the charades, all the students had become a little closer with each other as we shared our knowledge of scientific terms and acting skill.

The improvisation play complimented the charades beautifully and

was a new experience for many students. A scientific scenario was read out and two students would choose a science word from out of a box and use that word when they spoke to further the play. This alone leaves infinite possibility for amusing scenes, but it got even more fun because other students could tap one of the two actors out and use a different science word to add a new twist to the play. The plays allowed us to show off our humour, our knowledge of scientific vocabulary and our wit, as many clever and hilarious words gave way for exciting twists! This Science Olympic event definitely got us in the frame of mind to enjoy the scientific and fun filled summer ahead of us!

Lastly, the tower building contest was where our engineering skills and imagination took over as the teams competed to see who could make the tallest tower out of a limited number of toothpicks and marshmallows. Each team was separated into four groups who would try to outdo the other's towers for height! The towers took on many different forms as the students collaborated on which designs and shapes to use. You could hear lots of laughter and good-natured rivalry flying between each team as the structures grew taller leaning buildings that made our fingers sticky! It was really an event to cement the adventurous spirit of WISEST and the relationships we formed as we had fun in science!

The Science Olympics were a rewarding way to get to know each other and herald in a sense of fun that lasted all summer! Just for the record, the winning team for the afternoon's fun filled events was team A, with team C closely behind and team B placing a valiant third. Needless to say, the Science Olympics definitely took home the gold for fun as we students enjoyed ourselves doing what we love; science!

Building Your Elevator Pitch

By Gauri Chaggar

Canada is a country which produces comedy shows that entertain while still teaching viewers valuable life lessons. The television show *Hiccups* is a perfect example of one of these programs. One day while watching *Hiccups* I picked up on a lesson that I was confident would help me in the future. This specific lesson dealt with elevator pitches and how to ensure that they captured other people's interest. The method outlined in *Hiccups* was referred to as CQI – compliment, question and introduction. An example would be my meeting someone and saying, "Nice shirt! Is it silk? By the way, I am Gauri Chaggar." Although I have never tried to utilize this method, I had thought for quite some time that it would work wonders for me in the future. That is until I attended our first Learn 'N' Learn meeting "Building Your Elevator Pitch".

The first Lunch 'N' Learn discussed elevator pitches. An elevator pitch is basically a means to introduce yourself to a new acquaintance by sharing a few important characteristics about you. Key points to include in an elevator pitch include your name, occupation and how your job or research relates to your personal interests. The last point is especially crucial to include in an introduction as it allows others to see how involved you are in your work. Remember to be brief about yourself and your research so that the other

person has questions to ask, thus allowing the conversation to continue. I learnt that although it is important to keep your initial conversation with someone under a minute, it is better to exceed the three short sentences from the CQI method. As the name implies, the elevator pitch is only the beginning of a relationship although hopefully it will help to elevate us in the working world.

The first Lunch 'N' Learn helped us throughout the program as we met various mentors who worked both on and off the University of Alberta campus. I always felt confident while meeting someone new and luckily never experienced any awkward silences that may have been created with the CQI method. Seeing how the elevator pitch has helped me, in all likelihood I will never venture back to the CQI method although it does make a great conversation starter.



The Art of Networking with Role Models



By Amanda Marchak

When word spread about the topic of the Lunch 'N' Learn, questions buzzed. What was the point of this session? Networking is talking, and we have all been talking for years. As some people know, talking is all too simple and is almost second nature; all a person must do is open his or her mouth.

As everyone soon found out, networking is not this simple.

When confronted by individuals of authority – in this case the individuals who we would be networking with – most people swallow their tongues and clam up. Accordingly, no questions are asked and no answers are given – voluntarily at least. As time would soon tell, it is easier to hide a shy, self-conscious interior behind a fake smile and bubbly giggles brought about by inappropriate comments.

We were provided with a set of guidelines (1. Politely introduce yourself. 2. Listen to your role models, taking notes if you wish. 3. Ask appropriate question. 4. Thank your role models.) and a mock skit in which Lynn was the role model, I realized that my mother's favorite saying isn't just a saying. As she will tell you, if you can't say something nice, don't say anything at all. Inappropriate questions are rude and get a person no where when they are trying to gather information from an authority figure. Jokes may be fine among friends, but they certainly don't belong in the professional world as they truly can be found insulting. Polite language and appropriate questions are key to successful networking.

Later in the session when we broke into groups to hold mock discussions, I realized how hard talking truly is. We easily fell into the rhythm of inappropriate questions, gestures and laughter. However, despite the entertainment these questions brought, we didn't learn anything at all. This completely defeated the point of networking – to gather information and make connections.

I found this session very rewarding as it opened my eyes to the effort that is needed for effective networking. If it hadn't been for this session, I probably wouldn't have prepared or asked one single question during the networking Professional Development seminar the following Monday afternoon. As it is, this session allowed me to maximize the restricted time I had with seven phenomenal women.



Sharing your WISEST Experience



By Meghan Eaker

The last Lunch 'n' Learn was more than just finding out about what we would be doing at the Celebration of Research and the Teacher Appreciation Day, although we did get a lot of tips about how to present our posters. We also found out about what we should wear – the question “are we required to wear pants?” was answered with giggles from the students.

However, this session’s purpose was to review and make the students think and reflect upon our entire WISEST experience. We were encouraged to think about the most important things that we have learned this summer and our favorite experiences. At the end of the session, after we had summarized the events of the program, we each wrote down our lasting impression and favorite moment of our experience in WISEST. Then, when we all had written down our thoughts, we crumpled up the papers and threw them across the room for another student to read anonymously and compare with their own experience.

After the session, I collected all 60 of these little papers and, not surprisingly, most of the students gained similar life lessons from the program. These lessons ranged from learning about the realities of research to gaining more confidence and professional skills. Many students spoke of WISEST as showing them all of the opportunities open to them and that “if...you are motivated enough, anything is possible.” Some were comforted by the fact that “if you love



what you’re doing you will never go wrong” even though it may take many years to find this career. A number of students said that through the program they have decided on a career path and now know how to achieve success in a scientific role. After reading all about the truly amazing affects that this program has had on all of the students, I think that it is not a stretch to say, as one student put it, that “[WISEST] was...one of the most important experiences of [our lives].”

The Male Perspective



By Anders Muskens

With a name like “Women in Scholarship Engineering, Science and Technology,” one would assume that WISEST was a program completely intended for females. However, as misleading as it sounds, this is not entirely the case. Upon my acceptance into the program itself, some of my friends were confused as to how I could have possibly gotten in, being a guy. Many were unaware of the fact that WISEST can in fact be a place for men and women alike to work in research fields. There is always a small contingent of males who are a part of WISEST every year; this year, there were a grand total of 4 males participating in the program.

What do the boys do in WISEST? The males of WISEST are placed in research fields that are not considered to be traditional fields for males, such as nursing, nutrition, and human ecology. Despite the somewhat limiting appearance, the males of WISEST play important roles in the program.

The males of the program were interested in experimenting with the unknown; the uncharted waters that were the non-traditional

fields. Indeed, it was unusual to at first be immersed in a completely female environment, but eventually, the surprise dies down and the scientific research becomes the main focus, as it always would be. I learned throughout the program that gender could not possibly matter as much as dreams and aspirations did. I met many people, most of whom were girls, and it became quite apparent that the pursuit of science was not dependent on gender, but on ability, perseverance, motivation, and sheer determination. Despite our differences, the never-ending search for a deeper understanding of the universe: the quest for scientific knowledge; it was a common interest between every single WISEST student.

Gender is merely a biological diversification. In the pursuit of science, it could hardly bear any importance. Science is the quest of the human race; it is not the quest of only the males, or only the females. And WISEST can most certainly help to lessen this pointless distinction. I was glad to have been a part of the program, as were the 3 other boys with me.

Life at Meanook



By Rebecca LaGrange

When we first came to the Meanook Biological Research Station, we were a bit awed by how friendly everyone was with each other. We had expected a work environment, where people knew each other slightly and were polite. Instead, we found a very close community. At night, no one went off to their rooms by themselves. Often they would watch movies together or simply socialize.

Another thing that struck us when we first arrived was how quiet and peaceful it was. There was no traffic, no neighbours. The only company we had regularly around our rooms were the trees, two small rabbits, and a flock of birds that would sometimes use a puddle as a birdbath.

When we woke up at Meanook, we were never sure what was going to happen that day. Sometimes there was a lot going on, and a lot of work to do. There were frogs to count, pitfall traps to fix, or an experiment on an invasive plant – tansy – to do. Sometimes there was a communal “enough” and a group of us would take off to the lake to escape the heat.

Our cook, Patje, was amazing. She never declined a food request, and kept the cupboard and fridge constantly stocked with food and lots of fruit. Most importantly, she never let the cookie bin get empty. Sometimes in the morning, she would make eggs for us each individually, and take requests.

As the weeks went by, we began to get to know everyone at the station. We watched movies with them, or sometimes sat in a circle on the grass talking. Everyone there was really welcoming.



By Eliza Pan

The more time we spent at Meanook, the closer we became to the rest of its occupants, including its resident beaver, with whom we became acquainted through his routine destructions of our tarp fence. With our new friendships came new opportunities to explore fields of science that we had never encountered before. Unlike many of our fellow WISEST student researchers, who focus on one project, we had the privilege of assisting several graduate students and researchers in their studies. From organizing forest fire fuels, to experimenting with invasive species, to sorting tent caterpillar parasitoids and predators, we gained firsthand experience in various scientific fields.

Life at Meanook was often equally as exciting outside of research. During our off-hours, we engaged in a range of amusing activities. With the help of our supervisor, Brandon Nichols, we learned to drive ATVs, to aim bear spray (which we were thankfully never forced to use), and to conduct gas chromatography. Even travelling to Athabasca to purchase supplies and groceries was enjoyable; in part thanks to the entertaining conversations and candy escapades we had along the way.

After putting in a long day's work, we would find numerous diversions and methods of relaxation. The surrounding wilderness provided a beautiful backdrop for leisurely strolls. Cows would low welcomingly as we ambled past their fields. When we felt less inclined to physical activity, there were always shelves of books and videos begging for attention, as well as plenty of people with whom we could converse.

Our stay at Meanook has been extraordinary. Not only have we had the chance to undertake our own research projects at a lively research station, but we have also been able to do so much more. Each experiment enhanced our appreciation of nature; each investigation opened our eyes to new scientific concepts; and each day fostered memories that we will forever cherish. Everyone—and everything—at Meanook has helped make our WISEST experience extra special. Without a doubt, we will treasure everything it has given us!

Living in MacEwan Residence



By Kirsten Pearce

Movies, games, festivals, movies, chocolate and taco nights, movies, shopping, deep-fried ice cream, and did I mention movies? There were many unique experiences that we had while staying in the MacEwan Residence (nine of us girls and our residence advisor Julia); movie marathons were a common theme as you can tell.

Living in residence was a liberating adventure that complimented and highlighted the WISEST program. It gave us a taste of independence, what living on our own would be like, and will indubitably help us prepare for our own time in university. We learned to navigate around the big city (and not get lost in transit) buy our own food and not burn the building down trying to cook it, also to do our laundry on time so we have something to wear. In any case cooking disasters did ensue (one case of stove top cookies being particularly amusing comes to mind) but luckily we were able to stop the fire alarms before the whole building was evacuated.

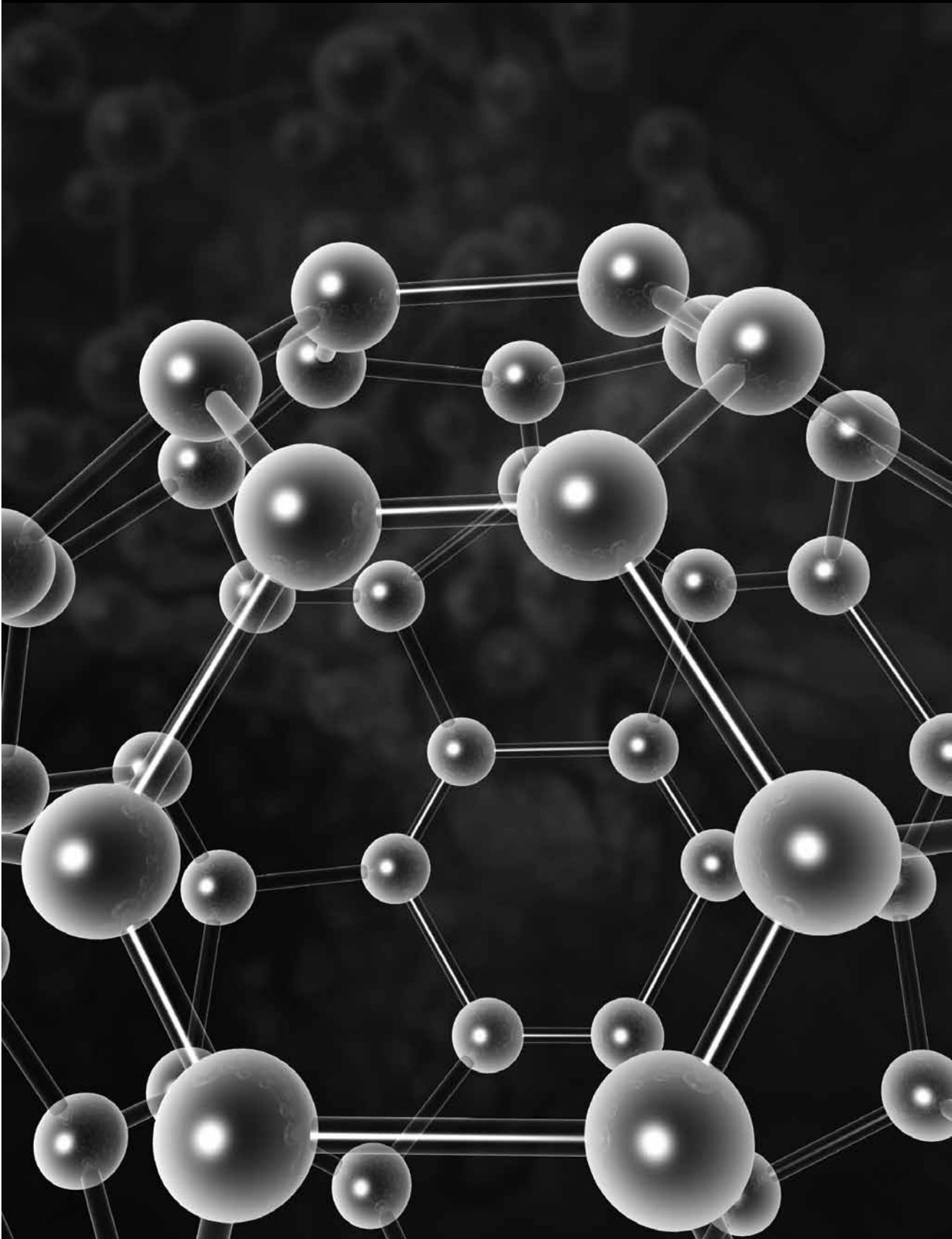
Living for the six weeks in residence was an unbelievably fun experience (minus dish duty of course), oh, and those movie marathons? They were everything from Harry Potter, to Hayao Miyazaki, to Star Trek and Lord of the Rings. We spent countless hours in the lounge on our floor watching, talking, eating, and one impromptu night of gymnastics on a sugar rush 'till the wee hours of the morning. Everyone had such a good time that by the time the last week of the program rolled around no one wanted to go home.

Our residence advisor was always happy to assist us in any way and devised numerous outings for us that were extremely enjoyable (the Heritage festival being a particularly bright spot). Julia was also able to draw our lounge loving behinds into a real movie theatre to see Inception (which had many of us on the edge of our seats). She also brought us to the art gallery, Capital Ex and many other sights. She truly made living in residence much more exciting (and got us out of that lounge room).

For every wonderful thing that has happened this summer, the girls at residence would like to thank a few people. Firstly the WISEST team for even enabling us to have the option of staying in residence, to the Margaret-Ann Armour scholarship for helping a few girls cover their residence fees, to our sponsors for making our position here at WISEST possible, to MacEwan Residence for putting up with us, and finally, Julia our awesome residence advisor for entertaining us and making sure we didn't get run over by buses. So to everyone listed and many others we thank you, and hope you continue be as amazing as you have been this summer!

The last thing I would like to add is that this summer we all learned that independence truly tastes like chili-cheese fries.

Special Events



Teacher Appreciation Day



By Darian Bremmekamp

I know, as surely as my fellow WISEST students, that without the help of our many science and math teachers we would not be the students that we are today. For their expertise, wisdom and guidance, especially into this program, we are all very grateful. Thus, we waited in anticipation to find out if our teachers would be coming to WISEST's Teacher Appreciation Day. The chance to showcase the work that we had done during the summer to the very people who had inspired us to apply for the program was both nerve-racking and exciting.

For the WISEST students, Teacher's Appreciation Day began at 11:45 in the morning, or earlier if you had anticipated getting very lost, which some of us did, through the many winding and confusing halls of the Biological Sciences building to get to the final destination of CCIS. Everyone set up their individually designed research posters and then we were invited into the lecture theatre after our teachers for a panel discussion on collaborative research. Dr. Denise Hemmings, Vice Chair of WISEST, introduced everyone to the four accomplished women who comprised the panel, Dr. Gerda de Vries of the Department of Mathematical and Statistical Sciences, Dr. Eleni Stroulia of the Department of Computing Sciences, Dr. Linda Pilarski of the Department of Oncology and Dr. Suzanne Kresta of the Department of Chemical and Materials Engineering. Each speaker gave us about a ten minute overview of the many exciting and ground breaking interdisciplinary research projects that they are working on. We then moved back out to the general area where our posters were set up and presented them to our teachers. My own chemistry and biology teacher, Mrs. Katherine Storey Smith, had come for the day and I had the opportunity to present my poster to her. The WISEST students were also given the opportunity to

see each other's posters, running in a circuit so that some people were always at their posters and others were out looking.

After an hour of this, our teachers left and we once again went into the Lecture Theatre, half of us in one theatre and half into another theatre. As a group we were given an interdisciplinary research activity to work through. One group was working on the declining world oil supply and the other was working on the problem of obesity. We were split into three areas within each, preventing the problem from happening, fixing the problem that had happened and minimizing the problem. At the end each group gave a presentation proposing their research strategies.

The WISEST Teacher Appreciation Day was a great success in showcasing the students' research posters, as well as giving us the opportunity to learn more about the importance of interdisciplinary research in society.



Research Team Thank You



Speech written and presented by Amanda Marchak

If you ask a little girl what she wants to be when she grows up, she would smile and ramble off a list of careers – traditional and otherwise. Maybe she'll say that she's going to be a carpenter or possibly a mechanic, all the while blissfully unaware of the fact that these roles are primarily dominated by the opposite gender. If you ask a little boy the same question, he too would smile and ramble about the future, possibly saying that he's going to be a nurse or a ballet dancer – yet just as unaware of the field domination by the opposite sex.

Children truly believe that everyone is equal – there are no “women” jobs or “men” jobs, just “people” jobs. Children truly believe that they can be anything or anyone.

As we get older, we become more aware of ourselves and the world around us. Eventually, we become aware of the fact that boys play football and girls dance – boys fix cars as mechanics and girls take blood pressure readings as nurses. In the blink of an eye, the child who once believed that he could be anything or anyone has become a house of cards; desperately longing to be a nurse, the fragile house can crumble with a single glance from a friend, sending the cards hustling back to practice.

Occasionally, one of these houses will be sturdier than it appears, standing tall against whispered words and pointed looks. In this case, a young man may find himself working towards a bachelor of science in nursing, and a young lady may find herself sitting in MecE 250: Engineering Mechanics. But this doesn't mean that these houses have been built on rock, or that they are any more stable that they were all those years before. In fact, finding themselves trapped in a sea of the opposite gender, having to voyage to another floor to find a washroom, the cards can once again come crashing down.

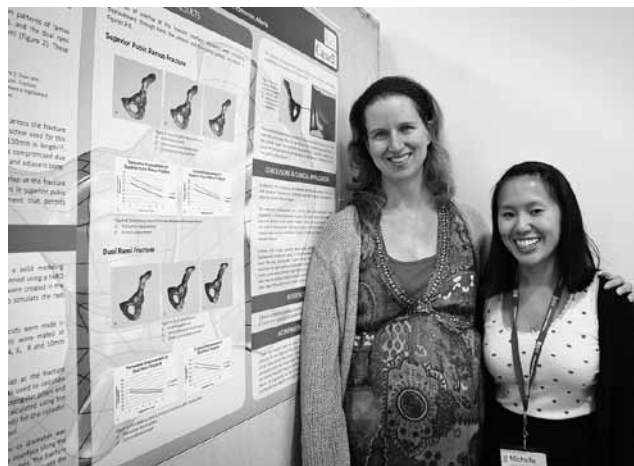
Sensing the fragility of these houses, programs such as the WISEST Summer Research Program have been founded to help young women interested in science and young men interested in nursing and nutrition stand tall. Six weeks ago, I was one of these individuals, determined to pursue a non-traditional career, but travelling

the unknown terrain on shaky feet. Thankfully, after placing me in a field that I didn't know anything about, the program didn't leave me – or any of the other fifty-nine WISEST students – exposed to the harsh elements of reality. Determined to support us in our efforts of pursuing a non-traditional career, the WISEST staff surrounded us with a vast number of role models and guides, all of whom we could turn to when we were unsure of our footing. These phenomenal individuals allowed each and everyone of us to stand tall against the challenges of a non-traditional career, making these six weeks mind-blowing.

Of course, who are these role models and guides? Who made up this support system? The answer is really quite simple; you did. You – the principal investigators, the direct supervisors, and even the other members of the lab – have been our guides. Six weeks ago, you took a chance and welcomed nervous, inexperienced high schoolers into your labs, knowing fully well that there was a high probability that we might screw something up – after all, our lab experience consisted of pipetting solutions and lighting a Bunsen burner. Even though you probably could have accomplished the tasks set before us in a fraction of the time it took us, you allowed us to stumble through lab procedures anyway, always there to lend a helping hand when need be. After a while, your patience paid off, as we learned more and more about the workings of our new environment, finally able to prepare samples, run tests, and create simulations efficiently. This probably wasn't a simple feat condensing four years of a bachelor degree studies into one week, but you did this anyways. Later on when we bombarded you with redundant question after redundant question, you smiled and answered every single one.

I know that I speak for the sixty of us when I say we are grateful for your unceasing faith and patience, never once doubting our abilities or looking the other way when we struggled. Most of all, thank you for your willingness to allow sixty high school students into your labs, and making this summer so memorable.

Sure, we were told that the six weeks of the WISEST program would be unparalleled, but you truly made them mind-boggling. Thank you so much for that; you truly have our gratitude.



Celebration of Research



By Rabia Ladha

The Celebration of Research was an incredible and memorable way to end the 2010 WISEST Summer Research Program. All sixty of the WISEST participants were enthusiastic to share their professional calibre research posters that provided insight to their work over the past six weeks.

The Celebration of Research was held at the University of Alberta's newly constructed Centennial Centre for Interdisciplinary Science. This was a very appropriate location as many of the WISEST students' projects involved the collaboration of various areas of science, engineering and technology. The topics presented ranged from the biomedical application of nanoparticles, to the behaviour of local coyotes, to the development of interactive toys for autistic children.

We, the WISEST students, were all proud to exhibit our success in our research and it was exciting to see others show interest in our work. This was our opportunity to demonstrate the skills and the knowledge we gained over the past six weeks in a professional setting to family, friends, University dignitaries and WISEST Program partners and contributors. Also in attendance were politicians. My MLA, Dr. Raj Sherman, brought a token of recognition for my completion of the Summer Research Program.

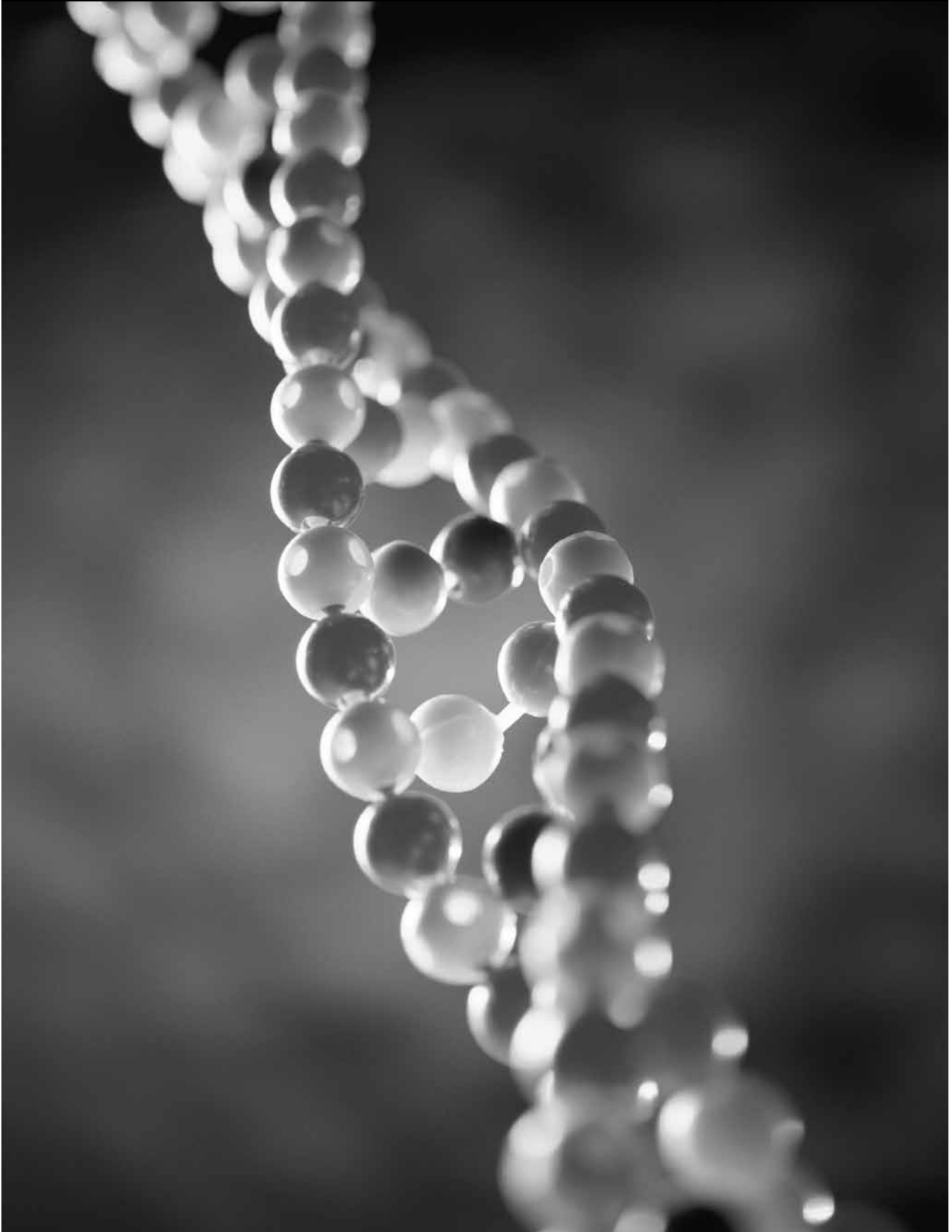
The program following the poster presentation provided the perspectives of students, university staff and WISEST sponsors. We heard from the Associate Vice President (Research), Dr. Renee Elio and Industry sponsor representative Marcella DeJong, P.Eng., from Dow Chemical. Our keynote address was given by Dr. Gerda de Vries from the Department of Mathematical and Statistical Sciences. She spoke to the interdisciplinary nature of science by explaining

how biology and statistical mathematics can work together to study ecological movement patterns.

Within the audience, there was a variation in the understanding and involvement with the sciences. We had: professors present who are involved with research everyday of their lives; WISEST students who had an inspiring but short six weeks to familiarize themselves with the life of a researcher; and families and friends who marvelled at our experiences with science. There was much teaching and learning going on between all those present - it truly was a Celebration of Research.



Student Reports



Alberta Le

Supervisor: Dr. Ania Ulrich / Civil and Environmental Engineering

Sponsor: Syncrude Canada Ltd.

“Before attending WISEST, I had expected to have my career choices narrowed down but WISEST has simply opened more doors.”



Summing up WISEST in one word is a task I describe as impossible or pretty close to it. WISEST is so much more than words can describe. It started out as an opportunity to work alongside lab professionals and see a glimpse of life at the University of Alberta but it turned out to be so much more than that.

So what made WISEST so unique to me? Using the word everything is a bit much but it sums things up nicely. Whatever expectations I had for WISEST were simply blown out of the water. After playing a few icebreaker games, we were to meet our supervisors. Although I was anxious to meet my supervisor, I realize now; I had nothing to worry about. I met my supervisor Elena and my coworker Kira on the first day of Orientation. We were to be working in the Department of Civil and Environmental Engineering in Dr. Ania Ulrich's lab on our very own projects.

My project for the summer included growing a fungus, *Trichoderma harzianum* on samples of Oil Sands process affected water. We wanted to determine if *T. harzianum* could tolerate the toxicity of the water and the effect of *Trichoderma* inoculated aspen wood shavings on the microbial community of process affected water (PAW). We started out by deciding on two substrates; saline and PAW. We sterilized wood shavings and inoculated half of it with *T. harzianum*. Mixtures were made of 5% and 25% (w/v) wood shavings mixed with either saline or PAW. On certain days, we would take samples from the flasks, dilute them & then plate them on malt agar. After 2 days of incubation, we would look at the number of colonies that grew, count them and then record it in our lab books. At the end of 3 days, the number of *T. harzianum* colonies started decreasing but they quickly shot back on day 7. After 15 days of incubation, we took a DNA sample and looked at the bacterial diversity of our samples by using a DGGE image.

Initially, the DNA concentration on day 1 of PAW was below the detection level but after treatment with *T. harzianum*, there was an increase in bacterial diversity and cell numbers. This was a great outcome for our experiment and it just shows you to expect the unexpected; nothing is ever predictable in science!

In addition to providing me with valuable lab experience, WISEST also offered us with weekly Professional Development Days & Lunch 'n' Learns. During our Professional Development Days we had a chance to go on tours of other research facilities or learn about different things like science methodology. Lunch 'n' Learns were a great way to learn something new while eating your lunch and talking with other people.

Before attending WISEST, I had expected to have my career choices narrowed down but WISEST has simply opened more doors. Instead of being more set on a career, I now want to explore tons of other careers. During one of our Professional Development sessions, we had the opportunity to meet with other women in non-traditional careers who taught us to be open to everything around us; even if it doesn't seem like what you want to do, you can still learn something new from them. WISEST has given me so much to do and think about. From working in a research lab, meeting women in non-traditional fields, learning science methodology, building our elevator pitch... WISEST has been an amazing experience and it's something that I'll never forget. I would definitely recommend this program to anyone interested in science!

Alisa McMaster

Supervisor: Dr. Diane Cox / Medical Genetics

Sponsor: Edmonton Glenora Rotary Club



“With my project I had the opportunity learn lab and research techniques I had never even heard of before.”

Over the past six weeks I have been living a dream four years in the making. When I heard Dr. Margaret-Ann Armour speak on the roles of men and women in nontraditional fields at the age of thirteen, the motivation to be a part of the WISEST summer research program was ignited. I, however, did not anticipate the amazingness of the experience that began the moment I set foot in Dr. Cox’s lab in the department of medical genetics. Genetics has always fascinated me, and I was overjoyed when I discovered that I would have the opportunity to work on my own project in this area.

The second day in the lab I was given my project, supervised by university summer student Julia Pon. My work was focused on Wilson Disease, a disease that the lab had been working on for 20 years. Wilson Disease (WND) is a copper transport disorder where the gene ATP7B contains variations so that one does not produce the copper transport protein ATP7B, resulting in liver failure and psychiatric symptoms. Despite being easily treated with chelating agents, diagnosis is often not made quickly, often a year after symptoms present themselves. Dr. Cox’s lab is working to identify variants found in patients as disease causing or non-disease causing. With this work they hope to facilitate more rapid diagnosis of patients presenting with WND symptoms.

The purpose of my project was to test variants found in patients who are not Wilson Disease presenting, find their level of function and identify them as disease causing or non-disease causing. The variants in the gene ATP7B that had already been determined to be non-disease causing were V1140A, K832R, and S406A. The variants that we were working to identify as disease causing or non-disease causing were R616Q, L523X, L778V, T991M, G543S, and R778W.

With my project I had the opportunity learn lab and research techniques I had never even heard of before. One such techniques I

learned this summer was transfection of Chinese Hamster Ovary (CHO) Cells. With this technique we inserted the DNA with the variated ATP7B into the CHO cell genome. We could then test the sensitivity of these cells of copper and determine if the variants had any affect on the gene’s ability to produce copper transport protein. Very quickly, needing to ensure that our variant was inserted properly in the DNA, I learned how to prepare samples for sequencing. Then came the opportunity to test my computer skills when we had to analyze the sequence results for the samples to determine if we could go ahead with transfection. The results from various smaller experiments all helped to achieve one over arching purposed of classifying the variants.

This summer I was able to achieve something that very few seventeen year olds have; I have just helped the fight against Wilson Disease. From our research we were able to conclude that variants T991M and R616Q are non-disease causing and L523X, G543S, and R778V are likely Wilson Disease Causing. I still find it hard to believe that we were able to achieve such amazing results in the short span of six weeks.

WISEST made this a phenomenal summer through providing us the opportunity to experience various science related careers through the professional development seminars. The fantastic learning opportunity provided by WISEST was only aided by the wonderful group of individuals from Dr. Cox’s lab. A heartfelt thank you to my mentor and teacher Julia Pon, Dr. Gina MacIntyre, Anna Wilson, Darren Bugbee, and Leah Luoma, for making this the summer that changed my life. This experience has helped me chart my future and understand the means necessary to achieve my dream of being a doctor. I am able to look back at the filled pages of my lab book and smile proudly, knowing I have achieved success.

Alissa Adams

Supervisor: Dr. Jingli Luo / Chemical and Materials Engineering

Sponsors: Anonymous Donors & Service Canada (Canada Summer Jobs)

"My research, under chemical and materials engineering, made more sense as I realized how it had a real life application."



From the very first phone call, I wasn't really sure what to expect of this Summer Program. I only caught phrases of my job description, which I couldn't exactly decipher. "Metallic oxides"... "nanotubular arrays"... "biocompatible"- I really had no idea what I was working on. Of course, that all changed when the program actually started. Although I didn't understand everything at first, with time I did.

My research, under chemical and materials engineering, made more sense as I realized how it had a real life application. Zirconium dioxide nanotubes show promise for use as implant materials such as hip replacements. Nanotubes are tiny, tiny tubes that are arranged together in a way similar to a honeycomb. The advantages of using these nanotubes include strength and more surface area for chemical and biological bonding with surrounding tissues- also known as biocompatibility. My exact project was aimed at increasing this biocompatibility by creating a hydroxyapatite coating. This involved making the zirconium dioxide nanotubes with an electrochemical cell, dipping the samples in different solutions and then analyzing the results with various instruments. The part that interested me so much was the fact that this research could eventually improve people's lives by creating a better biomedical implant material. Although the research-based knowledge I gained was a highlight of the summer, I appreciated even more gaining knowledge that can't be found in a book.

I've lived on an acreage my whole life, so I got to experience life in the city for the first time. So besides learning about research, I learned some 'street sense' too. I've figured out that the LRT isn't confusing at all and the U of A campus may be big, but it's manageable. It was interesting to experience a real-life lab on the campus. It isn't the same as a school lab- in a way hard to describe. Despite the differences, I still learned and practiced important lab proce-

dures and skills. The WISEST Professional Development seminars and Lunch and Learns allowed me to learn and hone some essential skills like creating an 'elevator pitch'. I also really enjoyed the on-campus tour where I saw a sweet computing science lab.

The experiences of WISEST have translated into some significant things that I get to take with me. WISEST has sparked interest in different careers and I now know that Med School isn't the only option for those who want an exciting career in science. Getting exposed to all these possible careers has given me a drive to do even better at school this coming year. And probably most importantly, I will leave WISEST with some great friendships and will miss many people who made this experience all the more better.

It is essential that I thank my sponsors, Canada Summer Jobs, for their funding. Without our sponsors, this program wouldn't be operational. Thank you so much to my supervisor, Luning Wang, for your help, guidance, patience and ability to make my day more interesting. I also thank Guihua Zhou for your kindness, taking me into your lab for two weeks and showing me another interesting aspect of chemical and materials engineering. Of course, a big shout out to WISEST for creating this program and making it what it is! This summer was definitely one to remember and never forget.

Amanda Marchak

Supervisor: Dr. Jason Carey / Mechanical Engineering

Sponsor: Alberta Innovates - Technology Futures



“... it was the prospect of being exposed to a wide variety of careers in science and technology that drew me like a moth to a flame.”

If you told me I was going to be a secretary one day, I would laugh. Sure, I tried dancing and cooking like most young girls, but for whatever reason, I always felt more at home digging for worms, studying ant colonies, or taking apart the TV controller while hiding in the closet. No offense to women who hold traditional jobs – teachers, secretaries, and bank tellers – but I’m looking for something more scientific and academically challenging. Fortunately, I heard of the WISEST Summer Research Program in grade nine and have been looking forward to applying ever since – could there be a better program for science loving women?

Although I was enthralled by the idea of working in a university lab while still attending high school, it was the prospect of being exposed to a wide variety of careers in science and technology that drew me like a moth to a flame.

For the six weeks of the summer, I was placed in the biomedical-mechanical engineering lab of Dr. Jason Carey where my supervisor, Michael Rory Dawson, was working on a myoelectric prosthesis for above elbow amputees.

Despite my preconceptions about my duties in the lab – small, easy, you-can’t-possibly-screw-this-up tasks – I was presently surprised to be an active, equal member of the project. My project involved testing the prosthesis, making sure that the computer simulation of the prosthesis was properly calibrated, and writing the patient user manual – my favourite part.

Seeing as I was in the same situation as the patients would one day be – no knowledge whatsoever about myoelectrics or the prosthesis – the questions that I asked Rory about the prosthesis were likely to be the ones asked of us and our user manual by the patients. This truly hit home the fact that I was a crucial part of a legitimate re-

search project. Without a proper user manual, patients won’t understand how to use the prosthesis. If this is the case, the patients won’t be able to use the prosthesis. Unusable, the prosthesis would be nothing more than an elaborate, electronic paper weight. This was neither Rory’s nor my goal; our goal was to return the freedom that was lost as a result of the amputation to above elbow amputees. Once this was done, I was given a second project which involved modeling components of the electronics enclosure on the computer so that we could determine the best way to assemble the parts.

Despite the fact that lab work was the bulk of my WISEST experience, we had biweekly group meetings – Monday afternoon Professional Development (PD) seminars, and Friday Lunch ‘n’ Learns. The Friday Lunch ‘n’ Learns provided us with practical skills which we would need throughout the program and later on in life, while the PD seminars allowed us to apply the skills in some of the most astonishing situations. One of my most memorable experiences of the program was a PD seminar. During that afternoon focused on networking, I had the opportunity to speak with seven phenomenal women, all of whom had pursued careers in science and mathematics. I was truly touched by what they had to say.

As a whole, this program has been everything I dreamed of and more. So, I would like to thank everyone that made this experience possible. Without the WISEST team – there would be no summer research program. In addition, had it not been for the generous donation given by Alberta Innovates – Technology Futures – my sponsor – the program would have accepted one less student (maybe me). Moreover, if it had not been for Dr. Jason Carey allowing me to spend the summer in his lab, and Michael Rory Dawson for allowing me to assist him on his project, I would not have had this outstanding experience. Thank you. You all have my sincerest gratitude.

Anders Muskens

Supervisor: Dr. Spencer Proctor / Agricultural, Food and Nutritional Science

Sponsor: Alberta Advanced Education and Technology

"We all got opportunities to try work in a field of research, and through this experience, we would have a better understanding of what we want in a career."



As I look back upon the WISEST Summer Research Program, I see an experience I will never forget. Throughout the summer of 2010, I found myself working in a lab at the Alberta Institute for Human Nutrition. I had a most interesting experience with the program.

From the moment when I learned of my acceptance into the program, I was filled with excitement. I soon learned that my biology teacher, who was one of my teacher references, shared that excitement, in fact so much so, that he brought me down to meet the principal and introduce me as the school's "male representative" in the program. Indeed they seemed proud.

The program began on July 6, and I found myself immersed in the glorious world of science. I was charged with reading papers, and preparing for the upcoming investigation we would carry out. How does trans-11 vaccenic acid affect lipogenesis in the liver? We would be using a rat model to find out. We would be conducting various analytical tests on tissues, including colorimetric assays, western blotting, and gene expression analysis, all of which were extremely complex lab procedures. Much preparation was needed.

I learned many skills over the course of the program. I learned how to properly pipette fluids into plates. I participated in carrying out the complex procedures of western blotting, which involves transfer buffers, gels, membranes, and electrophoresis. I extracted RNA using TRIzol, and proceeded to determine the gene expression through temperature cycling. I used liquid nitrogen to freeze rat tissue so I could grind it up, manually with a mortar and pestle, into fine powder, which was to be homogenised. And all the while, I heartily enjoyed the processes, and felt I was making a contribution to the world of science.

Upon completion of our lab work, we proceeded to make a poster detailing our findings. I gained valuable skills in making research posters and writing scientific papers; both skills I will likely need in my later university life.

Apart from working in the lab, I attended seminars and met many interesting people. It is very important to get connections in the scientific world, but through the various lab tours and meetings, I got to know some professors in fields of my interests, including one who had worked with NASA on the Phoenix Lander. We toured the Schlumberger lab in the Edmonton Research Park, and got an idea of the research being done as part of industry.

As Napoleon Bonaparte once said, "Nothing is more difficult, and therefore more precious, than to be able to decide." Your decisions guide your career path, and often, it is near impossible to know what you could possibly want to do for the rest of your life. But through WISEST, the difficulty was eased. We all got opportunities to try work in a field of research, and through this experience, we would have a better understanding of what we want in a career. I am quite sure someday I will find myself as a researcher, and the WISEST program helped me influence that decision.

Anita Haine

Supervisor: Dr. Vinay Prasad / Chemical and Materials Engineering
Sponsor: iCORE, Informatics Circle of Research Excellence



“After six weeks of this summer internship I have gained an insurmountable amount of knowledge, learnt ideal work practices, and experienced the lifestyle of a grad student.”

How do you sum up the experience of a six week WISEST summer research position? I can tell you now, it will not be easy. The WISEST program cannot just be called ‘Amazing’ or ‘Inspiring’ since that would not be doing the program any justice. After six weeks of this summer internship I have gained an insurmountable amount of knowledge, learnt ideal work practices, and experienced the lifestyle of a grad student. It was nerve-wracking in the beginning when I first met my supervisor, thoughts of ‘How do I prove myself as a capable WISEST student?’ plagued my mind. The stress I put myself through was quite unnecessary, for everything was explained thoroughly and in just the right amount of detail for a grade 11 student to understand.

I was one of the few WISEST students who worked on the computer instead of being active in a lab setting, which at first was a bit of a disappointment. But those sentiments changed very quickly when I found out what I was conducting my project on. My task was to create a catalyst model on the preferential oxidation of carbon monoxide using rhodium as a catalyst. In the hydrogen gas production for fuel cells, carbon monoxide is produced and poisons the fuel cell catalyst; preferential oxidation can be used to convert the toxic gas into something harmless: carbon dioxide. Preferential oxidation is when a specific substance is chosen to be oxidized, which is possible through the use of a catalyst. The catalyst’s surface allows the substance and oxygen to adsorb to its surface where a chemical reaction between the substance and oxygen takes place. The catalyst creates another pathway for a chemical reaction to take place without being used up in the process. In my project, carbon monoxide was the substance that was to be depleted by oxidation to create carbon dioxide.

By using the computer program MatLab, short for Matrix Laboratory, I was able to create the catalytic model. Differential equations were created for forty-six different chemical equations, which were then condensed into nineteen differential equations. The differential equations are basically rate laws that represent the change in the substance’s concentration over time. These equations were programmed into MatLab to produce the model. The model’s program allows the temperature and pressure values to be changed to find the greatest conversion of carbon monoxide to carbon dioxide. The significance of creating catalyst models is because conducting lab experiments many times over to find the ideal catalyst and conditions requires a greater amount of time, not to mention the costs of experimental materials.

WISEST has been one of the greatest learning experiences I have had outside of high school; I have learnt calculus and chemical practices at University level, computer programming and graphing using MatLab, and social skills such as interacting with researchers and fellow WISEST participants. I was given a research project to work on my own and supported by my supervisor. Within a few weeks, I was proudly displaying my results to friends and family. It has never felt so rewarding to say ‘I did that’.

This learning experience in chemical engineering research was made possible by my principal investigator, Dr. Vinay Prasad. I am also grateful to my supervisor, Siddhartha Kumar, who was very patient with me and taught me a lot about catalyst modeling. Lastly, I wish to thank my sponsor, iCORE (Informatics Circle of Research Excellence), and the WISEST coordinators for providing me with such a unique summer experience.

Arezoo Ahmadzaden

Supervisor: Dr. Colleen Cassady St. Clair / Biological Sciences

Sponsor: Allard Foundation

“Everyday, I would come to work excited and ready to learn. Every moment was a chance to experience, think, learn, and most importantly, have fun.”



I applied for WISEST convinced that any opportunity to gain experience for a career would be worth the effort. However, I did not realize how unique WISEST was in its dedication to guide us in setting our paths and pursuing our future careers. I now realize how lucky I am to have been given this opportunity. Everyday, I would come to work excited and ready to learn. Every moment was a chance to experience, think, learn, and most importantly, have fun. My WISEST experience was so much more than a summer job; I learned valuable skills and gained essential knowledge that could not be attained anywhere else.

Before WISEST, I only knew research had endless career options but did not understand what it meant to be a researcher. My perspective changed as soon as I began working on my project. I was assigned to Dr. St Clair’s lab to help study urban coyotes in Edmonton. Coyotes have become a recent issue in cities due to their ability to adapt to urban environments. As the species becomes more habituated to human areas, human-coyote interaction will increase and become a source of conflict. To prevent such conflict, city wildlife managers require a thorough understanding of coyote behaviour, movement, habitat selection, and diet before implementing regulations and procedures. As a result, there is a demand for extensive research on urban coyotes.

As I quickly became aware of the important role of research in this situation, I was also introduced to the joys of wildlife ecology. Our tasks ranged from extensive fieldwork, to computer processing, to scat analysis in the lab. At first, we learned how to use the tracking equipment, which use signals sent from a coyote’s GPS collar to help us find it. Observing the coyote would help determine its behaviour characteristics and body condition. Once we went tracking, I knew this summer was going to be full of adventures! From climb-

ing steep hills, hiking through ravines, and visiting coyote habitat across the city, I knew I was getting the best hands-on experience I could ask for. Our research also focused on factors that predict coyote habitat selection. We visited numerous highly used areas and compared their characteristics to random points in the same area. Preliminary results suggest that urban coyotes tend to avoid human activity when selecting habitat but use more developed lands in the winter or when they have disease, perhaps because food becomes more difficult to obtain. However, I learned that research is an extensive process that will require continuous years of effort and dedication to achieve confident results.

I never expected that wildlife ecology would intrigue me as much as it did and play such a relevant role right here in Edmonton! However, WISEST also introduced me to other research fields through networking fairs, and tours of different labs both on and off campus. The information and experience I gained from these sessions embedded an understanding of what opportunities exist in my future. I have no doubt that WISEST has played a significant role in determining my future career path.

I would like to thank Dr. St Clair and her research team for allowing me to be a part of their exciting projects. I truly appreciated their continuous mentoring and enthusiasm every day; they made my WISEST experience unforgettable and showed me that research is always fun and interesting. As well, I would like to thank the WISEST Summer Research Program for creating this once in a life time experience and the Allard Foundation for providing the funds to make this opportunity possible.

Ashley Brown

Supervisor: Dr. Walter Bischof / Computing Science

Sponsor: NSERC PromoScience



"All of the WISEST events let me meet new people and learn about other projects."

When I first heard of WISEST Summer Research program I was at a SET conference, and I had no idea how my life would change because of it. The past six weeks I have learn everything from how to network with people, to how to build a 3-D virtual reality. I have gained confidence, organization, and skills to help me plan my future.

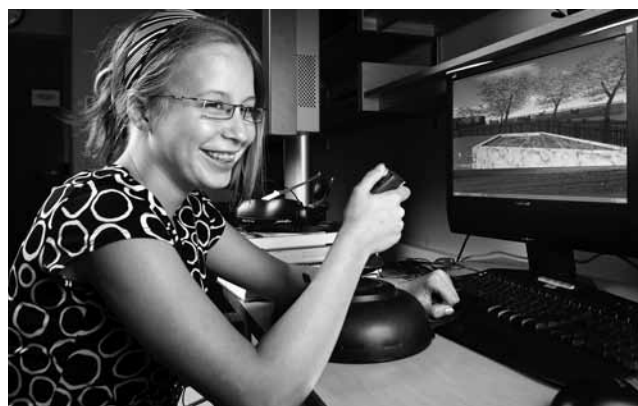
I have spent my summer working in the Advance Man Machine Interface (AMMI) lab working on a project to increase realism in virtual reality. My job was to create an environment that contains multiple types of fruit trees and to create a "Smell-O-Vision" apparatus that will regulate the scents of each fruit. I created an environment capable of both day sky and night sky that can be changed on the press of a button. The environment also has the ability to change the visible fruit on the press on a button, which will can in handy in future testing. In the future, the environment will be displayed in the CAVE and using head mounted display to help control a person's line of vision and create a 3-D display. All of this will help the AMMI lab to create more realistic virtual realities.

A part from creating the environment, my task was to create component that would make testing easier and more accurate. The main component of the environment that I used was Phiget control that enabled me to be able to control the fans in my Smell-O-Vision apparatus from my key board and joystick. This meant that during testing I was able to navigate people through my environment without needing to flip on and off switches for the fan and therefore disturb the test subjects.

WISEST has helped me learn in so many ways. We have our Monday and Friday meetings, were we learned how to create research posters, write articles, create elevator pitches, and present our projects. Mentors for different fields can in to talk to us and answer our

questions. We also toured labs both on and off the campus. Each lab opened my eyes to new possibilities available for me. All of the WISEST events let me meet new people and learn about other projects. The WISEST Summer Research Program has prepared my for life after high school as well as give me skills that will prove useful in grade twelve.

I would like to extend my thanks to the many people whom made my WISEST Summer Research Program experience possible. My thanks must go out to the WISEST team who have put together the Summer Research Project. I also would like to thank NSERC PromoScience for sponsoring me. I had an awesome time working in the AMMI lab and I would like to thank Dr. W. F. Bischof, Fraser Anderson, and Michelle Annett for being my supervisors. I also need to thank the Margaret Ann Armour Endowment Fund For Rural WISEST Students for helping to cover the cost of residence. I also would like to thank Julia for being our residence advisor and MacEwan for letting us stay there.



Branwen Price

Supervisor: Dr. Bruce Sutherland / Physics / Earth and Atmospheric Sciences

Sponsor: WISEST Guest Lecturer Sponsorship in the name of Hon. A. Anne McLellan, P.C., O.C.

“That’s one part of WISEST that I think is sometimes overlooked: working with other researchers and being part of a team.”



6 weeks ago if you had asked me what I wanted to do after high school my answer would have been simple: “I will be going to the University of Alberta and studying geological engineering” –that was before I started the WISEST Summer Research Program.

The WISEST Program is an opportunity that should be seized by everyone in grade 11. It introduces you to a whole new world that is barely spoken about in high school. WISEST changes your perspective about less-traditional careers and introduces you to true scientific research. Through-out the Program you are able to meet with role models who have careers in both academia and industry providing you with a chance to develop networking skills that are invaluable. We also visited a state-of-the-art laboratory at the university other than the one that we were working in. I never knew microbiology could be so interesting! And that’s kind of the point with WISEST you are given the chance to explore any and all interests you might have in science alongside other students who have similar interests and goals.

Over the summer I was working in a fluid dynamics laboratory in the department of Physics, and of Earth & Atmospheric Sciences. My project was based on how hurricanes are partly responsible for fluid mixing in the oceans. However, what happens to the fluid after a hurricane is not well understood; thus my research project. We – a graduate student and I –were validating the theory of the Rossby radius. The Rossby radius is the distance a flow travels before it feels the effect of rotation. In the case of hurricanes, the rotation would be caused by the Earth’s rotation; although, in our lab we used a rotation platform to simulate the Earth’s rotation on a much smaller scale. We found that the Rossby radius is only applicable if the rotation rate is fast enough. I really enjoyed experiencing life as a researcher in academia. My research group was extremely help-

ful and patient with me even when they had to explain things over and over again. I don’t know what I would have done without them. And even though, I was a little intimidated by everyone at first they were extremely welcoming. That’s one part of WISEST that I think is sometimes overlooked: working with other researchers and being part of a team.

I would like to thank my research group for all of your help, you guys are incredible! A special thanks to Amber Holdsworth for being so patient with me and introducing me to the fascinating world of fluid dynamics, and to Dr. Bruce Sutherland for welcoming me into his team and for allowing me to work in his lab. Thank you to my sponsor Hon. Anne McLellan, P.C., O.C. for supporting WISEST and the Summer Research Program. Without sponsors this amazing experience would never have happened, so thank you very much.

If you were to ask me now what I was planning to do after high school my answer would be “I will be going to University and studying engineering, or fluid dynamics, microbiology or maybe geophysics...,” and to some that might seem scarier than just staying in geological engineering, but because of WISEST I was able to discover new career paths that I didn’t even know existed. WISEST doesn’t just show you doors that were unknown; it gives you the tools you need to unlock them.

Brett Steele

Supervisor: Dr. Spencer Proctor / Agricultural, Food and Nutritional Science

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



“Throughout the summer I was able to meet a plethora of talented individuals with goals similar to my own.”

WISEST. Women In Scholarship, Engineering, Science and Technology. Not the place I would have expected to spend my summer. Oddly enough I found myself involved there and not only that, I enjoyed it. Throughout the summer I was able to meet a plethora of talented individuals with goals similar to my own. Through our Monday and Friday group sessions I was able to solidify my future plans as I met professors and grad students and was able to find out a lot about many different education and career options. That extra information alone was worth the whole summer of work. Although at first it felt rather unusual to be in such a female dominated environment, I realized that it didn't really make a difference and that everyone was there to earn, learn and have a good time.

I spent the majority of my time at the Alberta Institute for Human Nutrition, where I worked under Dr. Spencer Proctor with Dr. Faye Borthwick and Miriam Jacombe, as well as my student partner Anders. In the lab we performed a variety of experiments from colourimetric assays to Western Blotting procedures and overall I was able to learn quite a bit about the ups and downs of becoming a nutritional researcher. All these experiments were part of a larger project in which we were studying the effects of certain trans-fatty acids on the digestion of lipids and insulin. I spent a considerable amount of time in the early stages doing readings and practicing pipetting, and although I admit it was not the most exciting of work, I realized it actually had quite a few benefits when I later actually 'understood' what was going on. What do you know, sometimes a bit of prep work goes a long way. Once our project really got underway, I realized that I may have bitten off more than we could chew as we started getting flooded with data and I found myself wading through it to find what it all meant and where the connections were. Lots of my work involved a lot of thinking because what we were studying had a lot to do with the liver and intestine. The

intriguing part of this is although the organs may seem unrelated, they actually work in conjunction with one another and often compensate for each other in protein synthesis and gene expression. What this all means that lots of my data seemed to go in circles, and that made sense because it was just the natural function of the liver and intestine as the constantly were adjusting for what the other was doing. Even more curious is that towards the end as we seemed to truly figure out what was going on, we realized that perhaps trans-fats weren't as harmful to us as we think. That trans-fat actually has some positive effects on our body, like lowering cholesterol and promoting the reduction of triglycerides in our body.

As summer went by and I made new friends and learned new things, I realized that getting paid to do this was actually a pretty good deal. I mean, the work was interesting, the people were great and all the stuff I learned really helped me a lot when working on my future plans. One thing I should mention though is none of this could be possible if my lab didn't take me in or if Canada Summer Jobs hadn't made their generous donation which allowed me to partake in this program. Anyway, go for WISEST, you won't regret it.



Brianna White

Supervisor: Dr. Sylvie Quideau / Renewable Resources

Sponsor: Alberta Advanced Education and Technology

"The research I have done here has broadened my mind and pushed me to not take the little things for granted."



I come from a small town almost three hours away from Edmonton and I plan on going to the University of Alberta for my post secondary education. When I heard about WISEST from my teacher it sounded like something impossible, something far away, but also it sounded like something that I really wanted to try. Realizing that the trample of footsteps wouldn't be cattle, that the wind in my face wouldn't be from riding my horse and that the loud noises happening every once in awhile wouldn't be a dog barking to let us know someone was entering the drive, was actually really difficult. Edmonton is so different from my hamlet of fifty people and yet because of that I was determined that I would learn how to cope with such a place and knew that I could persevere. Living here has definitely taught me to be more appreciative of my life.

The department I work in is Renewable Resources and within that large field I have been looking at soil. Soil, one of the most basic and overlooked things, is formed of decomposed plants, animals, rocks and minerals. Soil plays an important part in our world because it provides nutrients and gives space to plants, gives a nice environment for bacteria, and has places that store water. I have taken a tremendous liking to this piece of our world because along the way I have realized how important it is, how special it is and particularly how it incorporates many different sciences into one small package.

For six weeks I have been studying two Edmonton soils. The sites that I went to had soil types under a specific classification. One is found in forest areas and the other in grasslands. My Principal Investigator wanted to make sure that they were representative examples of these types of soils for upcoming research. We've looked over the manual and done tests that will give information to the future students. I hope that the students get as much out of this course that I have put into it, I hope to never forget to think about

the small things in life, and I hope that what I have done will impact work done in the future. The research I have done here has broadened my mind and pushed me to not take the little things for granted.

I'd like to thank my family and friends for supporting me, my teachers who recommended me for this program, the WISEST coordinators, Denise Hemmings, Grace Ennis, Kerry Humphrey, Lynn Dafoe, and Jen Duffy, my principal investigator Dr. Sylvie Quideau, my supervisors Charlotte Norris and Aria Hahn, and my sponsor Alberta Advanced Education and Technology.

I walked into the WISEST Summer Research Program with an open mind and a willingness to work. This has easily be an experience I could never forget. It has prepared me for my future by teaching me how to create a good network (both friends and potential colleagues), preparing me for after graduation and university life, and giving me many more options for careers and potential jobs. I wanted the most I could possibly get out of this experience, but I didn't realize how much that would actually be.



Brittany Lissinna

Supervisor: Dr. Amos Ben-Zvi / Chemical and Materials Engineering

Sponsors: Faculty of Engineering & Service Canada (Canada Summer Jobs)



“Thanks to the help of my supervisor and the other members of my research team I easily adjusted to the daily routine of research.”

As a female, expressing your interest in math and science often results in a surprised look on other’s faces. At the WISEST Summer Research Program however, the reaction is completely different. Thanks to this program I have spent the past six weeks of my summer with sixty other females who have all responded with an enthusiastic, “Me too”!

I first heard about the WISEST Summer Research Program at the university open house. It was explained as an opportunity for enthusiastic females interested in less traditional areas of research to spend six weeks in a research lab all before graduating high school! From that day forward I couldn’t wait to apply for this amazing experience. When I received the call, informing me that I had been selected to participate in the program I could hardly contain my excitement. Then I was told that I would be working with Hector De la Hoz Siegler, under Dr. Amos Ben-Zvi in the department of Chemical and Materials Engineering, and my lab’s main goal was to optimize and extract bio-diesel from microalgae. This bio-diesel has the potential to provide an environmentally friendly fuel source for the future. Having never heard of anything of this sort before I was a little worried, the project seemed overwhelming and much too complicated for a grade eleven student. I was quickly proven wrong. Thanks to the help of my supervisor and the other members of my research team I easily adjusted to the daily routine of research.

My project was concerned with altering the carbon-nitrogen ratio in the solution where the algae cells are grown, in order to maximize their oil production. The first step to this is growing the algae you will use in your experiment. After a few unsuccessful attempts at promoting growth in the algae, I got the solution right and was able to see growth in my algae. Observing the algae grow and change color throughout the week was surprisingly rewarding and

I found myself excited to come into the lab each morning and discover what changes had taken place overnight.

Another proud moment of mine came when I had the chance to extract oil from the microalgae cells. After using a mortar and pestle to crush the cells, hexane and a centrifuge I was able to look into the vial and see the oil that I had extracted by myself. I never imagined that working with microalgae would be so rewarding.

During my time with WISEST I have gained irreplaceable knowledge. From realizing the diversity of research projects conducted at the university and understanding the methods required to carry out research to the traditional daily experiences of a research lab and the vital skills of workplace etiquette. The awareness that I have acquired during the summer can be attributed to both the people I’ve worked with daily in the lab, as well as the Professional Development and Lunch ‘n ‘Learn sessions put on by WISEST. The topics covered on Monday and Friday provided real world examples that we were able to relate to our own research, making the impact of the program even stronger.

I would like to thank my Principal Investigator Dr. Amos Ben-Zvi, my supervisor Hector De la Hoz Siegler, and the rest of my research team for being patient and always willing to help. I would also like to thank my sponsors, the Faculty of Engineering and Canada Summer Jobs for making this summer possible. Nevertheless I would not have had the opportunity to participate in this program without the dedication of the members of the WISEST team who have done an incredible job organizing the entire program. None of your contributions will be forgotten as WISEST has been an experience that I will continue to promote and won’t soon forget.

Charmaine Navis

Supervisor: Dr. Elaine Yacyshyn / Rheumatology

Sponsor: GlaxoSmithKline Foundation

“Talking to some of the researchers and grad students, and even the other WISEST students really helped me see that there is so much out there for us when we finish grade 12.”



This past summer at WISEST has been one of the most incredible experiences of my life. For my project, I received the opportunity to work in the Department of Rheumatology at the University of Alberta Hospital. Rheumatology is a sub-specialty in internal medicine, dealing with the joints, bones, and muscles. For my research, I mainly looked at the disease rheumatoid arthritis. This is an auto-immune inflammatory arthritis that attacks primarily the small joints of the hands and feet. If not treated rapidly, it can cause serious and permanent deformations to the joints. It is a non-curable disease however, with certain medications; it can be put into remission. The best drugs currently available are the biologic agents, which suppress the immune system to the point where a patient cannot even tell that they have the disease. The problem is, these drugs are extremely expensive, and it is a long process to receive coverage for them from the Blue Cross. The goal of my research was to discover whether the rheumatologists are being ageist when prescribing these drugs. To do this, I compared the ages of patients on a biologic to the ages of patients on another less effective drug, leflunomide. Our results showed that the patients on the biologics were younger than the other patients on leflunomide. This represents a significant statistical difference.

My WISEST experience was so much more than the research. Every week, I had the opportunity to go to the clinic with Dr. Yacyshyn, my principle investigator and supervisor. There I shadowed her and some of the med students, and was able to observe her working with patients. I also attended rheumatology rounds each week, where various med students presented an interesting case that they had seen in the clinic, and then the rheumatologists argued about the best course of treatment. Each week WISEST also opened my eyes to many more of the other fields on campus. I went on several lab tours, including a tour of the facilities at Schulumberger

Canada, and an agriculture microbiology lab. Talking to some of the researchers and grad students, and even the other WISEST students really helped me see that there is so much out there for us when we finish grade 12. It took away some of the stress of getting ready for university.

I would like to thank my sponsor, the GlaxoSmithKline Foundation, because without them, I probably wouldn't have been able to do all of the awesome stuff I did this summer. I also want to thank WISEST, and the University of Alberta, because if they didn't exist, I definitely wouldn't have gotten this opportunity. Most of all, I would like to thank my Principle Investigator, Dr. Yacyshyn for all of her time that she devoted to me and my learning. It was invaluable.

I believe that every grade 11 girl should have the opportunity to go to this program, because it is incredibly eye-opening. It completely changed my view on how research in the sciences works.



Christen Oakes

Supervisor: Dr. Jan Jung / Physics

Sponsor: Alberta Innovates - Technology Futures



“The research was also very cool because of the practical application.”

Doesn't every teenager feel pressure to find their place in the world? With my last year in high school looming within arm's reach, I felt torn between my passions. I knew that I had to make a decision about what to do after grade twelve, and the fact that I have interests in many different areas didn't make the choice any easier. When I was told about the WISEST Summer Research Program by a friend who had been in it in a previous year, I saw it as an incredible opportunity to not only learn about something I love and get paid while doing it, but possibly to learn something about myself and where my true passions lie.

In the beginning of my grade ten year, I stumbled across an unlikely enthusiasm for automotives class. As a girl with no previous interest in cars, it was baffling how quickly I became infatuated with the world of mechanics. Soon after, my eyes were opened to the possibility of mechanical engineering as a career. The thought of working with aerodynamics and creating performance parts for high-end cars is thrilling to me! The chance to work in an engineering lab and learn about physics while still in high school seemed like the perfect opportunity to advance my learning and decide if engineering was the path I should take after graduation.

Though I didn't get into my choice lab in mechanical engineering, I was still excited to explore the possibilities in the field of Physics Engineering. I knew practically nothing about magnetic fields, superconductors, and compounds called manganites, and in the first few days of work I learned more than I do in a week of school. I found the learning portion fascinating; I have a curious mind and love to know how things work. There were many slow days in the lab, though, where there wasn't a whole lot to do. Those days taught me patience (a virtue I admit I still don't fully possess), and the fact that work in a lab is much like my favorite sport, drag-racing: hurry

up and wait. The research was also very cool because of the practical application. Little is known about manganites, which are the compounds that I spent most of my time testing, so every piece of information we discover about them contributes to general knowledge that will one day make computers more efficient.

WISEST had a lot to offer outside of the lab, too. We had a chance to speak with people in other areas of engineering and science and learned much about the requirements of university life. Many of the sessions helped prepare us for the large gap between high school and post-secondary education, and opened our eyes to other possibilities for career options.

This was an incredible opportunity, and while I didn't learn much about myself this summer (I already knew I didn't want to be involved in theoretical physics!), I can genuinely say that I learned a lot, and had a lot of fun! I think that I would have been more enlightened in an area that I was passionate about, but as far as summer jobs go, it was fantastic. All of the students in my lab that acted as supervisors were incredibly helpful; they taught me a lot every day, put up with my questions, and were very kind people. Special thanks goes to Guillaume, who kept us busy learning even when there was nothing to do. Dr. Jung and Dr. Chow oversaw our project and made sure we learned to our full potential. The WISEST team was incredible in organizing the whole program, and of course, a massive thank-you goes to my sponsor, Alberta Innovates – Technology Futures, for providing the opportunity for me to be involved in this unbelievable program.

Courteney Robinson

Supervisor: Dr. Diane Cox / Medical Genetics

Sponsor: Faculty of Medicine and Dentistry

“My amazing mentors and supervisors, Anna Wilson and Gina Macintyre were right there, planning ahead, looking for different approaches, and teaching me about everything I was doing.”



“Can I use your phone please?” In the last few weeks of May when I found out I was being considered for the WISEST program I was so excited to call them back for my phone interview I couldn’t even wait until the end of the school day. Lunch time, in the student services office of my school, nervously answering questions. I didn’t even think that nerve wracking lunch hour would eventually lead into one of the greatest learning experiences of my life. I spent six weeks working in the medical genetics lab of Dr. Diane Cox, learning more than I ever thought possible about genetics, research, networking, troubleshooting, and things I had no idea were possible to learn in such a short time span. I never thought that I would have multiple mentors, incredible support, and friends all in the same lab. I did.

Wilson disease is a recessive disorder in which the body’s copper transport gene (ATP7B) is not functioning correctly, and copper builds up in organs such as the liver, brain, and eyes. This causes both neurological and hepatic symptoms, and can be very difficult to diagnose due to the wide range of ages of onset, and symptoms. My project was a new approach on testing the mutations that happen in ATP7B to cause Wilson disease and contribute to an easier diagnosis. My project was to create a minigene in which the variants could be introduced and the effects could be analyzed. I never thought for a second coming into this program that I would actually be doing the experiments, going through the steps and doing it myself. It was a steep learning curve but once I got it, everything was easier and even more exciting.

My experiment wasn’t effortless. Things went awry that were out of my control, steps had to be redone, the experiment itself had to be restarted. The problems, no matter how frustrating at times, were probably what taught me the most. My amazing mentors

and supervisors, Anna Wilson and Gina Macintyre were right there, planning ahead, looking for different approaches, and teaching me about everything I was doing. Even when we thought we weren’t going to be able to continue with the project, both of my supervisors were planning new things for me, and teaching me a great deal to do with other methods of testing variants. We were eventually able to restart the experiment again, and again there was a problem. Failure can be a detour, not a dead-end.

Not only did WISEST plan a networking fair that gave me new and different outlets for information, my direct supervisor set up multiple meetings with influential women within the medical genetics field, but also many other areas. All of the networking that I was able to experience over the last six weeks has given me so much more knowledge about fields I could go into, the different jobs, schooling, and being a woman in non-traditional position. The women that I talked with gave me an outlook on my coming university years that I wouldn’t have been able to get any other way.

The lab that WISEST placed me in was perfect for me. I feel that the people I met and the things they were able to teach me has better prepared me for the future. I may not stay in medical genetics research, but this program has given me knowledge and an interest to a side of science I had never experienced before. WISEST for me was like part of shopping for the perfect pair of jeans. I got to try on a few pairs, some that I would have never normally chosen but looked pretty good on, some were the wrong fit, and some didn’t look the way I thought they would. The WISEST experience was one I’ll never forget. Hopefully in the future I’ll find my “perfect jeans”, and be happy in the career I choose.

Danielle Pertschy

Supervisor: Dr. Philip Currie / Biological Sciences

Sponsor: NSERC PromoScience



“WISEST helped me realize that I really want to go into a career that is Biology-related, after working in Biological Sciences for six weeks.”

When I first got the call from WISEST, I was amazed. I couldn't believe that I was actually chosen out of all the Grade 11 students from across Alberta. Coming from an academic school, I am constantly surrounded by people who are smarter than me. It just goes to show you, there's no harm in applying for something. You never know, you may just get selected!

Science has always been a passion of mine ever since I was in Elementary school. So after hearing about this program from my science teachers, I thought it would be a perfect match for me. My hope coming into this program was to narrow down which field that I wanted to go into. All I knew coming into this program was that I wanted to go into sciences at university. WISEST helped me realize that I really want to go into a career that is Biology-related, after working in Biological Sciences for six weeks. I had high hopes coming into WISEST and I have to say all those expectations were far exceeded. I still can't believe that six weeks have gone by. If I could, I would do it all over again.

During my six weeks with WISEST, I worked in the Laboratory for Vertebrate Paleontology under the supervision of Dr. Phillip Currie. In our lab we prepared dinosaur bones from the Late Cretaceous (around 70 million years ago). These bones were from the hadrosaur *Edmontosaurus* and were found in the Danek Bonebed, located in Edmonton, Alberta. Preparation of fossils included cleaning, gluing and stabilizing the bones so that they could be removed from their plaster cases and then further studied. The work that we did here will help paleontologists to learn more about *Edmontosaurus*.

The second part of our research project was the CT scanning of Komodo dragon teeth. We performed CT scans, much like those done in hospitals, using a micro-CT scanner on these teeth so that they could be compared to tyrannosaurid teeth, as they are very similar.

Using these scans, we were able to create three-dimensional models that can be used for more accurate study.

In the end, I prepared about twenty different *Edmontosaurus* bones, ranging from femurs to ribs to vertebrae and I scanned around seven Komodo dragon teeth. We managed to prepare most of the bones from the Danek bonebed collected this field season.

The WISEST program was very well planned out. The Lunch 'n' Learn really helped me achieve many important skills while in science research. The Professional Development Seminars helped me learn so much about research that I never knew before. Thanks to both of these sessions, I now have a better understanding of what it would be like to have a career in sciences.

All in all, this experience was pretty mind-blowing for me and I am extremely grateful to a lot of people. I would like to thank all those in the paleontology lab, especially Miriam Reichel, Clive Coy and Nicola Howard, for letting me work in their labs and for answering all my questions about paleontology. I would also like to thank my science teachers for encouraging me to apply for this program and then giving me the necessary references to get in. Thank you as well to NSERC PromoScience, my sponsor. Without you, I would not have been able to do all these amazing things and programs like WISEST wouldn't be possible. A big thank you as well to Kerry, Grace, Lynn and Jen for organizing this program and for quickly answering all the questions I had. Thank you WISEST for a summer that I will never forget!

Darian Bremmekamp

Supervisor: Dr. Daryl McCartney / Civil and Environmental Engineering
Sponsors: Faculty of Engineering & Service Canada (Canada Summer Jobs)

“As I read the many reports and articles of information on our project I quickly began to better understand what this summer would teach me.”



Starting my second term of Grade 11 in January, I had no idea what career path I wanted to take with my life. My interests ranged from science to fashion, drama to farming, law to engineering and the list goes on and on. There wasn't really any one thing that I could pin point going into. I had always loved my science classes in school though, especially biology and mathematics. So when my chemistry and biology teacher handed a brochure and set of papers to two of my fellow students and I about WISEST I was immediately interested. Living on a farm I had never really had a real off-farm summer job and I was by no means looking for one but the opportunities that WISEST offered were not something I wanted to pass up. The chance to work hands on in a research lab at the University of Alberta for a summer before going back for my last year of high school offered an amazing prospect.

I was placed in the Department of Civil and Environmental Engineering with Dr. Daryl McCartney studying the use of tire shreds as a landfill drainage layer. I was extremely excited to be working on this project although at the beginning I had very little understanding of what I would actually be doing.

Upon arriving for the program in early July, fellow WISEST student Marjorie Mallare and I began what would become a six-week adventure. We started by meeting our Direct Supervisor Kristine Wichuk and some of the graduate students that we would be working with. Then our first couple of days were spent learning about the project that we would be working on. As I read the many reports and articles of information on our project I quickly began to better understand what this summer would teach me. We would be helping to study the use of shredded tires as a drainage layer in landfills as compared with the previously used product of gravel.

As the program progressed we went out to the Edmonton Waste Management Centre of Excellence to do tests on 3 different types of tire shreds, passenger and light truck tires (PLTT), medium truck tires (MTT), and off-the-road tires (OTR), and a mixture of PLTT and OTR as well as gravel. The tests were done to determine their properties, such as particle size distribution, specific gravity testing and compression tests. The long term goal of the project is to determine the permeability and hydraulic conductivity of the leachate passing through the tires to see if they are an adequate drainage layer and also to determine what type and size works best.

Being a part of WISEST has opened my eyes to possible career options through the work in my lab as well as the on and off campus trips to the Agricultural Genomics and Proteomics Unit and Schlumberger's DBR Technology Centre. I now have a better understanding of what a research career entails; a broader knowledge of the many areas of science, engineering, and technology and a feel of what the University is like.

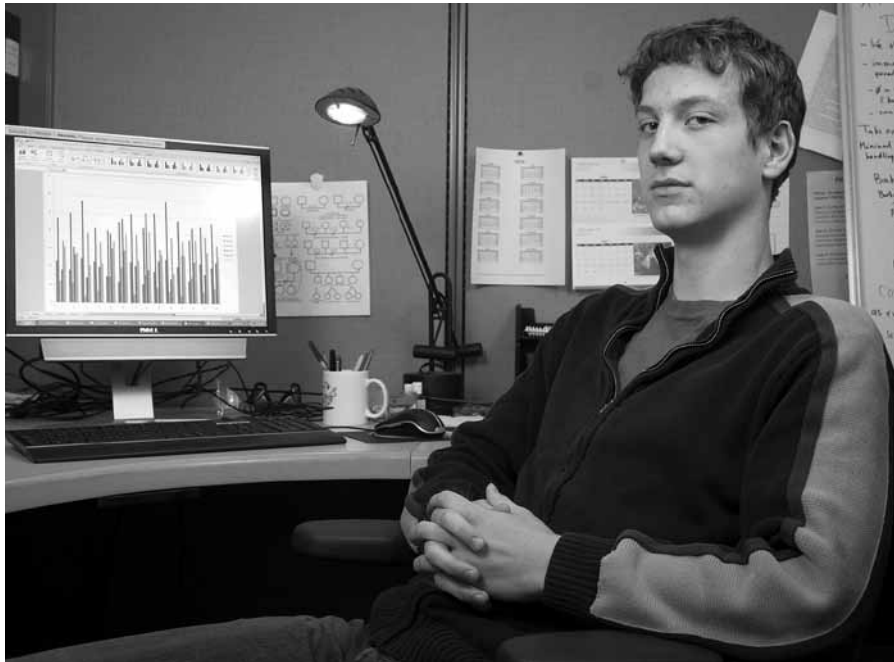
Thank-you to everyone who helped make this experience possible for me, my family for encouraging me to apply, my teachers Mrs. Katherine Storey Smith and Mrs. Diane Williams for their references, the entire WISEST team, my research team especially Kristine Wichuk and graduate student Marclus Mwai and my sponsor the Faculty of Engineering & Service Canada (Canada Summer Jobs).

I came to WISEST hoping to solidify a career path for post secondary and I am leaving with even more options than I initially had.

Douglas Rebstock

Supervisor: Dr. Gwen Rempel / Faculty of Nursing

Sponsor: Faculty of Nursing



“The program does not limit you to learning about the position you got placed in but tries to give you a taste of many different opportunities . . .”

I worked in Dr. Gwen Rempel’s team in the Faculty of Nursing. My summer project was a small part of the whole research team’s project: “Safeguarding the Heart Child”. The goal of the research team is to develop and test parent-focused interventions that will improve long term developmental outcomes for children with complex congenital heart diseases (a congenital heart disease is a malformation of the heart that is present at birth). So far, almost all of the research done in our team has been qualitative with the main tool being interviews conducted with the parents of the child with the complex congenital heart disease. When I came onto the scene, the team was in the preliminary stages of a quantitative pilot study with the aim of profiling families for possible intervention with the use of questionnaires. With around twenty questionnaires being returned, my research project over the summer was centered around analysing this data.

There were two booklets sent out to the families; one being a questionnaire with multiple profiling measures, and the other being a questionnaire focusing on the educational and rehabilitation services used by the child with the complex congenital heart disease, which in this case was hypoplastic left heart syndrome (HLHS). HLHS is a disease in which most or all of the left side of the heart is small and undeveloped. The survivors can face serious lifelong complications that affect not only the child but the family as a whole. After punching in the data (research work is not all glamorous) I was able to begin analysis. One thing about this research program is that you have to be able to adapt and learn on the fly which I learned quite quickly as I taught myself how to use statistical analysis programs. My work focused mainly on the Family Management Measure (FaMM), a 53 item questionnaire developed by Knafelz, K., Deatrick, J., Gallo, A., Dixon, J. and Grey, M. in 2007 with the purpose of identify how the family manages with a child that has a

chronic health condition and how the management is incorporated into their day to day life.

Through the use of REDCap for data entry, Microsoft Excel and SPSS for statistical analysis, I was able to identify certain patterns and relationships in the data. One pattern I discerned was that the fathers who responded to the questionnaires had a more positive score in all the subscales of the FaMM compared to the mothers. As well, I was able to put the results in a continuum from low to high scores that display the level of success the families are having in managing the HLHS of the child as well as showing the range and spread of the data. In addition to the FaMM, there were five other profiling measures in the questionnaire. I was able to obtain the significant correlations between the subscales of the FaMM and the other measures in the form of Pearson correlation values. Even though these results are not very helpful in isolation, they are useful in further work on the study and in what ways the pilot study should change in regards to which measures should be kept.

Overall, the summer research project was an extremely positive experience that enabled me to expand my knowledge on the multitude of careers out there. The program does not limit you to learning about the position you got placed in but tries to give you a taste of many different opportunities which I see as possibly the most important part of the program. The experience was very positive and I highly recommend this program.

Eliza Pan

Supervisor: Dr. Heather Proctor / Biological Sciences / Meanook Biological Research Station
Sponsors: Alberta Women's Science Network (AWSN) & Service Canada (Canada Summer Jobs)

"With help from my fellow researchers, I discovered that scientific understanding and personal experience go hand in hand, and that the joy of trying new things is not underrated."



"Always walk through life as if you have something new to learn and you will" (Vernon Howard). At the beginning of the summer, I arrived at Meanook, eager to learn, yet unaware of what I would discover. Now, as the WISEST Summer Research Program is drawing to a close, I look back on my summer with pleasure, grateful for having the opportunity to study ecology and alternative energy. Both inside and outside of my research, I have gained invaluable knowledge and insight that I will remember for years to come.

This summer, I had the privilege of researching at the Meanook Biological Research Station, located 15 kilometres south of Athabasca. While, on the onset, Meanook appeared to be tranquil, I soon discovered that the facility was as vibrant as the nearby pond. Working among graduate students and independent researchers, I was inspired to devote myself to my research project. Along with my fellow WISEST student, Rebecca LaGrange, I engaged in several environmental investigations.

My primary research focus was to determine the potential cost-effectiveness of solar and wind power in Alberta. While fossil fuels are relatively inexpensive and readily available, their utilization in power generation is harmful and unsustainable. Fossil fuel combustion releases atmospheric pollutants, such as sulphur and nitrogen oxides that form acid rain, while fossil fuel extraction damages surrounding ecosystems. Moreover, since fossil fuels are non-renewable, their supply may not keep up with global demand in the future. Meanwhile, technological advancement is improving the potential of alternative energy. The purpose of my research was to investigate the viability of powering an average Albertan home with solar and wind energy for 25 years, compared to relying on fossil fuels.

After collecting data from a meteorological station, I systematized

and analyzed daily solar radiation and daily average wind speed data from 2005 to 2010. I then calculated the efficiency of solar and wind technology. Although I based my calculations on efficient solar panels and wind turbines, my results revealed that conventional, on-grid power would still be much cheaper than a combination of solar and wind power, because of the high initial cost of solar and wind technology. Nevertheless, solar and wind power could become more practical in the future, particularly if promoted by government subsidies and technological developments. In the meantime, my research can help local residents understand the present pragmatics of powering their homes and businesses with renewable energy.

Thanks to the WISEST Summer Research Program, I have learned more than I could have conceived before July 6, 2010. Between learning to aim bear spray, drive an ATV, and deliver an elevator pitch, WISEST has filled my summer with laughter, exhilaration, and education. With help from my fellow researchers, I discovered that scientific understanding and personal experience go hand in hand, and that the joy of trying new things is not underrated.

My research experience could not have been the same without several people and organizations. I would like to thank Brandon Nichols, Kaitlin Kawalilak, and Dr. Heather Proctor for their tireless support and humorous anecdotes. Furthermore, I wish to thank the Alberta Women's Science Network and Service Canada for their generous sponsorship. Finally, thank you to the WISEST team for making my experience possible. What I have learned could not have been acquired from a mere textbook. This summer was one of a kind and I look forward to additional unique learning experiences in the future.

Emma McDonald

Supervisor: Dr. Gerda deVries / Mathematical and Statistical Sciences

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



“Not only did I thoroughly enjoy every minute I spent at the university, I found the area in which I would like to spend the rest of my life.”

Following my acceptance to the WISEST summer research program, I was placed in the Department of Mathematical and Statistical Sciences. With the supervision of Dr. Gerda de Vries and Hannah McKenzie, my task was to create math workshops for the GAME (Graduates at Alberta Mathematics Etc.) in Schools outreach program. The goal of this program is to promote mathematics in grade school students by introducing the students to the fun, applicable side of math. To do this, graduate students like Hannah travel to local schools and conduct interactive workshops with the students. These workshops often cover topics that students would not get the chance to explore through the regular curriculum.

I spent my summer developing new workshops for the GAME in Schools program, along with another WISEST student, Nadia Shardt. Collaborating with Nadia, I created two workshops on the topics of cryptography (the mathematics behind codes) and symmetry. For the last half of my work term, I chose graph theory to concentrate on for an individual workshop. This gave me a chance to extensively explore an area of math that I found interesting. To enhance my understanding of these three concepts and to enrich my time in the math department, I attended a number of special presentations and activities. These included various meetings with different faculty members to discuss their research, a math fair, a number of lectures from Math 222: Introduction to Discrete Math, and a fieldtrip to the art gallery to see the M. C. Escher exhibit. As well, Nadia and I had the opportunity to try our symmetry workshop with a group of DiscoverE campers. All of these experiences served to increase my knowledge about how research is conducted in terms of mathematics, the difference between applied and pure math, and life at the university in general. I also had the chance to hone a number of real-world skills, such as presenting to a group and using the formatting program LaTeX.

The WISEST aspects of the program also added to the richness of my experience this summer. I relished each opportunity to meet a new role model, especially those who had found their place in a less-traditional field. The multiple tours opened my eyes to the numerous and practical applications of science and mathematics. As well, the professional development sessions provided me with the basis for a number of necessary skills, such as networking.

At the beginning of the summer, I assumed that I would enjoy my six weeks at the university and perhaps gain an idea of what I would like to study in post-secondary education and eventually pursue as a career. The summer research program exceeded all of my expectations in the best possible ways. Not only did I thoroughly enjoy every minute I spent at the university, I found the area in which I would like to spend the rest of my life. For me, the WISEST summer research program was, quite simply, life changing.

I would like to thank my sponsors, Canada Summer Jobs and the Faculty of Science, for making it possible for me to participate in the program. I would also like to thank Kerry Humphrey, Lynn Dafoe, Jen Duffy, Grace Ennis, and Denise Hemmings for orchestrating this experience. Lastly, I want to extend my heartfelt gratitude to Hannah McKenzie, Dr. Gerda de Vries, Trevor Pasanen, Diana White, and all of the faculty and undergraduates in the math department who allowed me into their classrooms and offices to share their work and passion for mathematics.

Gauri Chaggar

Supervisor: Dr. Walter Bischof / Computing Science

Sponsors: Process Solutions Canada & Service Canada (Canada Summer Jobs)

"... I will never lose nor will I forget the courage that I have gained from countless role models with respect to pursuing a less traditional career."



WISEST. Growing up the word meant having sense and good judgement. This summer has changed the way that I look at the word WISEST. Although it still has a positive connotation, it has taken on a personal and deeper meaning.

My desire to participate in WISEST started in grade ten when the program seemed the perfect opportunity to become acquainted with less traditional careers. Today, the word perfect cannot define how much this experience means to me. I have gained a mountain of knowledge along with lifelong memories.

My enthusiasm to attend WISEST has been so immense that I did not feel nervous on our first day. Upon entering the orientation room, it took only a few moments before a group of girls invited me to their table. Conversation flowed very easily as we had conversed online beforehand. As the day continued, my excitement increased and not once did I leave cloud nine. I met three other girls who were to work alongside me in the Advanced Man-Machine Interface (AMMI) Laboratory. Those three girls have now become very close friends of mine. Our research team has been extremely helpful and I am grateful for their teachings.

My project this summer was to create Avedi – a glove which alerts users of their activity levels. The glove can be used in situations such as desk work to promote physical activity through vibrations, lights and sounds. In order to create Avedi I refreshed my sewing skills and created new programming skills using LilyPad Arduino components. Having never programmed before, the experience was certainly enlightening and challenging. Regardless of the hurdles that I experienced, I enjoyed every moment of this summer.

This summer has taught me an incredible amount that will give me an advantage in life. I am extremely well versed in the methods of

introduction, researching, creating experiments, questionnaires and posters. Although I consider all of the lessons from this summer to be important, I will never lose nor will I forget the courage that I have gained from countless role models with respect to pursuing a less traditional career. I have heard numerous times that if you want something and you go after it, you will eventually receive it. The last six weeks of this summer have reinforced this saying as I have seen it in practice and am now doing the same.

I would like to thank the WISEST Team with all my heart for this wonderful opportunity as well as Dr. Margaret-Ann Armour for continuing to address the disparity of men and women in less traditional careers. All of you truly change lives through meaningful contributions. My sincerest appreciation goes to my sponsors Service Canada (Canada Summer Jobs) and Process Solutions Canada who allowed for my participation in WISEST. The research team at the AMMI Lab including Michelle Annett, Fraser Anderson and Dr. Walter F. Bischof consists of some of the most supportive people that I have ever met and I would like to thank them for a fantastic summer.

I will miss numerous people from WIEST although I am consoled that we will be seeing each other at the University of Alberta next year. In the meanwhile I will take everything that I have learnt and put it into practice. No matter what you do, if you do it passionately and with your heart, you will be rewarded. This summer was no exception.

Haley Lawrance

Supervisor: Dr. Walter Bischof / Computing Science

Sponsors: Process Solutions Canada & Service Canada (Canada Summer Jobs)



“Over the course of the program I met so many diverse people that answered a lot of my questions and taught me about things I didn’t know.”

I remember the first time I learnt about the WISEST Summer Research Program, I thought it sounded unbelievable, but the chance I would actually get to participate were slim. When I learned I had been chosen for this once in a lifetime opportunity, and would work in the Department of Computing Science, I was both thrilled and a bit frightened.

Just days into WISEST, I had already met countless individuals who were as interested in science as I am, and I was lucky if I could remember the name of the last one I had encountered. Although the beginning was a blur, once I got settled in the AMMI (Advanced Man-Machine Interfaces) Lab I was relieved.

The project I was assigned involved creating an interactive animal, which would be done by programming sensors, and using the Arduino Lilypad and Arduino Duemilanove (which are both microcontrollers). The greater project involves studying how ‘unhumanistic’ a toy can be, before children no longer desire to play with it. My project is just the first step in the project and so my ‘toy’ was supposed to be as realistic as possible.

My supervisors helped me immensely throughout my six weeks. Upon arriving at WISEST I had no experience with programming, so there was a lot of work ahead of me. I have been thrilled from the beginning with my project. I became more familiar with programming by doing several tutorials. Once I was more comfortable, I removed all of the stuffing from a toy monkey, and started to play around with the sensors that I wanted to use. As much as I wanted to start tearing apart the monkey and attach parts on to it, I first had to build circuits on my own and confirm that they worked effectively.

Inside the completed monkey there are magnetic sensors, light

sensors, flex sensors, vibrating motors, and buttons. Using the light sensor, for example, we are able to detect when the monkey is petted. The monkey has LEDs in place of its’ eyes, a glowing stomach and mouth (made with electroluminescent wire), and can even make noises (using a wav board). In addition, the monkey has several accessories that it can interact with. It shows anger when you remove its safari hat by vibrating and flashing the eyes red. The monkey’s eyes and stomach light up different colors in response to the banana, ice creams, or spoon being touched to its mouth, stomach or hand.

Working in the Department of Computing Science through the WISEST program has opened up a lot of doors for me. Spending time on the University of Alberta Campus has definitely forced me to reevaluate where I would like to receive my secondary education. WISEST allowed me to see several different research labs that were fascinating and featured very interesting projects.

Over the course of the program I met so many diverse people that answered a lot of my questions and taught me about things I didn’t know. The Lunch and Learns and Professional Developments were great opportunities to meet with other people in the program and discuss our jobs and interests.

This experience could not have been possible without Michelle Annett, Fraser Anderson and Dr. Walter Bischof, who all volunteered their time and watched over my project. They are all extremely helpful and made sure I felt comfortable in the lab. Also, I am very grateful for the generous donations from my sponsors: Process Solutions Canada and Service Canada (Canada Summer Jobs). All of these contributions allowed myself to have one of the most amazing summers of my life, by expanding my knowledge of science and technology and receiving incredible hands-on experience.

Hazel Gutierrez

Supervisor: Dr. Joel Dacks / Cell Biology

Sponsor: Syncrude Canada Ltd.

"Many people from WISEST, I realized, came from small towns and places other than Edmonton where going to a university and exploring around the campus is unavailable."



The Summer Research Program was a unique experience full of learning opportunities and new discoveries. From lab meetings to BLASTing queries, there seemed to be an endless amount of work to do in Dr. Dacks' lab, and always something new to learn!

I learned about genome annotation, the organism *Bigelowiella natans*, the evolutionary history of eukaryotic cells, and the functions of some of the proteins in them. I learned how to access the information on the Joint Genome Institute website and make phylogenetic trees. I learned how to interact with the people in my lab, and appreciated working on a project as part of a team.

I learned that the membrane-trafficking system is a key characteristic of eukaryotes and is responsible for the proper movement of cellular material. For my project, I studied the SM protein family, responsible for specificity in vesicle fusion, in *Bigelowiella natans*. *B. natans* is a unicellular alga that is evolutionarily important because it is the product of a secondary endosymbiotic event and unusually retains the nucleomorph genome. It is also the first member of the rhizarian supergroup to be sequenced. I used comparative genomic and bioinformatics methods were used to search for and characterize SM proteins in *B. natans*, as well as determine whether they were derived from the host or nucleomorph genome. We identified homologues for each of the four SM protein families in *B. natans*. Two of the proteins are likely host-derived machinery, while the evolutionary history of the other two proteins remains unclear. What is relatively normal about these SM proteins is that *B. natans* contains all four of the SM protein families and there is no indication of any of these SM proteins being sent towards the nucleomorph.

Many people from WISEST, I realized, came from small towns and places other than Edmonton where going to a university and exploring around the campus is unavailable. Being here for six weeks

and working with a Principle Investigator on a project is pretty awesome in itself, but that is not the only thing out there. You can work for the six weeks you're here in WISEST, but why settle for just the minimum? Don't be afraid to ask your supervisors questions, and explore the many areas of study available at the University while you are working on campus.

This summer I managed to meet new people, tour some labs, and... meet more people! Meeting other WISEST students and talking and sharing about their experiences were also great way to explore different career options in the sciences and engineering areas offered at the University of Alberta.

I toured a Paleontology lab and the fossil museum. I saw some of the Agricultural, Food and Nutritional Science Department. I discussed possible career choices, which was something I was definitely indecisive about. I myself like many different fields and have many various interests, so talking to people and seeing what they think benefited me a lot. Still, the tours made me want to explore even more places and opened up new possibilities.

There was the fact that graduation year would be there when WISEST was finished. WISEST sessions, and talking to other WISEST students and professors got me thinking about that, more than ever. But after talking to them, I realized how diverse the careers are. There were so many choices of careers! And how to pick? I still don't know the answer to that one, but I'll get back to you on that.

Jacque Cream

Supervisor: Dr. Amos Ben-Zvi / Chemical and Materials Engineering

Sponsor: Alberta Innovates - Technology Futures



"I was able to see different aspects of what you can do in environmental engineering, which I had no idea it even existed beforehand."

My love of science seems to have no definite beginning. From a very young age I have developed a passion for constant learning and discovering new things. This passion was sparked by my Grandpa's own interest in science. My Grandpa would give me Sky News magazines and we would talk about the stars, the planets, and the moon when I was only six years old. I still love gazing at the stars and am fascinated by the moon and black holes. I'd constantly be asking him questions about the tools he used and the things he was building in his shop. In grade nine my interest in environmental sciences was sparked after a River Watch field trip that my science teacher arranged. In grade 11, my chemistry teacher told my Dad and I about WISEST at parent teacher interviews in the fall. When the application forms came out I jumped at the chance to apply. I took a chance and it paid off. I was so excited to receive the phone call telling me that I was able to participate in the WISEST Summer Research Program. I was also excited to learn that I would be part of a research program studying algae to produce bio-fuel. Drayton Valley, the town I live in has its own similar project called the Bio-mile Project.

The project I worked on this summer had to do with measuring the biomass of micro-algae. I grew three flasks of algae, each with its own carbon-nitrogen (C:N) ratio. I used several measuring techniques and compared them to see which ones were the best and most accurate. I also looked to see how these measuring techniques are related and the correlation between them. The measuring techniques I used included the transmittance and absorbance of light through the algae samples, the total cell count of the samples, and measuring the dry weight of the samples following filtration and centrifugation. I also used the microscope to take pictures of the slides and see if the different C:N ratios affected the algae cells.

Being in WISEST has opened my eyes to many more aspects of science. I still have my passion for chemistry and biology, but different lab tours have sparked a new interest of mine.. When I was able to tour multiple labs in the engineering department, it grabbed my attention. I was able to see different aspects of what you can do in environmental engineering, which I had no idea it even existed beforehand. I was able to see many different possibilities of what you can do in mechanical engineering, which I now find extremely fascinating. I was able to see a wind tunnel in action and I was able to meet with the group of engineers at the U of A who are involved with the Phoenix Mars Lander Mission 2007. I will never forget this summer as it has given me an amazing opportunity to learn more about my interests, open my eyes to more things, allow me to explore and get to know the campus of a university that I may attend in the future, and catch a glimpse of what university is like. I have met many new people who I won't forget. I have met people who have guided me along the way and people who I am becoming good friends with and will stay in contact with them for as long as possible. Staying at the MacEwan Residence has given me the chance to become more independent and learn how to do things for myself. I have made good friends while staying in residence and our residence advisor Julia always made sure there was something fun to do. This will be a summer I'll never forget and has been another collection of sparks creating a new passion to drive me forward into the future.

Jaskiran Sandha

Supervisor: Dr. Monika Keelan / Laboratory Medicine and Pathology

Sponsor: Alberta Advanced Education and Technology

"The Summer Research Program is rounded out by a variety of professional development seminars and Lunch 'N' Learn sessions that teach diverse but important lessons."



This summer, I was one of sixty fortunate high school students selected to participate in the WISEST Summer Research Program, which has been an enriching experience. At a glance, the program may appear to be a six-week summer job, but it is in fact a great deal more. The experience taught me about the research I was doing, as well as a multitude of valuable lessons in career management. It has prepared me for my future in post-secondary education and has given me insight into the vast world of opportunity beyond it. I have gained many important skills and made new connections with undergraduate, graduate, and fellow high school students.

The past six weeks have taught me much about the vastness of science and research. One can literally study anything, from the DNA of bacteria, to the proteins in eggs, to the psychology of fish. Progress can sometimes seem slow, but this is compensated by the opportunity to learn continuously, work with cutting-edge technology and make ground-breaking discoveries.

This summer, I was placed in the lab of Dr. Monika Keelan working with summer student Megan Burlet on a study about *Helicobacter pylori*, a bacterium that colonizes the stomach and is linked to stomach inflammation, ulcers, and cancer. We were working on *H. pylori* samples isolated from the residents of Aklavik, Northwest Territories, where the incidence of *H. pylori* and stomach complications is unusually high. Specifically, we fully sequenced one gene of the bacteria for each Aklavik sample, and compared the sequences to see if there was any similarity between isolates taken from members of the same household, which would suggest interfamilial transmission. The gene we have been working with is the alkyl hydroperoxide reductase gene, or the *ahpC* gene, which contributes to antioxidant activity that neutralizes harmful oxygen radicals that are formed from cellular respiration.

Our day-to-day activities included amplifying the *ahpC* gene in the

Aklavik samples using the polymerase chain reaction (PCR) method, and then testing for an amplicon (amplified sample) by performing an agarose gel electrophoresis. We then purified the samples, sent them to be sequenced, and analysed the sequences using DNA imaging software. Despite ten days of tracing contamination, we managed to completely sequence the *ahpC* gene for the samples, and Megan will continue to sequence one or two more genes during the year. Although the contamination did slow our progress significantly, I learned much more from it than I would have from simply sequencing another gene. The logical elimination and attention to detail required to trace a contamination in a microbiology lab is a skill by itself, and will surely be valuable to me in the future.

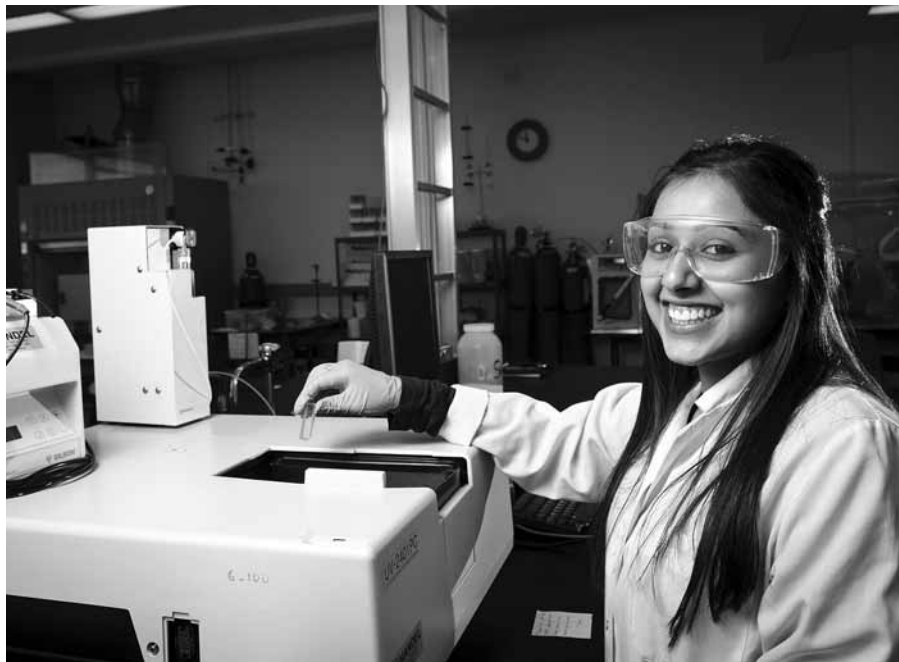
The Summer Research Program is rounded out by a variety of professional development seminars and Lunch 'N' Learn sessions that teach diverse but important lessons. The Friday sessions focused more on developing skills, such as forming mentoring relationships, whereas the Monday PD seminars explored new aspects of science. The PD seminars involved hands-on activities or even field trips to labs on-campus and in the Edmonton Research Park, which gave us exposure to research careers other than those in our labs.

My wonderful experience with the WISEST Summer Research Program could not have taken place without the help of several people. I would like to thank Alberta Advanced Education and Technology for their generous contribution to the program, without which I could not have taken part in this experience. I am grateful to the entire WISEST Team for giving me this opportunity to explore and develop, and to my teacher references, who introduced me to WISEST and facilitated my participation in the program. I would like to acknowledge Dr. Monika Keelan, Megan Burlet, and the rest of the research team for training me and making my WISEST experience such a memorable one.

Jasman Boparai

Supervisor: Dr. Zaher Hashisho / Civil and Environmental Engineering

Sponsor: Department of Civil and Environmental Engineering



“One of the most valuable pieces of information that I took from this program was: I need to find a career that fits into the kind of person I am.”

All my life I have wanted to do something that would make my parents proud while giving me a sense of pride. At the age of seventeen, I have realized that I have the opportunity to explore different careers that are available in science and technology. There are a vast number of courses that are offered at universities, for which I have recently gained interest in. With this broader perspective, it becomes overwhelming to make the right choice. With the help of the WISEST program I have had the opportunity of placing myself in a new situation working in a new city and new environment, which at the end was the best decision of my life.

Coming from Calgary I was really nervous living in a new city for six weeks. I was really scared the first week, but towards the end of the program I was able to walk downtown with confidence knowing that I was safe. This program has transformed me into a mature and out-going adult. I would have never received this new personality if I sat at home all summer. I consider myself lucky due to the fact that I got to experience university before my classmates.

My project for the summer focused on oil sands tailing water. Tailing ponds are made to hold wet waste that is collected during the process of extracting oil. There are many toxic organic wastes that are produced during the extraction of oil; however, the most concerning organic by-products are naphthenic acids. Petroleum coke has been proposed to help remove naphthenic acids. To prove this we performed adsorption equilibrium tests, which allowed me to learn new skills. I had the chance to use and calibrate both pH and electrical conductivity probes, as well as perform extractions on treated tailings pond water for FT-IR spectrometry. For my experiments I had the chance to use new instruments such as: fluorescence spectrometer, UV-VIS spectrometer, microtox, centrifuge and agitator. I also had to the chance to chemically activate petroleum

coke to increase its surface area and porosity. This gave me a chance to use new chemicals that I have never seen or heard of before. Throughout my research the most valuable skill that I developed was patience. I had to sit for hours in one place to wait for one test to be done, but at the end it was worth it.

The WISEST program has helped me open my eyes to a career in research. I am leaving the WISEST program with my head held high knowing that I am not alone in trying to find the right career. One of the most valuable pieces of information that I took from this program was: I need to find a career that fits into the kind of person I am. If I make the wrong choice the first time there is always time to change directions to find the right career.

I would like to thank the WISEST staff for their outstanding work in making this program run as smoothly as possible, and the sponsors for their continued support. I would also like to thank Christina Small and Dr. Hashisho for allowing me to work in their labs is summer. Without these amazing groups of people I would have never been able to receive this great experience.



Jennifer LaBranche

Supervisor: Dr. Jason Carey / Mechanical Engineering

Sponsor: Dow Chemical Canada Inc.

"By meeting various people I learned about the specific roles of engineers and I even learned some of the math and theory used in engineering."



As the end of high school approaches so does the task of choosing what to do after high school. I thought that the WISEST summer research program sounded like a great way to get ideas as to what I could pursue after high school. I didn't however fully understand what I would be doing as a part of the WISEST program and I certainly didn't anticipate just how much I would learn over the six week program.

I have spent the past six weeks in the mechanical engineering lab of Dr. Jason Carey. Throughout the past six weeks I have been working on a number of different tasks. My supervisor Dan Romanyk is developing a new orthodontic appliance which uses magnets to widen the maxilla or the upper jaw. This is why I have been doing research into the effects of magnets. My research was done in order to find what effects the appliance could have on patients. To further my research I also had the opportunity to conduct two experiments. The first experiment tested the effect of heat on magnetic properties and the second looked at whether the magnets used in the appliance would set off a metal detector.

Another task I have been working on this summer is solving a myth-busters project. Amanda Marchak, the other WISEST student in Dr. Carey's lab, and myself have been working on solving a myth from the movie Pirates of the Caribbean. We looked at if it is possible to use an overturned canoe to walk on the bottom of the ocean for one mile. We were able to bust the myth by using mathematical calculations as well as through conducting an experiment involving a scaled down version of the myth.

Throughout my time in the lab I learned a great deal. I was exposed to university life and was able to sit in on a second year engineering lecture. I attended regular lab meetings and orthodontic meetings which introduced me to a professional job setting. I also had

the opportunity to tour a number of different labs. By meeting various people I learned about the specific roles of engineers and I even learned some of the math and theory used in engineering. Throughout the summer I gained knowledge on how to do a literature review, how to design and conduct experiments and how to use a three dimensional modeling program. On top of learning a lot in the lab I also had a lot of fun talking with my supervisors and the undergrads in the lab.

The weekly Friday and Monday WISEST seminars were also invaluable learning opportunities. One seminar in particular which stands out in my mind is the networking fair. During the networking fair we were able to meet with role models who had chosen less traditional career paths. We were able to ask the role models questions about their careers that we couldn't find out through just reading a book or searching the internet. The seminars also allowed us to connect with other WISEST students who we didn't get to see on a daily basis.

This summer has been an extremely meaningful opportunity. I would like to thank Dr. Jason Carey for allowing me to work in his lab this summer. I would also like to thank my supervisor Dan Romanyk for letting me work on his project and for teaching me throughout the summer. I also want to thank my sponsor Dow Chemical Canada Inc. as well as WISEST for making this experience possible.

Jessica Li

Supervisor: Dr. John Vederas / Chemistry

Sponsor: Alberta Employment and Immigration (STEP)



“With the guidance and support of my supervisors, I found myself moving from just following instructions to understanding the reasoning behind what I was doing.”

When I first heard about the WISEST program at my high school, it appeared to be the ideal opportunity for an aspiring researcher. One amazing summer later, I was not disappointed. My time in the lab allowed me to learn about research methodology, improve my lab technique, and work with equipment I wouldn't have encountered until university. However, the WISEST experience provided more than just a chance to work in a lab. It also offered invaluable advice from women and men who have found careers in science that they are truly passionate about. This summer was a unique experience that I would recommend to any high school student even vaguely interested in science or engineering.

My work this summer in Dr. Vederas's lab in the Department of Chemistry focused around overexpressing and purifying an enzyme involved in the production of Lacticin 3147, a bacteriocin. Bacteriocins are antimicrobial peptides synthesized by bacteria that are active against closely related strains. Lacticin 3147 belongs to a class of bacteriocins called lantibiotics. Produced by lactic acid bacteria, lantibiotics contain unusual amino acids such as D-alanine. The enzyme I was working to isolate, LtnJ, is responsible for modifying Lacticin 3147 to produce one such unusual amino acid. What was amazing was that my project was a small facet of a much larger project that will hopefully see Lacticin 3147 applied in food preservation and treatment against infection by Methicillin-Resistant *Staphylococcus Aureus* and Vancomycin-Resistant *Enterococcus*. The prospect of having your research make an impact on everyday life added a new dimension to lab work that I had never experienced in school.

When I was given my project, I imagined that I would be shadowing my supervisor and following precise instructions to perform some basic lab work. To my surprise, I found myself treated as a fellow researcher, albeit an inexperienced one, rather than a high school

student. My summer saw me working in a fermentation lab, inoculating and growing *E. coli* to produce a maltose-binding protein-LtnJ fusion protein that contained my enzyme. I then harvested the bacteria and used a cell disruptor to break open the cells, releasing the fusion protein inside them. After purifying the fusion protein, I attempted to isolate my enzyme by cleaving the maltose-binding protein attached to it. With the guidance and support of my supervisors, I found myself moving from just following instructions to understanding the reasoning behind what I was doing. After six weeks, I was able to look back and say that I had truly accomplished something in my summer.

Of course, what made the WISEST program exceptional were the sessions and seminars held twice a week. These sessions gave us valuable information on a variety of subjects, from research methodology to building an elevator pitch. They provided us with the chance to network with inspiring role models and share their insights regarding career paths and working in less traditional fields. They allowed us to expand our perceptions of potential careers by bringing us to a variety of labs on and off campus. These sessions rounded off the program, leaving me with a diverse range of skills that I will be able to apply in school, as well as the confidence to pursue a career in science, traditional or not.

My participation in this program would not have been possible without the generosity, guidance and support of a number of people. I would like to thank my supervisors Avena Ross and Larissa Petriw, my principal investigator Dr. Vederas and the Vederas Group for creating a wonderful work environment. I would like to thank Kerry, Lynn, Jen and Grace for their work in organizing the WISEST program. Finally, I would like to thank Alberta Immigration, Employment and Industry (STEP) for their generous financial support.

Jill Schneider

Supervisor: Dr. Rhonda Rosychuk / Pediatrics

Sponsors: Alberta Women's Science Network (AWSN) & Service Canada (Canada Summer Jobs)

"As well, the tour to the mechanical engineering building showed me an entirely different side of engineering that I never even knew existed..."



"Wisest is she who knows she does not know" - Socrates

Upon hearing about my acceptance into the program, I felt so honoured to be chosen, as well as eager to discover what I would be studying. I was told that I had been placed in the Department of Pediatrics, under the supervision of Dr. Rhonda Rosychuk, and my project would involve mathematical, and analytical skill, as well as a commitment to perform 85% of duties on the computer. Admittedly, I felt slightly apprehensive about accepting. Computer skills are by no means my strong point, and I wasn't sure I would be able to live up to the high expectations of the program with a position so out of my element. However, my inhibitions melted away when I met Dr. Rosychuk in person. Her sunny disposition and encouraging nature helped me to feel comfortable and welcome, and her constant advice helped me to learn very quickly in a short period of time.

Dr. Rosychuk's ongoing project had to do with the annual scientific meeting of the Statistical Society of Canada. Specifically, we were interested in the participation of females in these meetings, and wanted to determine if previously identified associations in organizer gender and invited speaker gender persisted in later study years. I was assigned to collect data through the use of published program guides, and then under Dr. Rosychuk's instruction, I entered, reorganized, coded, tested and analyzed the data so that conclusions could be pulled from the dataset. We took into account multiple variables, such as year, session sponsor, session type, and gender. First and last names for participants, as well as counts for the total number of people and/or females present per session were later added. Analysis was done in the form of comparisons between previous and new data, and through a multitude of statistical tests, in order to calculate any associations between cat-

egorical variables; tests known as chi-squared and Fischer's Exact tests. From those results, I was then able to display the data through percentages, tables and graphs. All my work was done through the use of a statistics program known as Predictive Analytics Software (PASW) Statistics. Due to a lack of previous experience with PASW, I had to learn to use it very quickly, so I could be counted on to re-code variables and create graphs. It was definitely a challenge, but as the weeks passed, I became more familiar with the program, and was able to carry out Dr. Rosychuk's requests independently.

Participating in the WISEST Summer Research Program 2010 was unlike anything I have ever experienced. The program gave me many opportunities to expose myself to successful men and women in scientific fields, and allowed me to share my interest in science and medicine with people my age. The Networking Fair gave me a "real-life" demonstration of how to market myself and showed me how to interact with and learn from influential members of academia. As well, the tour to the mechanical engineering building showed me an entirely different side of engineering that I never even knew existed, by introducing me to the role of engineers in past and future missions to Mars! Overall, this experience has opened my eyes to new and innovative parts of the scientific community, and has proved just how important women really are to the fields of science, engineering, and technology.

I'd like to thank the WISEST team and my sponsors, Alberta Women's Summer Science Network and Service Canada, for giving me this enriching opportunity. Most importantly, I'd like to thank He Gao and Dr. Rosychuk for teaching me so much, and for putting up with my constant questions and concerns. You truly have made this a summer to remember!

Joel Gupta

Supervisor: Dr. Catherine Chan / Physiology

Sponsor: Alberta Advanced Education and Technology



"In my first week alone I had taken in more information and done more hands-on experiments than I thought I would throughout the duration of the entire program!"

When I first learned about the WISEST Summer Research Program, I was sure it was right for me. Even though it initially sounded like it was mainly oriented towards females, I soon understood that it merely focused on non-traditional gender employment, and it seemed like the best way to learn about and experience career options in science. Being a part of this program was certainly more rewarding than I expected. At first, I was intimidated by the fact that I would be working with such highly qualified people and I didn't even fully understand the research question, but I soon overcame this, as everyone was extremely kind and willing to share their time and knowledge. In my first week alone I had taken in more information and done more hands-on experiments than I thought I would throughout the duration of the entire program!

I was placed in the Department of Physiology, working in Dr. Catherine Chan's lab with several university students studying the effect of blood pulses on glucose control in diabetic rats.

I had the chance to learn much about diabetes from the people around me and through daily hands-on activities. Diabetes is essentially a metabolic disorder characterized by high baseline (fasting) blood glucose levels and insulin resistance. Like many chronic illnesses, the impairing effects can be lessened through changes in lifestyle (such as diet or exercise), or with the help of pharmacology. The study I participated in pertains to dietary treatment of diabetes by exploring the question: Does pea seed coat supplementation of high-fat diets alter glucose homeostasis?

The pea seed coats we worked with contain fiber and proanthocyanidins (antioxidants), which are both known to be beneficial in treating diabetes. Colored seed coats contain more proanthocyanidins than the non-colored variety. By feeding groups of rats different diets and examining their response to a glucose challenge we

were able to see how these diets impact glucose control. We also tried to determine which diets have the most Akt activation in the liver, for example, by using western blotting. Proteins like Akt are very important in insulin signaling.

As part of the larger project, I helped with the Oral Glucose Tolerance Tests (OGTT). I also participated in the rat tissue collection, and did some Western Blots of Liver samples from four groups of rats. Furthermore, I analyzed the weights, which validated the experiment. For the OGTT, we essentially fasted the rats and then forced them glucose before measuring their blood glucose at specific time intervals. During the tissue collection, I learnt to remove and store the liver, epididymal fat, a segment of the jejunum and the soleus muscle. When doing a western blot, we used a gel and a continuous electric current to separate proteins (gel electrophoresis) that were then transferred to a nitrocellulose membrane. After treatment with antibodies and imaging, a computer-generated program calculated the amounts of pAkt in each liver sample. Although I didn't get very many significant results with my western blot tests, the OGTT showed that there was a fairly important improvement in glucose fluctuations, most likely as a result of our specialized diets.

I learnt a tremendous amount during this project. I couldn't stop thinking for a minute about how cool everything is that I was doing! Thanks to the WISEST Summer Research program, my sponsor (Alberta Advanced Education and Technology), and my spectacular research team, I spent my summer gaining invaluable skills and experience for my career. I now have a better understanding of potential career paths available in the field of medicine that keenly interest me!

Josie Liske

Supervisor: Dr. Diana Mager / Agricultural, Food and Nutritional Science

Sponsor: Weyerhaeuser

“Throughout the program, WISEST provided me with so many opportunities to learn the skills I now know I will need to acquire and master for my future.”



The day my teacher slid the application onto my desk, I had no idea what it would lead to. My first thoughts were that this could be an experience that was interesting, informative, and of course a little challenging at times. Looking back now at how I felt on my first day, walking into the ETLC Solarium, I was so naïve to think that that was all this experience would be for me. I have learned and grown so much, from gaining new knowledge about research and science in general, to further understanding my own personal interests and skills, and finally to my feeling of my own personal growth from participating in a program such as this.

I was assigned to the Department of Agricultural, Food, and Nutritional Science working under the guidance of Dr. Mager. Our project focused on the bone health of children and adolescents diagnosed with celiac disease, an autoimmune disease of the small intestine caused by a reaction to the protein gluten. My task was to research exactly how much gluten was present in foods that were eaten by the patients shortly after their diagnosis.

After originally thinking that this would be a simple task, we quickly learned just how unavailable this type of information was. We could not search the gluten content of certain foods, and even an amount within certain ingredients was difficult to uncover, so we were forced to conjure up our own method of calculation.

I first had to go through each patient's food intake records which were taken shortly after their time of diagnosis. This gave us a list of gluten containing foods that they consumed. With this, we then searched for the nutritional information and list of ingredients for each food. This gave us a measure of protein in the food at a standard serving size and informed us of which ingredients specifically within the food contained gluten. After finally discovering percentage measurements of gluten for all gluten containing ingredients,

we were able to multiply out the total amount of protein by the percentage of gluten protein, which gave us a final measure of gluten protein within that food. The difficulties we faced when trying to measure the amount of gluten made us believe and conclude that this information should be more commercially available as it could be linked to the severity of symptoms for patients diagnosed with this disease.

Throughout the program, WISEST provided me with so many opportunities to learn the skills I now know I will need to acquire and master for my future. I have learned what qualities and abilities are important to possess when in a workplace environment, such as the ability to form and ask questions, to communicate, and to show initiative. Now that I have realized the importance of these qualities, I have been given the chance to take my developing skills and better prepare myself for my future endeavors. Beyond those, I have also grown so much on a personal level which I believe is the greatest reward. I used to be such a shy person, and I have been able to enter a program such as this, completely intimidated before by the idea of being alone and having to meet other colleagues, superiors, and students, and actually come out of it with an increase in self confidence.

I would like to thank my teacher, Ms. Pretula, for sliding that application onto my desk. I would also like to thank Dr. Mager for everything she has taught me, as well as Jing Qiao and Carla Rodriguez for helping me as much as they did. Thank you also to WISEST for organizing such an incredible opportunity for young men and women; an opportunity that I can guarantee will be remembered as the experience that helped prepare us all for our futures.

Julie Osgood

Supervisor: Dr. Andrew Waskiewicz / Biological Sciences

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



"Everyone in my lab has been so supportive and I greatly appreciate everything they have done for me."

I had the wonderful opportunity to spend my summer working on zebrafish embryos in a developmental genetics lab. My lab uses zebrafish to study the role of Vitamin A and enzymes that metabolize it during embryonic development. Vitamin A is essential to embryonic growth but can only be used in the form of retinoic acid. Vitamin A is metabolized into retinoic acid by various enzymes. My project was to see if the enzymes Rdh10a and Rdh10b are responsible for the synthesis of retinoic acid and what would happen to the embryo if these enzymes were blocked.

To block an enzyme I had to stop gene transcription and translation. For a protein to be produced DNA must be transcribed into RNA. Then that RNA must be translated into a protein. Enzymes are specialized proteins that act as catalysts in reactions. I used a substance called a morpholino to inhibit gene translation. Morpholino works by binding to RNA so it cannot be translated into an enzyme. I used a technique called microinjections to inject the zebrafish embryos with morpholino. I then did a process called an in situ hybridization on them to determine where in the embryo a certain gene is being expressed. This is done using RNA probes and coloration. I did this process on both injected and un-injected embryos and then compared how the Rdh10a and Rdh10b deficient embryos have different gene expressions. Working in this lab has taught me so much. I learned about genetics and developmental biology in more detail than any high school class could teach. I got to fine tune my lab skills and explore areas of science that I had not previously considered.

I have grown and learned so much through the WISEST Summer Research Program. Because of WISEST I received the opportunity to experience hands-on lab work, go on lab tours, learn about the world of science, and meet new people. These are all reasons why I

applied for WISEST and I was not disappointed. I hope to be a scientist working in a lab one day and this program has not only helped me prepare for university, but has helped prepare me for a career. WISEST has been all about having fun doing what I love and meeting amazing people along the way. I can honestly say I do not want the program to end. This has been an amazing summer that I will never forget.

I would like to thank the WISEST team for letting me take part in this program and for providing us with seminars and other events. I also want to thank Danna Drummond and Dr. Andrew Waskiewicz for letting me work in their lab and teaching me all kinds of new things. Everyone in my lab has been so supportive and I greatly appreciate everything they have done for me. Lastly, I would like to thank the WISEST sponsors for making this amazing program possible.



Julisa Binet

Supervisor: Dr. David Stuart / Biochemistry

Sponsors: Suncor Energy Foundation & Service Canada (Canada Summer Jobs)

“Although the material I had to read up on initially was perplexing at times, I had the help from great supervisors who in the end I had a wonderful time with and learned so much from.”



It is strange to think that the WISEST program, something that I had looked forward to for a long, has already come and passed. To have the satisfaction of completing significant research, enjoying the company of other students who have similar interests and ambitions, and learning the ways of an entirely new and exciting environment is certainly gratifying. It has been an experience I hope to never forget, filled with invaluable lessons and moments that have changed what I perceive and view about life. There have been some mistakes along the way, but there have also been many successes that have created a truly rewarding experience. It doesn't hurt either to have such amazing mentors like Isabella Wong and David Stuart to provide guidance and teach me to think and understand the process rather than to just "do". I thank them for this especially, because I know that it can be difficult to explain ideas that are complex for a high school student to grasp, but they answered every question with patience and knowledge.

This summer I was assigned to work in the Biochemistry department, and I can easily say that I was lucky to be placed in such a great lab. My project was to find a strain of yeast that had a high tolerance to butanol and from there to increase that tolerance using an adaptive growth procedure and a mutagenesis procedure. The reason why we want to increase the tolerance is that butanol can be used as a biofuel to replace gasoline, and one way of creating butanol is with using yeast. Since most yeast can only tolerate about 1% butanol, we want to increase their tolerance so that butanol can be produced on a large scale. After six weeks of work, we accomplished something pretty amazing: using the adaptive growth procedure, we increased the yeast EC1118 to tolerate 5.0% butanol and also found that still continued to grow even after 5.0%. These results are pretty remarkable, and it is a wonderful feeling to know that you have achieved something significant.

The research was an important aspect of the WISEST Program, but there was also another side to the Program. The activities planned by the coordinators brought all the students together to explore new careers and get to know each other. The field trips on and off campus, the Monday seminars, and the Lunch 'n Learns were all great experiences, and I'm sure everyone enjoyed them as much as I have. I have made new friends that I will miss once the program ends, but I have a feeling that many of us will see each other again, whether it is during grade 12 or even when we enter university. I came to orientation on the first day of WISEST, wondering if the next six weeks were going to be challenging and completely petrified at the thought of meeting my supervisors and other WISEST members. What a change in perspective! Although the material I had to read up on initially was perplexing at times, I had the help from great supervisors who in the end I had a wonderful time with and learned so much from. When I found out that I had been accepted into the WISEST program, I hoped that it would be an experience that would last within my memories for always. And I know now at the end that it will.



Kaitlin Rafuse

Supervisor: Dr. Jason Acker / Laboratory Medicine and Pathology

Sponsor: Alberta Innovates - Health Solutions



“While I gained so much knowledge and insight with regards to the different fields of study available, I also learned of the inner workings of research and what research entails.”

When I initially printed off the application form for the WISEST Program, I thought to myself that this summer, if anything, I wanted to gain experience and some direction with regards to what I plan to study during my post secondary education. That’s it. Now however, I realize that I am walking away with so much more than I ever would have expected. While I gained so much knowledge and insight with regards to the different fields of study available, I also learned of the inner workings of research and what research entails. As if this weren’t enough, I furthermore learned about the research being done in my lab that I was placed in, and also of the research that was being done in almost 60 different labs. Ultimately, what I value most out of this experience was being given the opportunity to network, and to expose myself to other students as well as to different professors and researchers in the science and engineering field.

This summer, I was placed in the Department of Laboratory Medicine and Pathology under the supervision of Dr. Jason Acker while I worked alongside Mariia Zhurova. Mariia is a PhD student who is working in the Acker Lab and who completed the control for my project while I collected the experimental data. For my project itself, I was testing the deformability of red blood cells. Or more specifically, the ability of the red blood cells in our body to be able to elongate in order to travel through our capillaries, as our red blood cells are frequently larger in diameter than the capillaries themselves. The blood units that I was sampling had been treated with either a washing process or a washing and irradiation process. The washing process removes the molecules that remain in any leftover plasma (such as proteins, fats, etc) whereas the irradiation process destroys any remaining leukocytes, or white blood cells. Both processes are done in order to decrease the possibility of any complications following transfusion, such as illness. The data obtained from

this project was taken with the intentions of being used to analyze the quality of red blood cells that are stored with the aim of being given to patients in need of a blood transfusion – it is a new parameter in the analysis of the quality of blood because ideally, red blood cells of good quality will be highly deformable so maximum oxygen can be transported to our tissues. As for the results that I obtained through the analysis of this data, I was able to see a significant decrease in the deformability of the red blood cells after they had been washed as well as washed and irradiated. Finally, an interesting point that arose was that the rigidity of the red blood cells also decreased, so it therefore took less shear stress (applied force) to cause the cells to deform after they had gone through the irradiation process.

All in all, this experience that I had this summer with the WISEST Summer Research Program was a once in a lifetime opportunity and I would do it again in a heartbeat. Nevertheless, this experience would not have been possible without the efforts and contribution of my private investigator, Dr. Jason Acker, my sponsor, Alberta Innovates – Health Solutions, as well as the WISEST team themselves – Kerry, Lynn, Jen, Denise, Grace and others who make this amazing program available to grade 11 students across the province.

Katelyn Larson

Supervisor: Dr. Eric Parent / Physical Therapy

Sponsor: Alberta Employment and Immigration (STEP)

"I learned everything from computer skills to anatomy of a spine to statistical analysis."



In grade 11, university is "still a year away" and it seems like there is plenty of time to decide what to do with the rest of your life. But grade 12 comes fast and, all of a sudden, there is not much time left and you still have no idea what you are going to do after high school. University seems like such a foreign topic and yet, when grade 12 comes around, it hits you like a brick wall. For me, the WISEST program has softened the impact of the brick wall of university. I now know what university is all about and a better idea of what program I want to go into.

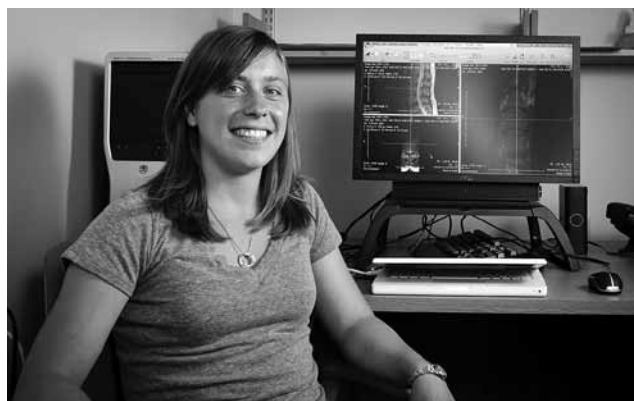
However, when I first heard about WISEST, I hesitated to apply because I wasn't exactly sure what I would be getting into and, honestly, I didn't want to give up a summer of beach volleyball and relaxation. When I was told that I would be working in physiotherapy looking at MR images of a spine, I just couldn't turn it down. I had been thinking of going into physiotherapy or sports medicine and the placement that WISEST put me in was perfect for my aspirations. Even after hearing about my placement in the department of physiotherapy, I still thought of the WISEST experience as just something that would look good on my resume. My expectations of the program were entirely wrong.

This summer, I had the chance to work with Dr. Eric Parent. I worked on a project dealing with low back pain and the effect of flexion exercises (bending forward), on low back pain. I analyzed MR (magnetic resonance) images to measure different parts of the spine including the spinal canal and the intervertebral discs. By looking at images from before and immediately after flexion exercises, I could find the changes that resulted from the exercise. I used these changes to detect a correlation between them and the changes in pain in the patients with low back pain. This project gave me a chance to use imaging software to look at the MR images from all

different angles and taught me a great deal. I learned everything from computer skills to anatomy of a spine to statistical analysis.

The WISEST lab tours were great in that they opened me up to a lot of different areas of research that I wouldn't have heard about otherwise. Also, the seminars were very informative and good at putting the whole research experience in a perspective that was easy to take in and understand. Looking back on this experience, I wouldn't give up this experience for any amount of relaxation and sleep. There is nothing better I could have been doing with my summer than this program. It has prepared me tremendously for all of my future endeavors in university and helped me with my decision-making that is to come in grade 12.

I met some really great people in my lab and in the program, and I would like to thank Dr. Eric Parent for allowing me into his lab, and my sponsor, Alberta Education, Immigration and Industry (STEP), with whom I wouldn't have been able to participate in this amazing opportunity.



Kayley Swonek

Supervisor: Dr. Erin Bayne / Biological Sciences

Sponsor: Edmonton Glenora Rotary Club



"I must have asked a thousand questions, which they (my supervisors, Erin and Jesse) were always willing to answer."

When I applied for WISEST, I had no idea what to expect. I signed up because I love biology and thought it would be really fun to do research as a summer job. It turned out to be so much more than just a summer job. The WISEST program has been physically demanding and full of hard work, but it has also been one of my most memorable and exciting summers.

I was placed in Dr. Bayne's lab in the department of Biological Sciences. My first day of work entailed attending the International Conservation Biology Congress, the largest convention of its kind. I was fascinated by presentations given by conservation scientists from around the world, gaining some perspective into the projects I would be involved in throughout the summer.

The main project I was involved in focused on the spread of invasive plant species along road networks and pipelines. For 11 days, I was camping and bushwhacking in Northern Alberta doing field studies. We set up 10 X 10m plots, which were specific distances from roads and pipelines. At each plot we searched for invasive plants, as well as measuring canopy density with a densiometer, taking photos of a cover board to show ground vegetation, and plotting each site on GPS. I learned that invasive plants are found mostly in ditches, and occasionally farther into the forest. We determined that dandelion is the most aggressive non-native plant species. The fieldwork meant long days of intense hiking, lots of mosquitoes, and getting soaked by rain, but it was so worth it. I loved working outside in the fresh air and getting to see parts of nature that haven't been disturbed by people. It was also cool to learn from experience that although pineappleweed smells like pineapple, it does not taste like pineapple.

Other than the field study, I did some work in the greenhouse, inputted data, and learned how to use GIS mapping technology. Of

all the WISEST lunch 'n learns and professional development seminars, my favourite was definitely the tour of a U of A lab. The tour I took was called "Eggcellent." Learning about eggs sounded dull at first, but it was really neat performing gel electrophoresis and learning about the various uses of eggs and chickens. I had no idea that feathers could be used to make biodegradable plastics.

The WISEST research program wouldn't have been the same without all the fantastic people worked with. My supervisors, Erin and Jesse, were laid-back, very knowledgeable and hardworking. I must have asked a thousand questions, which they were always willing to answer. The undergrads who came on field work trips, Sarah, Shaun and Zoë, were really fun to work with and taught me a lot about university life. My fellow WISEST student, Maddie, became one of my best friends this summer. We definitely had good times together tenting, blasting music in the greenhouse, and laughing a lot. Thank you to all these people who have made my summer so much fun.

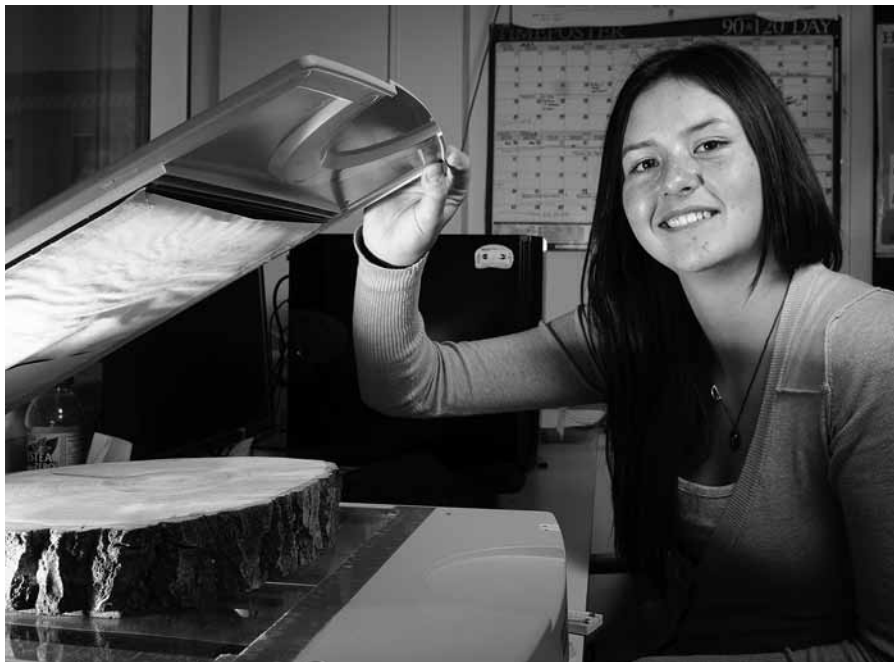
Overall, my WISEST experience has been amazing. I was interested in pursuing a career in environmental sciences and hoping WISEST could give me a taste of a career in science. I not only gained knowledge in scientific research but also broadened my life experiences. I got so much more out of the program than I could have ever imagined.

Kellie Gallivan

Supervisor: Dr. Simon Landhausser / Renewable Resources

Sponsor: NSERC PromoScience

"I now know what actually goes into research and that even though field work is awesome and the lab work can be monotonous, the end results are extremely rewarding."



I remember when WISEST first called my house, I had just left the house so my mother called me and said to return home because they would be calling back soon. After getting the green light from WISEST it felt like something hit me. I was thinking what have I gotten myself into? I'm from the small town of Valleyview which has 2000 people and the thought that I would be moving to Edmonton to work at the University of Alberta scared me. I'm extremely glad that my friends and family assured me that I could handle it and that it would be an opportunity I wouldn't want to miss. I was blinded by an image of science that was presented to me in a town dominated by the oilfield, but WISEST has opened my eyes in unimaginable ways. Opportunity is an understatement; the WISEST program has been a complete transformation.

I worked in the department of Renewable Resources under Simon Landhausser. My research team was amazing. They were hospitable, helpful, fun, and they were willing to give us advice when ever needed. It was a lot to be packed into 6 weeks but I wouldn't have had it any other way. My research project was looking at the defoliation of Aspen trees in Fort McMurray due to tent caterpillar that went through in 2007 and 2008. Our goal was to determine the effects of defoliation on wood production throughout the stems of aspen trees. We took a long day of field work to collect samples. We cut down 15 trees at 4 different sites and cut 4 cookies from each tree at different heights. I then sanded the cookies down to a very fine grit and then measured them under a microscope. After collecting two measurements from sixty cookies I compiled my data on excel and found my results. We found that the bottom half of the trees grew about 35%-40% of their normal growth in the defoliated years and the top half grew about 20% of their normal growth in the defoliated years. This showed us that wood production in the bottom half of the tree is less affected by defoliation than the

top. This project fits in to the long running work of hundreds of labs working towards better land reclamation practices which can be applied across many different industries.

The WISEST experience has been life influential and inspiring. I now know what actually goes into research and that even though field work is awesome and the lab work can be monotonous, the end results are extremely rewarding. The feeling of having your own data set which leads to the answers to your questions is phenomenal. The program itself is amazing. From day one you could tell that everyone involved really cares about the program, its goals, and the students participating in it. The effort WISEST puts in to assuring we take the most away from this experience as possible is much appreciated. The professional development seminars, speakers, lunch&learn, on and off campus research tours were all very informative. There's always someone you can talk to for help or advice like the WISEST office, your supervisors, other students, or people we meet throughout the program. There were only good things during my 6 weeks on campus.

I would like to express my gratitude to WISEST for running such an outstanding program, my lab team for accommodating me, and NSERC PromoScience for their funding. The combination of these efforts has allowed me to start the next step in my life informed, prepared, and motivated.

Kelsey Jones

Supervisor: Dr. Tom Etsell / Chemical and Materials Engineering

Sponsors: Suncor Energy Foundation & Service Canada (Canada Summer Jobs)



“Getting to talk to mentors, both in our lab tours and in our networking fair, was very beneficial as it helped us to learn more about different career paths and how to start on them.”

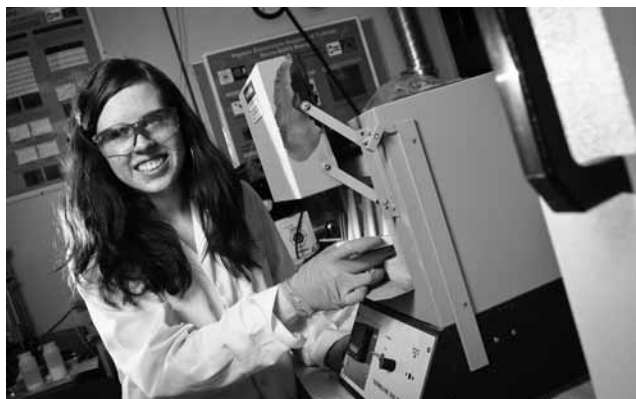
As with many grade eleven students I didn't know what I wanted to do for the rest of my life. I had read and heard about many career options that sounded interesting, but that was the problem, there were too many to choose. When my school guidance councilor told me about the WISEST program I was intrigued: a chance to find out whether or not research was for me, as well as get more about possible options in the science and engineering fields.

I received my phone call from WISEST in May and I was told me that I'd been accepted into the program and that I would be working with fuel cells. At the time I knew almost nothing about fuel cells, other than that they were an alternate energy source. I now have a basic understanding of how they work as well as some of the problems facing their development. Walking into the lab the first day, I wasn't sure what to expect; I'd been told that I would be fabricating a part of the fuel cell, but I didn't yet know what that would entail. As the days went by I learned to make the plaster molds used in the casting of the tubes that I would be making, as well as making the slip and actually slip casting. It is true that some days were quite monotonous, but there was always a feeling of satisfaction when a set of my tubes came out well. I learned this summer about the importance of being a part of a team and feeling that I have contributed to that team.

WISEST wasn't all about lab work of course. Every Monday afternoon and Friday at lunch we met to learn about some important skill, go on tours or talk to mentors. We learned about networking, how to make scientific posters and how to write research articles. Getting to talk to mentors, both in our lab tours and in our networking fair, was very beneficial as it helped us to learn more about different career paths and how to start on them. I think that the most valuable lesson that I learned was not to be worried that I would

be locked into a certain path if I took a certain degree. I learned that science and engineering degrees are incredibly flexible and that even if I were to decide that I didn't like the program I was in I could switch without great difficulty. These sessions helped me to gain the confidence that I can do anything with my life, regardless of whether I want to go for school for a decade more or not.

When I applied for WISEST I honestly wasn't sure what I was getting into. I knew that it would be valuable experience and would look good on my resume, helping me much more than any other summer job ever could. To say that the program exceeded my expectations would be an understatement; I truly felt that I was a part of something very important this summer both among the other WISEST students and in my own lab. I cannot believe that the six weeks have passed so fast. I would like to thank everyone who made this experience possible: my sponsors Suncor Energy Foundation and Canada Summer Jobs; my lab team Alyssa, Amir and Dr. Etsell; as well as the WISEST coordinators Kerry, Lynn, Grace, Jen and many others.



Kira Homeak

Supervisor: Dr. Ania Ulrich / Civil and Environmental Engineering

Sponsor: Epsilon Chemicals Ltd.

"However, I know now that it is okay if your research does not turn out as you want, because you'll still have a result, and therefore you have learnt something."



At the beginning of this six week program I had no idea what to expect. I had no idea of what it was like to work in a lab or what it would be like to work with the wide variety of intellectuals who work here. WISEST has shown me more about science and the university than any other conventional summer job. They have done so not only through my research position, but also through the interesting learning sessions which we had every Monday and Friday.

I was placed in a microbiology lab in the Department of Civil and Environmental Engineering. My supervisor, Elena Dlusskaya, had my partner and I working right away. She taught us safety information that will be important to know in any lab setting. We learnt many basic techniques, including pipetting, making agar plates (a hard gel filled with nutrients for microbes to grow in a petri dish), staining slides for the microscope and keeping a lab book. When we were given our projects, these techniques became very useful. Not only did we use these techniques in an actual research project, but we improved on how well and on how quickly we were able to complete tasks.

My research project involved growing the fungus *Trichoderma harzianum* on mixtures of wood shavings and biosolids wastes from the city of Edmonton. I put these mixtures into jars and let them incubate on the counter. I will admit, this wasn't the most pleasant smelling of projects, but hey, it was for science!

On specific days I would take samples from each jar, and mix it with water to dilute it. Then I'd put an extremely small amount (0.1 of a mL) on an agar plate.

When the bacterial colonies or fungal colonies grew, I'd count how many there were and record it in my lab book. At first this amount of work was difficult to complete in one day, but I worked in the lab

longer, and my partner and I used more teamwork it became easy to finish this work. Our supervisor was even surprised at how fast we could complete our work (together we were almost as efficient as her!)

The skills I have learnt in this lab can be applied in other labs, whether it's something specific like staining slides or simply being able to work with other people. Luckily for me, my project worked out as we expected it would. However, I know now that it is okay if your research does not turn out as you want, because you'll still have a result, and therefore you have learnt something.

Before WISEST I was positive that I wanted to go into the field of chemistry, but now it is hard to be so sure. There are so many more options and such a wide variety of interesting careers that it seems impossible to choose. But WISEST has also shown us that it is okay not to know now.

During the networking fair, when we talked to inspirational people who are already in science, they told us that we can't expect to plan out every detail. As we go along with our career, we'll see what we are interested in and that opportunities will come to us.

Science is about adventuring into the unknown to figure something out and whether you got the answer you expected, you'll have learnt something important.

Kirsten Pearce

Supervisor: Dr. Lola Baydala / Pediatrics

Sponsor: Syncrude Canada Ltd.



"It has been a summer of learning and discovery that I will never forget."

The choice to join the WISEST Summer Research program has been one of the best choices I have ever made. Anxious though I was at the beginning, to see how I would do and hoping I wouldn't screw up, it has turned out to be my best summer so far. WISEST has been a wonderful learning experience and I hope more people are able to share in this Program in the future.

For my project I worked with Dr. Baydala and her research team in a community based participatory research project. Our goal is to deliver a Life Skills Training program to the Maskwacis Cree Community while working together to adapt the program to make it culturally appropriate. The team out at Maskwacis, whom we visited often, was very welcoming and they provide excellent support and take many leads and initiatives with the program. They have really made it their own.

The important part of this endeavour is to be able to see if the project is making a difference with the community. To do this you have to measure the growth in Community Capacity. However the tool that they had was not culturally appropriate and they needed one that was, that was my job. I spent hours searching for a new tool, only to find one similar to what we already had and many articles saying that a culturally appropriate tool needs to be developed. That was my next task, I researched Aboriginal Ways of Knowing and compiled knowledge on a myriad of related subjects, and for my efforts, I developed some focus group questions to ask the community to begin creating the new tool. However it will take much longer than I have at this program, but I hope my research has been of use to the research team.

Along with going out to the community I also went with Dr. Baydala to clinics and seen patients with her. We would see newborn babies and other children on Tuesdays and Fridays at the Misericordia,

also every second Thursday at Maskwacis we would see patients at the clinic out there. Dr. Baydala also arranged for me to view a few minor surgeries to give me some experience about other types of medicine, although now I never want to have anything to do with surgery, I found that it was a valuable experience that I will appreciate during my university years. I have learned many things about being a doctor and I will never forget the six weeks that I have worked with Dr. Baydala. It has been a summer of learning and discovery that I will never forget.

The WISEST Summer Research Program has also helped me grow and become more independent than I was (learning how to iron!) as I lived in Residence at Grant MacEwan, five hours from home with eight other girls just as excited as I.

This time last year I could never have imagined that I would be where I am right now working with doctors and people in science. This summer would have never been possible without Dr. Baydala and her team, the team out at Maskwacis and WISEST. I would also like to thank Syncrude for sponsoring my position and Julia for being an amazing residence advisor.

Looking back at this summer I can honestly say that I wouldn't have preferred to be anywhere else.

Krista Boddez

Supervisor: Dr. Larry Unsworth / Chemical and Materials Engineering / NINT

Sponsor: Alberta Innovates - Technology Futures

"Dr. Unsworth is a very busy man who holds a respected position and I am very grateful for having had this chance to listen and learn from him."



My first impression of WISEST was that it seemed like a great opportunity to explore career opportunities. It offered a large array of specializations within science and engineering. I didn't, however, expect to get so in-depth with my project. One of the hardest, if not most necessary, skills I learned was the importance of literature researching. Research is all about building on previous ideas and expanding upon them. It's in other people's work that you find a baseline to start your own experiments. The most memorable quote I will take from this experience is definitely that, "Not everything you read is the truth."

As I worked through the WISEST program I realized that I was gaining more than I had expected to over the six week program. Not only did I get to spend time in the lab I met with people both my age and older that were interested in the field of science. They prepared me for what to expect in university and made me realize how important taking a break from studies to enjoy times with friends is. When your results aren't coming out right, a friend is always welcome to stand by you and remind you that sometimes negative results is what research is all about. However, when you do finally get the results you want after weeks of trials it makes all the brainstorming and redo runs well worthwhile.

My research project involved clotting blood plasma by adding CaCl₂ to it. Different modified nanoparticles were applied to samples in an attempt to slow down the rate of clotting. Since I was dealing with blood plasma there were lots of safety precautions and cleaning methods that had to be carefully followed. I used a Modulustm microplate multimode reader to measure the absorbance of light by the fibrin clot over a period of one hour. This machine essentially shone light at a specific wavelength (450 nm) through the wells. It then measured how much light was absorbed in the solution

by calculating how much light didn't reach the receiver. As I went through the experiment the surface area of the nanoparticles, became very important in observing the clotting rate. Only once an appropriate ratio of nanoparticles to CaCl₂ and plasma was achieved was the clotting curve able to be graphed. My project was done on a very small scale, each well holding a volume of only 200µm. This meant that the measurements had to be quite precise as they were so tiny. The fibrin clots that did formed were a cloudy, whitish, jelly material.

There are many people I would like to thank who made this experience possible and so enjoyable for me. First of all I would like to thank my parents along with my teachers Mrs. Hutchings and Mrs. Wong for getting me inspired to apply for WISEST. Along with them I would like to thank my sponsor "Alberta Innovates - Technology Futures" for the funding to be able to keep this program running as well as the WISEST team for making all the events run so smoothly. Most of all though I would like to thank Dr. Larry Unsworth and Alan So for helping me throughout my project. I could always count on them for everything from simple lab safety reminders, to borrowing solutions, to tracking down a Modulustm microplate multimode reader in the span of 24 hours. Dr Unsworth is a very busy man who holds a respected position and I am very grateful for having had this chance to listen and learn from him.

Leah Brown

Supervisor: Dr. Walter Bischof / Computing Science
Sponsor: iCORE, Informatics Circle of Research Excellence



*"In these six weeks
I went from not
knowing what
a degree was to
knowing the exact
courses to take in first
year..."*

I will never forget the day I got the call from WISEST. My day wasn't going as well as I would have liked but I got the call that changed everything. I was expecting an ordinary call one to just make things worse than they were, but to my surprise there was a woman named Lynn on the other end. She told me she was from WISEST and that I was accepted into the program. From then on nothing in the day could take the smile off my face. I knew the summer was going to be the transition between child and adulthood and would change my perspective.

My WISEST experience took place in the computing science department. I was working on creating assessments for the Wii balance board, to help patients who can't play the original Wii balance board games due to a balance condition. Many of the games for sale on the market are too difficult for them to enjoy, so I created new ones that are easier for them to play. They also have assessments for therapists to also look at to see how well the patients are doing. I learned a lot about programming and creating virtual scenes on a computer as well as how research works including the steps and discussions needed to learn something new.

In addition to working in a lab, I also made some new friends. I was accompanied by three other WISEST girls in my lab plus there were at least two workshops a week, usually Mondays and Fridays, where everyone in the WISEST program got together and shared new ideas and thoughts. During the workshops I got to talk to some very interesting people. Other WISEST students, guest speakers and the WISEST coordinators all had creative ideas and suggestions to give to myself as well as everyone else who was involved. In these six weeks I went from not knowing what a degree was to knowing the exact courses to take in first year and learned some other valuable information along the way just by talking to new people.

I never thought I could get as far in growth as I did in six weeks time. There were many things I could have done this summer and I am glad I chose the WISEST program. WISEST has led me on the perfect path to success and I thank everyone on the WISEST team for your guidance and time. A long with WISEST, I would like to thank my sponsor iCORE and everyone in the Advanced Man Machine Interface Lab. Without them I would not be here and this program could not happen. I recommend the WISEST program to any high school student who wants to pursue a career in a non-traditional study environment. Even if you are not sure about where you are going or what you want to do, just go for it and try it out. I guarantee WISEST is a life changing experience for anyone.



Lipee Bodarya

Supervisor: Dr. Fiona Bamforth / Laboratory Medicine and Pathology

Sponsor: Alberta Employment and Immigration (STEP)

"Getting my hands on everything let me grasp all the concepts very well and I appreciated this great gift that WISEST gave me."



Before getting the most anticipated call from WISEST, I had a pretty good idea of what my summer would be like. Reading novels, watching movies and doing things that are of pure enjoyment but don't convey any knowledge. But when I got accepted in this program, I was extremely elated and thankful that this summer would be productive. What's really astonishing about this program is getting your hands on all the technology that's only for university students. Besides that, I gained everything, from professional and communication skills to learning about variety of career paths. Time flies by so fast. I can't believe WISEST Summer Research Program 2010 is over.

I was assigned to department of Laboratory Medicine and Pathology and my project focused on studying mitochondrial DNA (mtDNA) from bone samples that are about 3000-5000 years old. The story goes back in time when the Baikal region of Siberia was inhabited by two Prehistoric Siberian Hunter-Gatherer cultures. They were temporally separated by a biocultural discontinuity characterized by a hiatus. The goal of my research project was to see if they are two structurally different hunter-gatherer cultures. This will let us understand the population of Siberia that lived along the shores of Lake Baikal and migrated on the Bering land bridge during the ice age and formed aboriginal population of North America.

From this project, I learned a lot about Gel Electrophoresis and Polymerase Chain Reaction (PCR) amplification. The first day when my supervisor mentioned these techniques, I felt overwhelmed. She told me, "Don't worry. Once you perform the experiments yourself, all the concepts will be cleared automatically". And she was right. Getting my hands on everything let me grasp all the concepts very well and I appreciated this great gift that WISEST gave me. Working with extremely old as well as extremely valuable

bones samples taught me how to be patient and exceptionally careful. I also had the fortune of doing PCR amplification of my own DNA and find out my ethnic background which was the most enjoyable part of my project.

What I expected from this program was learning about diverse career paths that are out there and that is exactly what I got from all the Monday Professional Development Seminars. Professional Development seminars provided us with amazing opportunities like communicating with women in less-traditional fields about their career paths, what obstacles they faced and how they overcame them. Friday lunch 'n' learn sessions helped me overcome my shyness and taught me to open up and start exploring. Overall, the sessions prepared me for university life and let me network with other WISEST students and learn about their career goals.

I would like to thank Nour Moussa for being patient when I was slowly but steadily performing experiments for the first time, Dr. Bamforth for letting me get involved in this prestigious project, my research team and the WISEST team for selecting me and spending countless hours organizing Monday seminars, lunch 'n' learn sessions and other important events that helped me grow as an individual. I would also like to thank my sponsor Alberta Employment, Immigration and Industry without whom all of this would have been impossible.

Maddy Hubbers

Supervisor: Dr. Christopher Sturdy / Psychology

Sponsors: Alberta Women's Science Network (AWSN) & Service Canada (Canada Summer Jobs)



"Most importantly I have been given the chance to see how every day work in research labs is conducted..."

This summer I came face to face with a situation I thought I'd never see. Having recently moved to Edmonton, WISEST is a program that I would not have had access to back home and I am extremely grateful for the opportunity it has provided. The experience the WISEST has given me is beyond explanation, while I can tell people about what I've learned, and the research I was able to participate in, words are not fully capable of describing how I've felt during the WISEST program. From the first day the WISEST program has exposed me to new people, new information, and new experiences. While I came to WISEST with the hope that I would be able to learn more about the different fields of science so that I would be able to narrow down my interests, I have been exposed to so many new ways in which science is applied that I am now faced with more decisions than before.

Having the opportunity to participate in WISEST has provided me not only with work experience, but learning experiences as well. Along with the interesting research I was a part of, we were given the chance to tour other research labs to learn about other applications of science and we participated in seminars that helped us improve our professional skills. I was able to develop my networking skills, learning how to present myself to people who I could provide me with beneficial advice and opportunities.

I was placed in the Department of Psychology working with Dr. Sturdy and my supervisor Lauren Guillette, doing research on the development of the call of a Black-capped Chickadee. I was given the opportunity to learn about some of the research already done on Black-capped Chickadee communication, and then working with Meghan Eaker, another WISEST student, we were able to learn how to measure and sort the raw data that had been collected during the experiment. The research was focusing on how the envi-

ronment a Black-capped chickadee was raised in would affect the vocalizations produced by the bird. Some of the birds had been raised with adult Black-capped Chickadees, others had been raised with Mountain Chickadees, and a third group had been raised in isolation away from adult birds from either species.

WISEST has given me the incredible opportunity to learn about many different things. I have met many new people who share interests with me, academic and otherwise. I have been able to familiarize myself with the University of Alberta campus, making me comfortable with the transition that I will have to make next year as I finish high school. Most importantly I have been given the chance to see how every day work in research labs is conducted, seeing the results of previous research and also being able to appreciate all of the work it takes to get the results. When I applied for WISEST I did not have any defined expectations, all I knew was that I wanted to learn, and WISEST has given me every possible opportunity to do so.

I would like to thank Dr. Christopher Sturdy, Lauren Guillette, Jill Avis, Marc Avey, Marisa Hoeschele, Kerry Humphrey, Lynn Dafoe, Grace Ennis and Jen Duffy, all of whom made this summer a fantastic learning experience. I would also like to thank Alberta Women's Science Network and Service Canada, whose sponsorship has made this experience possible.

Madison Chamzuk

Supervisor: Dr. Erin Bayne / Biological Sciences

Sponsor: Epsilon Chemicals Ltd.

"It [the Networking Fair] gave me the chance to ask questions to inspiring role models who have experience beyond me."



"What are you going to do once you finish school?" This question received a variety of answers over the years. In Grade 11 that question really stumped me, "What am I going to do?" This began my initiative to look into my options so that later on I could make a more informed decision. Then one day in class, my science teacher gave me a folder full of information on the WISEST Summer Research Program. This was my chance to become a part of an amazing opportunity that small town schools cannot offer.

After my acceptance into the Program, I learned that I was working in the Department of Biological Sciences in Dr. Erin Bayne's Lab. I was nervous at first but after meeting my supervisors I could hardly wait to begin my two projects.

My first project was examining the spread of invasive species along road networks with my supervisor, Erin Cameron. The first week we worked in the greenhouse and attended the 24th International Congress for Conservation Biology. This was a once in a lifetime opportunity to hear from inspiring individuals from around the world. The second week we went on a field trip to Northern Alberta where we roughed it for ten days in the outdoors. We surveyed for invasive species using 10x10m quadrats that were placed at increasing distances from well pads along roads. We also surveyed in plots at increasing distances from the road into the forest. At each plot we recorded any findings of invasive plants that were in a 1x5m section. We also took pictures of vegetation height, used a densiometer to determine canopy cover and used a GPS for plot coordinates. While working in the field I learned valuable information from three undergraduate students we worked with. With their help, I am steering in a clearer direction for a career path.

My second project was producing GIS data layers of landscape features and mammal occurrence with my supervisor, Jesse Tigner.

This project is still on the go so there is much more to learn. We entered information into a database in order to map our findings.

The WISEST program has been a great learning experience. It has been more than just a summer job; it has been an opportunity to open doors. The Networking Fair was my favorite activity set up by WISEST. It gave me the chance to ask questions to inspiring role models who have experience beyond me. It was definitely one of those moments I will never forget. Along with the WISEST experience, I have met so many new friends. My lab partner, Kayley, has turned out to be one of my best friends throughout the summer. Although, I question her when she tries to eat various things out in the field. Kayley now knows from experience pineapple weed does not taste like pineapple.

Many people do not have the chance to experience this great opportunity that prepares you for the road ahead. I would like to thank the WISEST program for this amazing experience. I would also like to thank my Principle Investigator Dr. Erin Bayne. Also, I would like to thank my two supervisors, Jesse Tigner and Erin Cameron for putting up with us. Epsilon Chemicals Ltd., without your generous donation I would not be able to have this experience, so thank you.

After this summer, I can officially say that my passion lies with science. Now when someone asks me, "What are you going to do once you finish school?" I can now say, "Environmental Sciences."

Marjorie Mallare

Supervisor: Dr. Daryl McCartney / Civil and Environmental Engineering

Sponsor: Alberta Advanced Education and Technology



"This invaluable WISEST program gave me the skills that took me a step closer to my future goals..."

Spending my summer by hanging out with my friends, camping and doing such activities may sound really awesome compared to spending my summer working seven hours a day, five days a week. Most of us would choose the first scenario rather than the second, but that would not likely be the case if working also means learning and acquiring beneficial experiences through the WISEST Summer Research Program.

My science student teacher was the one who encouraged us to get ourselves involved in WISEST programs, such as the SET conference and the Summer Research Program. Thanks to her consistent encouragement, I decided to apply for the program, and got accepted. When I got the call from WISEST, I felt so fortunate and started looking forward to this rare opportunity. My first week of summer went by quickly, and I found myself in a room for the orientation, with all the other WISEST students that were as excited and nervous as I was. Eventually, I was introduced to my direct supervisor, Kristine Wichuk, and to the other WISEST student that I was going to work with, Darian Bremmekamp. I found that moment somehow awkward, and started to worry about the six weeks of work and expectations ahead of me. Moreover, the fact that I would be working with professionals of high degrees of education added to my anxiety. However, things turned out way better than what I pictured them to be.

I was assigned in the Department of Civil and Environmental Engineering and became a part of Dr. Daryl McCartney's research team. As "young engineers", our project involved the study of using tire-derived aggregates or TDA. Moreover, this ongoing project is on its second year, and some results had been obtained by the research team during the first year. Due to their light weight and availability, recycled tire shreds are being considered as alternative for gravel as drainage media in landfill leachate collection systems. On the other hand, their compressibility reduces its hydraulic conductivity and

porosity, which are the big factors in determining whether tires are suitable for the specific task. Most of our work involved performing tests to examine such properties of TDA materials, along with other physical properties such as specific gravity and particle size distribution. These involve loading and unloading the lysimeter apparatus with different TDA types, pressurizing them with a manual pump, and using the shaker machine with screens of different sizes to determine the uniformity coefficient of each TDA type. All of these works are done at the Edmonton Waste Management Centre of Excellence where we spent sixty percent of our week, while all the analyzing and graphing of results were done in our offices at the University.

This invaluable WISEST program gave me the skills that took me a step closer to my future goals, from the complexity of performing tests that only specific engineers can do, to the fundamentals of being a part of various professional working environments. Similarly, the Monday and Friday WISEST sessions opened my mind to other careers and provided me with the necessary amount of information and understanding of the real world. Throughout the six weeks of "being an environmental engineer", this summer job turned from just being able to wear coveralls, hard hat and steel-toe boots to an experience that would definitely help and guide me as I choose and take my career path in the near future.

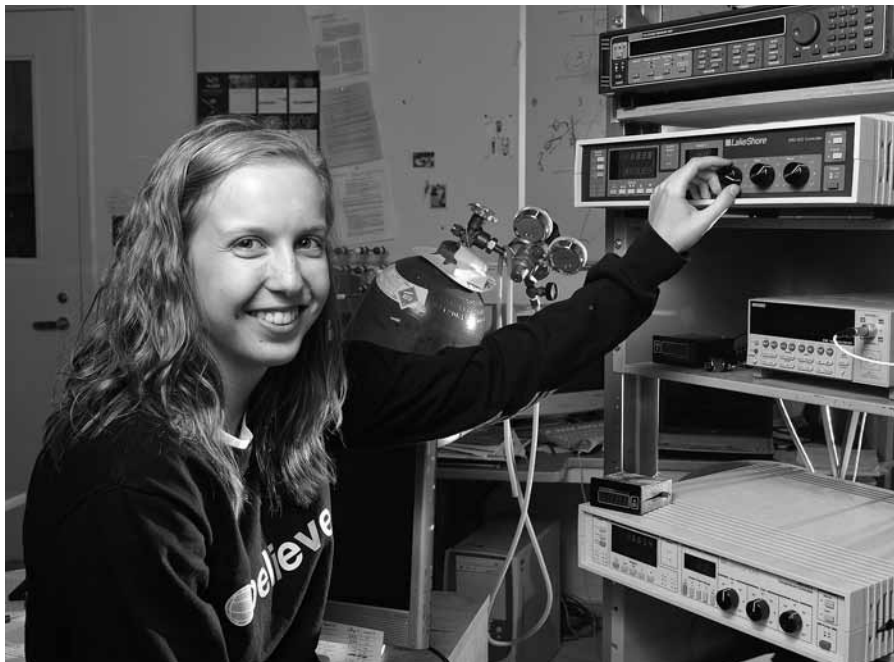
Such experience would have not been attainable without the generous aid of my sponsor, Alberta Advanced Education and Technology. I would also like to thank Dr. Daryl McCartney, Ms. Kristine Wichuk and Mr. Marclus Mwai who have been very accommodating and magnificent for allowing me to work with them. But most of all, I express my gratitude to WISEST for providing youth of my age with such an advantageous program that prepared me and all the other participants for our future careers.

Mary Cavanagh

Supervisor: Dr. Kim Chow / Physics

Sponsors: Suncor Energy Foundation & Service Canada (Canada Summer Jobs)

"I found this [networking] session very beneficial, and in my opinion, it is one of the best things this program has to offer."



When I applied for the WISEST Summer Research Program, I had no idea what I was getting myself into. Coming from Lloydminster, I didn't know anybody who had ever been involved in it before. In fact, I had never even heard about the program until a week before I applied. It was a difficult decision to make – spend the majority of my summer away from family and friends to take part in something I knew next to nothing about, or stay at home and possibly miss an amazing experience? After much debating and lots of encouragement from my parents, I decided it just might be worth it to apply.

Well, I must say it was definitely worth it. The experience was not perfect, but I learned far more than I ever imagined and had fun doing it. When it comes down to it, learning is exactly what the WISEST Summer Research Program is about. I learned something new every single day I went to work, and some days it seemed like I could feel my brain getting bigger by the minute. What a rewarding feeling it was when I found myself simplifying information to help other people understand my project rather than receiving simplified information from the research team!

The project I was working on was all about manganites. These special compounds respond uniquely to variables such as the strength and angle of an applied magnetic field, temperature, and the doping of elements into them. My summer was spent testing and observing how they react to changes in these variables. Though the testing process was long and required a lot of patience, it was cool to see graphs that were a result of manipulating variables on a sample I had made and connected to the system. It was interesting to see how these graphs were interpreted by other researchers in the lab, and exhilarating when I interpreted a graph on my own for the first time. Even though I would have preferred a more hands-on lab, it was a great experience to become familiar with researching tech-

niques and laboratory work.

Beyond the lab, we had several other great learning experiences. The networking session was by far the best one. All my questions about university and education were answered in one afternoon. My worries about going into the "wrong" area of study were settled through assurances that there was no such thing, and it is not difficult to transfer between programs anyway. I realized that what degree you have does not ultimately determine your career path; rather it is you who has the freedom to choose what you want to do and the power to become involved in something you love. I found this session very beneficial, and in my opinion, it is one of the best things this program has to offer.

Overall, this summer was a very good experience for me. I made new friends, strengthened my independence, developed my patience, practiced critical thinking, and, most importantly of all, I learned how to learn. I would like to thank all the people who have made this wonderful experience a reality for me: my research team; my sponsors, Suncor Energy Foundation and Service Canada; the WISEST team; and my family, friends, and teachers for their support and encouragement throughout the entire program. This is an experience I would definitely recommend to any girls interested in science, engineering, or technology who possess a passion for learning. Try it out; I guarantee you will learn something worth remembering.

McKenna Oleksuik

Supervisor: Dr. Simon Landhausser / Renewable Resources

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



“And, not only was the research interesting but so were the people I met, the things they had to say and the things that they taught me.”

I was sitting in my Biology 20 class just like any other day when a grade twelve student stepped into the class with this huge poster, saying something about summer research. This was the start of my journey to WISEST. Even though I didn't think I would make it soon I got the call telling me I had been accepted to the program and that I would be working in the Renewable Resources Department, doing an experiment with aspen trees. I was a little apprehensive about this, it sounded, for lack of a better phrase, like watching paint dry. I pushed ahead though and with the help of an article just like this one, from the previous year's student, I decided to not judge this job by its appearance. With that, I began to prepare for the WISEST Summer Research Program.

Turns out that I didn't have to work with aspens at all, I ended up working with lodgepole pine and white spruce studying wood allocation to the stems and the roots under different environmental conditions. In other words I had to find out if the stems or the roots grew more and which treatment we used caused this to happen. This project was so awesome; I couldn't believe all the different components that were involved. From field work, to sanding, to scanning there was always something different to do. And, not only was the research interesting but so were the people I met, the things they had to say and the things that they taught me. I couldn't imagine my summer without the crew from the Silviculture Lab.

Over the course of the summer there have been so many learning experiences between the lab tours and Friday lunch sessions. I have learned that you need to believe in yourself, follow your passions, and learn all you can. I also learned how to make a scientific poster, and how to write this article.

Since I live outside of Edmonton I applied to the MacEwan Residence. The prospect of living away from home had been in the back

of my mind for the last few weeks, but I quickly realized that this was freedom pure and simple, not something to be feared. I ended up making friends with some of the most amazing people I have ever met while in residence. Living at MacEwan was one of the best parts of my experience, with all the memories that I have of all of the different things that we did together.

When I applied for WISEST in the spring of 2010, I expected that I would go to a couple labs, see some other projects, do my project and then go home. But I didn't think I would do all the things I have. I made friends, went out into the field, saw amazing things, and had the experience of my life. Applying for the WISEST Program was one of the best things I have ever done, it exceeded all of my expectations and if I could go back I wouldn't change a thing.

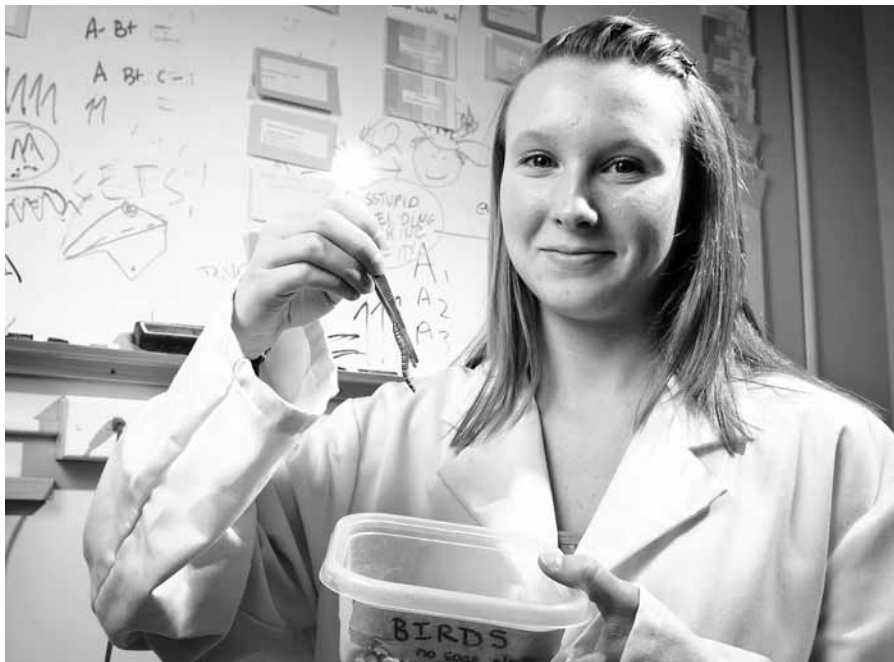
I have so many people to thank for my experiences this summer, the people that if it weren't for them, I wouldn't have been able to be in this program at all. First, I would like to thank my sponsors, Service Canada (Canada Summer Jobs), and the Faculty of Agricultural, Life & Environmental Sciences. I would like to thank the University of Alberta and WISEST for hosting this program. My parents were instrumental in helping me make it into the program. I have to thank all the WISEST coordinators, for organizing and helping everyone. Lastly, I want to thank my private investigators Simon and Vic, my supervisor Amanda, and the rest of the people at the Silviculture Lab who made this summer as informative, and fun as it was.

Meghan Eaker

Supervisor: Dr. Christopher Sturdy / Psychology

Sponsor: NSERC PromoScience

"Perhaps the most valuable thing this program has given me is a freshened sense of hope for the future; all the doors are open, all I have left to do is choose."



Ever since I was first introduced to the WISEST summer research program by my friend's older sister, I knew that after grade eleven I wanted to participate in it as well. Once I applied to the program and learned more about it, I found how much more it had to offer than just a regular summer job. All the extra opportunities, such as the incredible tours and seminars, were the reason why I chose WISEST and I most definitely have made the right choice.

This summer I have been working in the department of Psychology with Dr. Sturdy and my direct supervisor, Lauren Guillette. I was lucky enough to have Maddy Hubbers, another WISEST student, working with me in the lab as well. We have been studying the effects that different rearing environments have on the development of baby Black-capped Chickadee vocalizations. In the lab, we spent most of our time analyzing these calls, which were recorded prior to our arrival. The chickadees learn their calls as well as how to recognize different species, sexes and individuals using auditory features present in the calls. When we measure the notes that make up the calls we can find out which features are most useful for chickadees to make this kind of distinction.

Our first few days on the job were spent reading articles from scientific journals and learning the background information of our field. These papers seemed so prestigious then and it is exciting now to think that someday the study that we were working on will be published as well. Although work in the lab can often be challenging and monotonous simultaneously, I have learned that it is this excitement that drives researchers to come to work every day.

In addition to all I was learning in my lab, there were also the weekly Lunch N' Learns and professional development seminars. These sessions were incredibly useful and thought provoking. My favorite was the networking fair, which was an invaluable chance to talk to

real-life role models who have succeeded in a less traditional career.

The entire WISEST experience has prepared me for my upcoming post-secondary career and has prompted much thought about my future – in a scientific career and in general as well. I found that everyone I talked to in the lab was most willing to offer advice on anything and everything that I had questions about. They even gave me resources to find out more about scholarships, travel, and various school programs, which I am now considering. The program has also helped me gain self-confidence and independence as well as many lasting friendships. Perhaps the most valuable thing this program has given me is a freshened sense of hope for the future; all the doors are open, all I have left to do is choose.

For giving me this wonderful opportunity by inviting me into their lab, I would like to thank my research team; Dr. Christopher Sturdy, Lauren Guillette, Jillian Avis, Mark Avey, Marisa Hoeschele and Ashley Mckillop. I also am very grateful for the WISEST program itself and its exceptional coordinators, Grace Ennis, Kerry Humphrey, Lynn Dafoe, and Jen Duffy. Finally I would like to thank my sponsor, NSERC Promoscience, without whom I would not have had such a rewarding summer experience.

Michelle Louie

Supervisor: Dr. Kajsa Duke / Mechanical Engineering

Sponsors: Faculty of Engineering & Service Canada (Canada Summer Jobs)



"I was thrilled to discover the collaboration between the diverse professions of engineering and medicine."

If there is one question that we've been asked repeatedly during our young lives, it is this: "What do you want to be when you grow up?" I must admit that I have never known the answer to this, and as grade eleven drew to a close, I realized how soon that decision would have to be made. When I first heard about the WISEST Summer Research Program, I believed that participating would allow me to learn about different career paths and experience life as a scientific researcher. However, the past six weeks have given me much more. Not only have I experienced work in an accredited scientific research lab, but I have also learnt about the many diverse areas of study one is able to pursue after high school. I have learnt invaluable life lessons and professional skills that can be used for years to come, and I have made friendships and connections that I will cherish forever.

For the program, I was placed in the lab of Dr. Kajsa Duke in the Department of Mechanical Engineering. Prior to this summer experience, I had very little knowledge of what engineering in general entailed, much less the specific engineering fields. I was thrilled to discover the collaboration between the diverse professions of engineering and medicine. My project involved simulating fractures of the pelvis on a virtual model. This model allowed me to explore the relationship between fracture displacement and the cross-sectional contact area at the fracture interface. It also allowed me to examine the relationship between the degree of fracture displacement and the ability to successfully utilize screw fixation to heal a fracture. Although the work was at times tedious, seeing my results made the time and effort worthwhile.

Twice weekly, all WISEST students met to participate in informative sessions and seminars. The Monday Professional Development seminars and Friday Lunch 'n' Learns taught us professional skills

that will be useful for ever more. They were also a great place to meet fellow WISEST students and learn about the different studies being conducted in diverse areas of research. Although I thoroughly enjoyed all of the lab tours and informational seminars, I found the networking fair to be most inspiring. It gave me the chance to meet and network with professionals in a variety of non- gender-traditional areas. Listening to these individuals' advice and stories, I realized the obstacles and successes awaiting me in the future. I also realized that these role models were once our age, entering their last year of high school, and trying to decide what career to pursue. Just like me, many of them did not know what they wanted to study after high school. They advised not to stress, because life will hand you opportunities and experiences that will lead to areas you love.

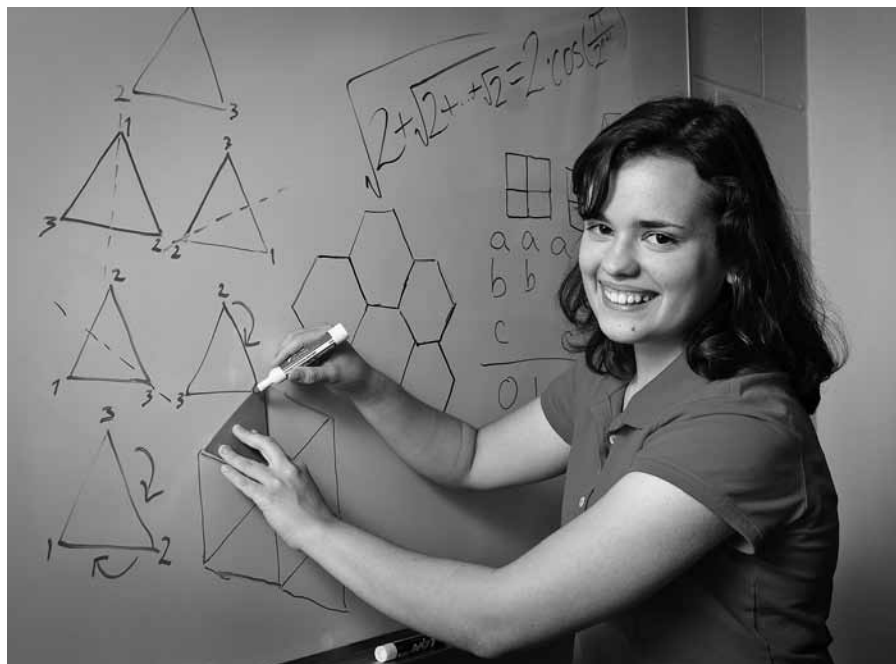
I would like to thank the WISEST team for their exceptional job organizing the summer research program. Thank you also to my sponsors, the Faculty of Engineering and Canada Summer Jobs, for without sponsors this program would not be possible. Finally, thanks to my research team, Dr. Kajsa Duke, Amanda Kulhawy, and Kristen Sabourin, for welcoming me into the lab with open arms. Although I am still unable to say with certainty where I will be after high school in a years' time, I am extremely grateful to the WISEST Summer Research Program for opening my eyes to the opportunities that await me.

Nadia Shardt

Supervisor: Dr. Gerda deVries / Mathematical and Statistical Sciences

Sponsor: Alberta Education

"It was a real privilege to work in a post-secondary research setting . . ."



When I applied to the WISEST Summer Research Program, I hoped to discover which field of study interested me most and make the most of a unique opportunity to be involved in university-level research. From the very first day, I was warmly welcomed into the office area where I would spend most of the summer, and I immediately knew that this would be an experience I would always remember. Over the past six weeks, WISEST has more than exceeded my expectations, and I am very pleased to have participated in the program.

Together with Emma McDonald, I was fortunate to have been placed in the Department of Mathematical and Statistical Sciences under the supervision of Hannah McKenzie and Dr. Gerda de Vries. Our project involved creating several interactive workshops for high school students that would engage the students, give them the opportunity to make their own discoveries, and demonstrate that mathematics is enjoyable. This project was completed for the GAME in the Schools program, put together by the graduate student organization that visits local schools. Specifically, my research partner and I developed workshops that explored cryptography and symmetry, and then I chose to focus a third workshop on fractals. We were even able to present our symmetry workshop to enthusiastic DiscoverE math campers who re-created some of M. C. Escher's tessellations as part of the session.

At the beginning of the program, I was given the task of converting previous workshops into LaTeX, a document formatting program. Though trying to figure out how to use this program involved a steep learning curve, I appreciate having been shown such a useful tool. The learning continued from there, as I was able to sit in on a university course on discrete mathematics that explored cryptography and graph theory, among other topics. Participating in these

lectures introduced me to what a university course involves, and it has prepared me well for my post-secondary studies. Throughout the summer, I was given the opportunity to meet with several faculty members in the Department of Mathematical and Statistical Sciences to hear about their research; as a result, I was exposed to numerous applications of mathematics and to career options that I would never have previously considered.

During the course of my research project, I uncovered fascinating areas of mathematics and gained a better understanding of what a career in mathematics entails. I learned even more about careers in engineering, medicine, and technology during bi-weekly meetings with other WISEST students. At the Friday Lunch 'n' Learns, we honed our professional skills, learned how to design our research posters, and continued to discover more about each other's research projects. I particularly enjoyed the Networking Fair, where I met mentors in non-traditional fields who were passionate and willing to share their career experiences with us. Tours of research facilities on-campus and off-campus brought yet another dimension to illustrating the breadth of possible careers in the sciences.

I would like to thank Hannah McKenzie, Dr. Gerda de Vries, the faculty and undergraduate students in the Department of Mathematical and Statistical Sciences, Trevor Pasanen, Diana White, and all those who organized the WISEST Summer Research Program and made my experience extraordinary. I would also like to extend my gratitude to Alberta Education for sponsoring my participation in the program. It was a real privilege to work in a post-secondary research setting, and I would not hesitate to encourage others to apply for this unbelievable opportunity.

Rabia Ladha

Supervisor: Dr. Larry Unsworth / Chemical and Materials Engineering / NINT

Sponsor: Merck Frosst Canada Ltd.



“WISEST provided many opportunities for learning outside the regular workday with Monday Professional Development and Friday Lunch ‘n’ Learn Sessions.”

Nanotechnology is a new term that is appearing more and more in everyday life in different contexts. While the average person is only starting to learn about the unlimited potential of nanotechnology, I have spent the past six weeks immersed in the world of nanotechnology. Through the WISEST Summer Research Program, I worked at the world-renowned National Institute for Nanotechnology (NINT). NINT is a multi-disciplinary research center which fosters collaboration of three major branches of science – biology, chemistry and physics – to provide practical solutions in various fields.

This experience has provided me the opportunity to explore possibilities for my future career path in the field of nanotechnology. For the past six weeks, I gained hands-on research experience under the supervision of Dr. Unsworth, and his team.

I worked on a project that investigates the effects of nanoparticles (SiNP, CBMA5, CBMA1, TEMPO5, and TEMPO1) on the Lysozyme, α -lactalbumin and albumin proteins at the secondary level. I spent the past six weeks either researching literature related to this topic or in the lab. The work in the lab was the most exciting for me! This summer, I was taught how use Fluorescein Isothiocyanate (FITC)-labeling, a procedure used to label proteins. Proteins are covered in various external markers. FITC is a fluorochrome which detects these external markers. FITC-labeling involves making various solutions and buffers and using different tools ranging from pipettes to centrifuges to UV-VIS (a machine that reads the absorbance levels of different solutions). The most complex and interesting part of this process was using the Fluorometer, a machine that measures the fluorescence levels of samples. After labeling proteins, I combined them with a pre-determined amount of the aforementioned nanoparticles with coatings of various polymers and incubate them for different time periods. At the end of each experiment, I would

create and interpret graphs to determine the amount of protein that adsorbed to the nanoparticle sample.

WISEST provided many opportunities for learning outside the regular workday with Monday Professional Development and Friday Lunch ‘n’ Learn Sessions. These sessions included tours of research labs, learning to develop an elevator pitch and how to design our very own research poster. The tours of research labs, both on and off campus, were great opportunities to explore other research facilities. The WISEST Networking fair was an extremely valuable session as I got to meet with women who have pursued their passion in less-traditional fields. It was inspiring to meet women who have faced trials along their career path but have been so successful. Events like the scavenger hunt and Science Olympics was when each of us met new people, formed friendships and great memories.

I would like to thank Dr. Unsworth, Alan So and Harsh Deep Singh for mentoring me this summer and providing a successful lab experience to me. I am also grateful to the WISEST team for organizing every detail for me to enjoy this unforgettable opportunity. In addition I would like to recognize Merck Frosst Canada Ltd for sponsoring my involvement in the WISEST Summer Research Program. My family who constantly provides me with support and encouragement deserves a huge thank-you. Participating in the WISEST program has equipped me with networking, lab and academic skills that will stay with me throughout and beyond high school and university.

Rachel Touchie

Supervisor: Dr. Colleen Cassady St. Clair / Biological Sciences

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

"The Schlumberger facility and the on campus Agricultural Genomics and Proteomics Unit both gave us an intriguing tour of their facilities and intimidating equipment."



I first heard about the WISEST Summer Research Program from a University of Alberta representative and it sounded like an amazing opportunity. If accepted I could make invaluable contacts and new friends, learn research skills and find out what a career in a non-traditional field would be like. It would also give me the chance to familiarize myself with the U of A campus and allow me to explore a career option I was interested in and learn the duties that came along with it. It was an opportunity to test working in a field before studying to aspire to it.

I was placed in the Biological Sciences department with Dr. Colleen St. Clair whose lab focuses on wildlife ecology through conservation behavior. I worked on three of her lab researchers' projects; an urban coyote diet and habitat selection study, an elk behavior project and a bird window-strike project. The majority of my time was devoted to the coyote project while I mostly analyzed video files and completed spread sheets for the other two projects. The purpose of the urban coyote project was to collect data on coyote habits in relation to their diet and preferred habitats to provide information for city management officials and the public in order to predict and prevent human-coyote conflict. We collected coyote scat and learned how to analyze hair and other excrement components to learn what coyotes ate and how much they depended on human related food, like garbage and pets, for nourishment. We also tracked coyotes by GPS collars on Google Earth and did telemetry sessions in the field in order to record what habitats the coyotes favored and record visual sightings on their health. We visited areas that they had frequented and documented characteristics of the area in order to later understand what attracts coyotes to specific areas. By learning what attractants cause coyotes to adapt to human presence we can try to limit those appeals thus reducing the likelihood of conflict and the need for lethal management.

The WISEST component meeting every Monday and Friday always brought some new information to the table. The WISEST team did an excellent job of choosing interesting people to inspire us and present fascinating information on careers in non-traditional fields. The WISEST presentations gave us more insight as to how to be a better researcher by teaching us how to make professional hypotheses, research posters and presentations. My favorite WISEST events were the tours. The Schlumberger facility and the on campus Agricultural Genomics and Proteomics Unit both gave us an intriguing tour of their facilities and intimidating equipment. Both excursions provided us with plenty of opportunities to ask questions about graduate school and careers to experts in research outside of the fields we were currently working in.

My expectations for the whole WISEST program were met and exceeded however, it changed my view of research; it doesn't just have to be hard work, it can be fun too. I met so many new people and my research team made it their goal to let us experience as much as we could in such a short time. I owe this wonderful experience to all the members of Dr. St. Clair's lab (Dr. St. Clair, Maureen Murray, Adam Cembrowski, Forrest Gainer, Tobias Tan and Rob Found) as well as to my sponsors, Service Canada and the U of A Faculty of Science and of course the whole WISEST team. I hope all the students – past, present and future - realize how lucky we are to have been chosen to take part in this program.

Rachelle Lavoie

Supervisor: Dr. Jingli Luo / Chemical and Materials Engineering

Sponsor: Canadian National Railways



"But before I knew it, thanks to the help and patience of my supervisor, I started grasping concepts and running tests on my own."

Upon learning that I was accepted into the WISEST program, I couldn't contain myself. Thrilled, I phoned my chemistry teacher to inform him of the good news as I couldn't wait till the following morning to tell him. It seemed obvious for me to apply for the summer research program after attending the SET day in the winter of 2009 because all the coordinators and past students had encouraged me to do so. I knew it would be an invaluable experience, and I was not left disappointed. Having a summer that I could enjoy was important to me but being able to learn and broaden my horizons seemed more of a priority. The WISEST program allowed me to do both.

Originally, I was placed into medical research. Though this would have been a great experience, I really wanted to explore engineering as it was a domain I didn't know much about. Having a passion for chemistry, I was lucky enough to be relocated in the faculty of chemical and materials engineering. There, I started my project on studying the reactivity of Alloy 800, a type of steel used in steam generator tubings in CANDU facilities. In my first week, I was very intimidated by what I was about to be studying as it was like nothing I had ever seen before. But before I knew it, thanks to the help and patience of my supervisor, I started grasping concepts and running tests on my own. Family and friends would ask me what I was researching and I would find myself going in depth about how I was studying the localized surface reactivity of metals under stress in a solution of thiosulfate and comparing them to different controls using a Scanning Electrochemical Microscope. Naturally, I would have to simplify my explanations as I would forget how much knowledge I had quickly gained over something I had previously known nothing about. I would explain that the point of my research was to better understand the initiation of corrosion on Alloy 800 at microscale and understand this material's surface information. This was better

understood but I often received smiles from my family and friends and was told that what I was researching was incredibly complex. Being accepted in the WISEST program made me feel one of a kind and exceedingly lucky for this reason as I felt that I had acquired so much knowledge.

Waking up every Monday to go work in my lab definitely didn't feel like a chore as waking up every Monday to go to school. Mondays meant having Professional Development Seminars which broke up the day and made it even more exciting. I learned how to make a proper scientific hypothesis from doing experiments on a potato, touring the coolest lab on campus in neuroscience and did a few more interesting activities over the duration of the program. I loved how WISEST organized activities throughout the week because it allowed me to learn even more about science and research and this in turn, gave me a better idea of what I would possibly want to pursue after high school.

Everything I learned throughout my program wouldn't have been possible without the financial support from my sponsors at Canadian National. I am eternally grateful to them for seeing the importance in supporting programs like WISEST. I will certainly never forget my supervisor, Renkang Zhu's relentless patience and kindness throughout my program. I am so grateful that he and Dr. Jing-li Lu allowed me to work on their project. Last but not least, it's imperative that I thank WISEST and all its coordinators that take their time to organize such a program every summer that gives girls and boys who enjoy science, the opportunity to explore their typically non-traditional interests. I will never forget what they did for me.

Rebecca LaGrange

Supervisor: Dr. Heather Proctor / Biological Sciences / Meanook Biological Research Station

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

“Another thing I learned is that even people in university don’t know what they are going to do with the rest of their lives.”



WISEST was everything I had expected, and nothing that I had expected at the same time. I knew I was going to have a great summer. But I did not know that this year would be memorable in its incredible scarcity of frogs, neither did I imagine the variety of activities we would be doing. No one day that was the same as another.

Some days Eliza, the other WISEST student at Meanook, and I helped other researchers and talked to them about their projects. Throughout our stay we sorted insects floating in ethanol, fed caterpillars, and sorted trees into branches, leaves (or needles) and trunk. We also went with our supervisor, Brandon Nichols, to his site a couple of times, where he collects air samples for Environment Canada and NOAA (National Oceanographic and Atmospheric Association).

But it wasn't all work. Some days when it was really hot we went out to the lake. At night we watched a lot of movies and sometimes played games, like cranium or badminton. One day, after someone had seen a bear on the path we take to check the frog traps, we had bear spray training and learned to fire off bear bangers and flares. That involved spraying bear spray into the trees and firing the bear bangers and flares until they were all gone. That was a lot of fun. For a few days after that we carried bear spray down the ponds with us ... just in case.

However, there was one thing that did stay constant. Every morning and afternoon we would go out to check the pitfall traps for frogs. We measured, weighed, and recorded some of the characteristics of the frogs as part of RANA (Researching Amphibian Numbers in Alberta). At first, I was going to see the differences in the activity of the frogs between the morning and afternoon. But as the days went by and we continued to catch only ten or less frogs a day, when before they had been catching ten frogs a trap, I decided to

switch my project and try to find out why this was.

I also helped Eliza with her project, which was to find out if it is cost effective to power a small home using only solar and wind energy. This involved compiling weather data, researching appropriate wind turbines and solar panels, finding out the average energy consumption in a home, and calculating all of the associated costs. We also got to go out to Meanook's weather tower once, which is in the middle of the "swallow grid" where the swallows all build their nests. There, after downloading the weather data, we found a nest with some baby birds in it.

I also used the weather data in my project to find out if there was anything exceptional weather wise that could affect the frogs. I focused on the precipitation and temperature, and compared them against the years before. I hit a snag when I realized there is no precipitation data for 2010 from our weather station. However, there was other data I was able to use.

One thing that I learned from this experience is that you cannot go into science for the glamour of it, because you'll be disappointed. Sometimes it is hard work and repetitive, but everyone at the station feels like they are doing something important. Another thing I learned is that even people in university don't know what they are going to do with the rest of their lives. They told me the best way to learn what you like is to start taking courses in university.

The summer I spent at Meanook is a summer I will never forget. I had fun, but I also learned about research and the researchers who do it.

Susan Hutchinson

Supervisor: Dr. Miles Dyck / Renewable Resources

Sponsors: Suncor Energy Foundation & Service Canada (Canada Summer Jobs)



“Without WISEST, I would never have understood the significance that role models can have on my education and career, especially women in non-traditional fields of study.”

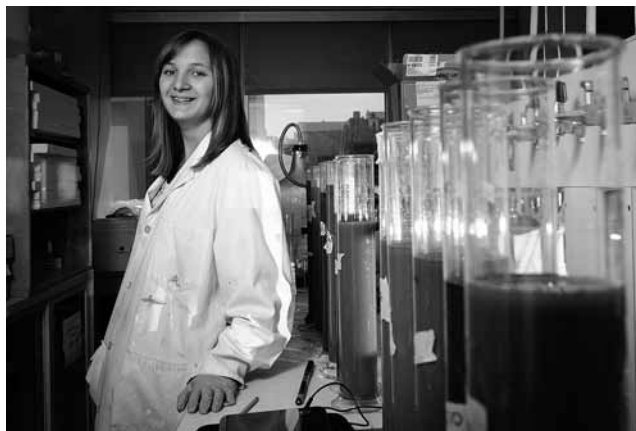
After orientation on the very first day, I knew WISEST would go above and beyond my expectations. Before me was the chance to work with grad students, in university labs, for six weeks assisting with research that is important and key to a larger project and interesting to me as well.

This summer, I had the chance to work in the department of renewable resources under Dr. Miles Dyck and Amy Gainer. Specifically, our project focused on the irrigation of willow trees with treated municipal waste water and the affects it had on the soil and ground water. Willow can be harvested every couple years and can be turned into bio-fuel as a renewable source of energy. As water becomes more and more valuable, it is crucial for us to recycle the fresh water which we use. However, it is also imperative to make sure that the excess nitrates from the treated water do not enter into the ground water and into the rivers and streams. Luckily, this involved many field trips out to our site in Whitecourt, Alberta. Two or three days of the week I was fortunate enough to spend the time out doors learning first hand about soil and ground water. I was able to gain valuable field techniques for observing changes and collecting samples, as well as lab techniques for analyzing them. In my department, there was the perfect balance of lab work and field work, so that I obtained a very good understanding of what being a student in sciences is like. In addition, the entire department was welcoming and supportive. They accepted me as another researcher, allowed me to experiment with new things and encouraged me to grow in as many different ways as possible.

This summer, I gained valuable knowledge that is truly unique to WISEST. From the fun and entertaining Lunch 'n' Learns every Friday, to the professional development seminars on Monday, I obtained skills that I know will help me in my future. We had the privilege

to tour labs on and off campus, learn how to make a professional research poster and vital networking tips. Without WISEST, I would never have understood the significance that role models can have on my education and career, especially women in non-traditional fields of study. Other connections were also made between my self and a large group of young women and men my age who all share the same interests and passions as me. Now that the six weeks of research has come to a conclusion, I am certain that I am now prepared to take the step from high school into university life, and begin on my way to a career that interests me.

If it were not for the support of my sponsors, Suncor Energy Foundation and Canada Summer Jobs, the staff and volunteers of WISEST and the entire research team who I have worked with, I would not have been given the opportunity to participate in this wonderfully unique experience. This summer has been extremely advantageous, and I know the results of the WISEST summer research program will last me my entire lifetime.



Tyra Adamic

Supervisor: Dr. Michael Ganzle / Agricultural, Food and Nutritional Science

Sponsor: Alberta Advanced Education and Technology

"It is remarkable to me that the lab workers volunteer to supervise a high school student for nothing more than wanting to pass on their knowledge."



The WISEST Summer Research Program was the experience of a lifetime. Over the course of the program I was not only exposed to life in the lab, but also life at the University. Both of which provided a great insight into what my future may hold. I cannot begin to explain the impact this program has had on me. In the beginning I expected to be thrust into an unknown environment and to expand my knowledge in a field of science. What I didn't expect to learn was confidence, independence and an insatiable thirst for knowledge. It is remarkable to me that the lab workers volunteer to supervise a high school student for nothing more than wanting to pass on their knowledge. When asking a question I was never once met with exasperation but was met with their excitement for the chance to teach me something new. This passion for knowledge is something I will take away from the program to use in all aspects of my life.

The research project I worked on was the behaviour of *Lactobacillus reuteri* 100-23 in the fermentation of sourdough bread. *Lactobacillus reuteri* is a strain of bacteria with many different niches. It is found in the gut of rodents as well as the fermentation of sourdough. This strain is responsible for the sour taste in the dough due to its formation of lactate and acetate. More specifically our strain *Lactobacillus reuteri* 100-23 was taken from the gut of a rat. Our objective was to observe the behaviour of the *Lactobacillus reuteri* 100-23 wild type and mutant strains in sourdough. Our mutant strains were created by deleting specific genes from the original bacteria. The hypothesis of our project was that the mutant strains may be more sensitive to acid stress than the wild type. We hope to use this information in the future for the food industry as well as the medical industry.

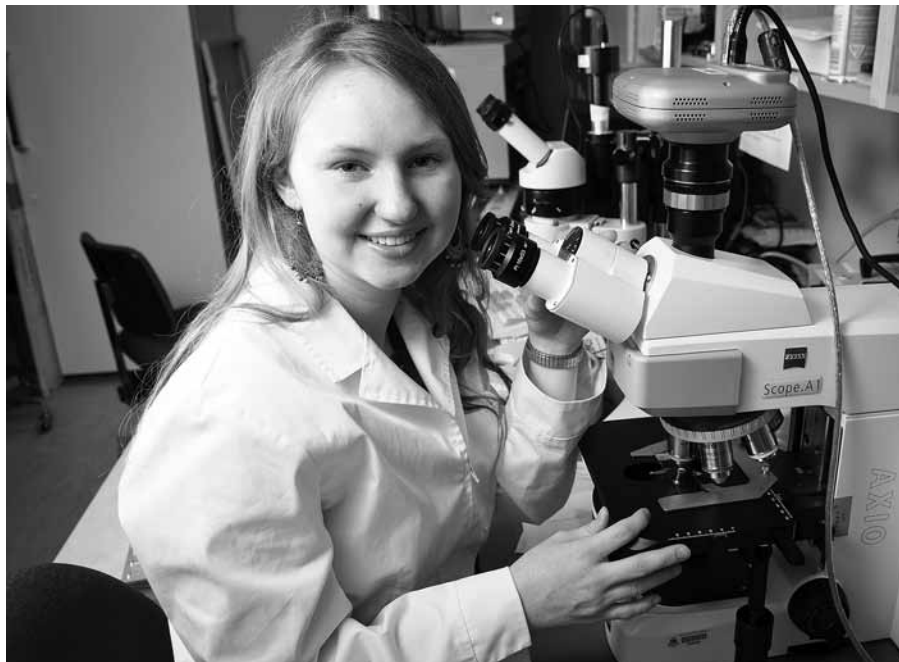
Life in the lab was a wonderful experience. I was able to conduct experiments with my supervisor. It was incredibly satisfying to see that every piece of information on my poster was something I had contributed to in my work in the lab. Whenever I was faced with a new obstacle, my supervisor was unwavering in her belief that I was capable of solving it. This continuous belief she had in me pushed me to do things I never thought I would be able to achieve. The most memorable experience in overcoming my fears was presenting my project in the general lab meeting in front of my co-workers. At the start of this program I would not have had the confidence needed to present my work in front of an audience, never mind the audience being Masters and PHD students. Confidence and self worth in my work is also something I will take away from this program. This program taught me so much more than the basics for working in a lab. It taught me about life, about what I am able to do with my life. One of the most important lessons I learnt along the way is to follow your passion. The only mistake you can make when choosing a career is to not follow your heart. If you follow your passions in life and they will lead you to where you want to be.

I would like to acknowledge my incredible supervisors Marcia Shu-Wei Su and Sabine Schlicht for inspiring me to always want to learn more, Dr. Michael G. Gaenzle for allowing me to work in his lab on his research project and to my sponsor Alberta Advanced Education and Technology for without their support this program would not exist. I would also like to extend my endless gratitude to all those involved in this program, who make it what it is. An experience of a lifetime.

Veronica Meston

Supervisor: Dr. Cindy Paszkowski / Biological Sciences

Sponsors: Alberta Women's Science Network (AWSN) & Service Canada (Canada Summer Jobs)



“One of the best parts about being in this research project and laboratory was definitely meeting so many people with so much diversity in their research projects!”

I had no idea that I would actually ever get accepted into such a fantastic and reputable program as the WISEST Summer Research Program! Finally, after sending in my application with high hopes of spending the summer doing what I love - science, I finally got the call saying I had been accepted! I didn't even know half of the amazing summer I was in for, but I knew that it would be life changing like no experience I had ever had before!

I was placed under Dr. Cindy Paszkowski's tutelage in the Department of Biological Sciences researching the decline in a population of long-toed salamanders (*Ambystoma macrodactylum*) in Linnet Lakes, Waterton National Park. Definitely not what the average student gets to do for their summer job! My role in this research was mainly aging the salamanders with skeletology (where you count the rings on the bone, kind of like rings on a tree, to see how old it is). I spent a lot of my time in the Advanced Microscopy Laboratory preparing the salamander toes I would be aging in a specific way. First, the toes would have to be fixed, decalcified and then embedded in special wax. From there, I would section and mount the cuts of the toe on slides where they would be stained and eventually aged under the microscope. During this process, I was using equipment and technology such as the Histomatic, Tissue Processor, Microtome and Zeiss Light Microscope that I never even dreamed I would ever use until I had graduated. My experiences in the labs here at the University of Alberta have definitely been worlds above my high school's science lab!

It was really interesting to be working in Dr. Paszkowski's research because although researching the Linnet Lake salamanders may sound like too specific a study to be of use elsewhere, what we learn from the data collected can be applied to many other aspects of environmental stewardship, such as the use of under-road

tunnels to prevent road collisions, and the importance of being aware of changes in populations, like age! One of the best parts about being in this research project and laboratory was definitely meeting so many people with so much diversity in their research projects! I felt that WISEST really tried to broaden and enrich my experience here, with meeting role models in non-traditional fields for their gender with weekly Lunch 'n' Learn sessions every Friday and Professional Development sessions every Monday afternoon. A really cool opportunity that WISEST set up for its summer research students was touring on campus research facilities! I got to see a research lab where different aspects of poultry use are being researched! This was the type of opportunity WISEST regularly presented, setting the bar for many other programs; this was definitely not a summer camp!

During my time here in the program, many individuals made it an especially memorable experience for me. I would like to thank my sponsors, the Alberta Women's Science Network and Service Canada (Canada Summer Jobs), without their generous financial support, this opportunity would never have been possible for students like me. I would also like to give a big thanks to the WISEST team, whose hard-working efforts made this summer one of the most incredible of all! Thank you as well to Julia Pon, the residence advisor who showed me so much about city life in Edmonton and making my stay in residence such a blast. And last, but not least, thank you Dr. Paszkowski and Ms. Arlene Oatway, as well as all my other supervisors for the tremendous help you gave me. I have learned so much in the course of one summer; I feel I can never thank you enough! The WISEST Summer research Program has been a life changing experience, thank you to all who played a part in making this the best summer ever!

Victoria Giacobbo

Supervisor: Dr. Philip Currie / Biological Sciences

Sponsor: Alberta Advanced Education and Technology

"I enjoyed every aspect of this experience, and I know that it will have a tremendous impact on my future."



When I was in grade six I was fortunate enough to participate in the CHOICES program, where young girls are introduced to science at an early age, here at the university. CHOICES had a huge impact on me, I still remember coming to the enormous university with millions of people (at least that is what it felt like at the time). It was here that I realized that I really loved science, and had a passion for it. I never believed that I would have a chance to relive this experience in the future. Only when my teachers informed me of the WISEST Program in high school, did I remember my past experience and realized that this opportunity would give me another chance to relive my previous experience. I also realized that this program could offer me so many new opportunities and experiences, and give me something productive and enriching to do during the summer. I decided to apply to the program, and see where it would take me.

I was placed in the Laboratory for Vertebrae Paleontology. I remember being extremely nervous and excited the first day, and could not even imagine being allowed to touch, or even work on, dinosaur bones. My mind was filled with worries that I would somehow end up destroying the bones, but my worries were soon erased. It is normal for the bones to sometimes break during the preparation process.

During my time in that lab I worked on two different projects. One of the projects was the preparation of dinosaur bones. I was immersed in the land of the dinosaurs, where I had to continuously brush, chisel, and glue together bones. Specifically, we worked on the Edmontosaurus, a hadrosaur. I was also fortunate enough to work on the occasional tyrannosaurid. These dinosaurs are from the Late Cretaceous period, around 70 million years ago. The fossils were originally from the Danek Bonebed in Edmonton, Alberta.

It was important to work on these fossils, because they are of great significance for researchers, so that they can learn more about hadrosaur and tyrannosaur populations and how they lived and died millions of years ago. The tyrannosaurid specimens were of great importance, because their preparation will help researchers in the future to identify which species of tyrannosaurid lived here millions of years ago.

The other project I worked on was CT Scanning of Komodo dragon teeth. I found this experience extremely interesting, as I was able to scan these teeth, put them onto a computer and use 3D software to create some very fascinating images. This software gave us the ability to compare these teeth inside as well as outside. It was important to work on this project because Komodo dragon teeth resemble tyrannosaurid teeth.

This experience has been a tremendous honor; I am extremely fortunate to have been a part of it. The WISEST program has opened my eyes to a variety of career options in the science field. It has also given me numerous materials through the Friday and Monday seminars. I enjoyed every aspect of this experience, and I know that it will have a tremendous impact on my future.

I would like to thank the WISEST team for giving me this opportunity. I would also like to thank Dr. Phillip Currie, Clive Coy, Miriam Reichel, and Nicola Howard. You have all made this experience everlasting. I would also like to thank my partner, Danielle Pertschy, you have made this experience more enriching. I would also like to thank my sponsor, Alberta Advanced Education and Technology. Thank you all for giving me an amazing six weeks.

Yondu Mori

Supervisor: Dr. Pete Hurd / Psychology

Sponsor: Alberta Advanced Education and Technology



"I greatly enjoyed making friends with people from all over the city, province and country who had similar interests and abilities to me."

Over the past six weeks I have done so much more than just found something to do during the summer. In working in Dr. Hurd's lab in the Department of Psychology alongside my direct supervisor Michele Moscicki, I have been examining the cerebral lateralization of convict cichlid fry. In other words, what hemisphere of the brain is used. In fish this is determined by what eye they face a situation with. For my research project I placed these fry in a mirror task environment and analyzed the relationship between the laterality and size of the fish. Understanding which side of the brain is used enables us to learn more about the social behaviour and personality traits of the fish, which can provide insight into how the fish would act when facing certain situations.

Initially when I received the call that I got into the WISEST Summer Research Program I was told I would be looking at the psychology of fish in differently shaped tanks. So leading up to the start of the program I envisioned fish in all the wackiest shaped tanks: triangular, diamond, oval, etc. Although, after orientation I soon realized this was not the case at all. There absolutely were differently sized tanks but they primarily ranged from small, medium and large ordinary, rectangular fish tanks. Nonetheless, while my project did not meet my original expectations I became exposed to a whole world of study that I had not been aware of before: the psychology of animals, particularly fish. Within a couple of weeks I realized that fish have all sorts of personalities. In doing the tasks involved in fish maintenance, such as cleaning tanks and feeding fish, I quickly figured out which fish will hide from me, swim towards me, wait anxiously for food, or dominantly get the food first within a group tank. It was then that I could often draw small parallels between their behaviour and our human behaviour.

Also, besides constantly being in the humid wet lab with the fish, while in the dry lab I gained insight into the amount of work involved in being a researcher along with having the patience and determination to reach a result. Within my research team, I had adopted the idea that when things are not working out and frustration or fatigue is building, do a crossword puzzle. Though it never completed the task at hand it did provide a short, temporary escape. That summer we went through numerous crosswords.

Overall, the WISEST Summer Research Program has shone a light on the sciences for me. Through the professional development seminars and Lunch and Learn sessions, I had the opportunity to meet so many successful people in various areas of study and practice skills that will carry me through to university and later on in life. Furthermore, after completing a various amount of tasks within my own lab, my interest and appreciation for the sciences has definitely grown. At the same time, the learning aspect of WISEST would not be as memorable without the diversity of other student researchers. I greatly enjoyed making friends with people from all over the city, province and country who had similar interests and abilities to me. Thank you WISEST and my sponsor, Alberta Advanced Education and Technology, it was an incredible summer experience that will aid me in my future pursuits in post-secondary education and something that I will never forget. I would recommend this program to anybody who has the enthusiasm to learn about different perspectives of thinking, make new friends and discover more about their capabilities. It was by far the best-spent summer I ever had.

MAKE THE WISEST CHOICE

Empower women in science, engineering and technology

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

Problem

There is a growing concern that Alberta has the lowest postsecondary participation rate of all provinces in Canada, with only 17% of the population aged 18-34 enrolling in postsecondary in 2009. Though the number of female undergraduate students has grown sharply over the last ten years, few women study science, technology, engineering or math (the so-called 'STEM' fields). The gender imbalance continues into the Canadian work force with 31% women in the physical sciences; 26% in computer and information systems; and 12% in engineering (Canadian Census 2006). There is still much work to be done in retaining women in the workforce and advancing them to the boardroom where they can combine their talents with men in change management. Diversity is important for business.

Solution

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

Your Impact

WISEST Summer Research Program

\$3,000 provides a six-week intensive hands-on research experience in STEM fields for a high-school student.

Multiply your Impact:

Number of students: *(provide for one or more)*

Term of your impact: *(three years two years one year)*

Margaret-Ann Armour Endowment Fund for Rural Students

Donation promotes diversity in the Summer Research Program by facilitating the participation of students who would otherwise be unable to attend.

Networks for early-career women in STEM

\$600 supports a monthly network session for early-career women in science, engineering, technology and math

Donate

Thank you for supporting the WISEST way.



Contact WISEST at **(780) 492-1842**

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