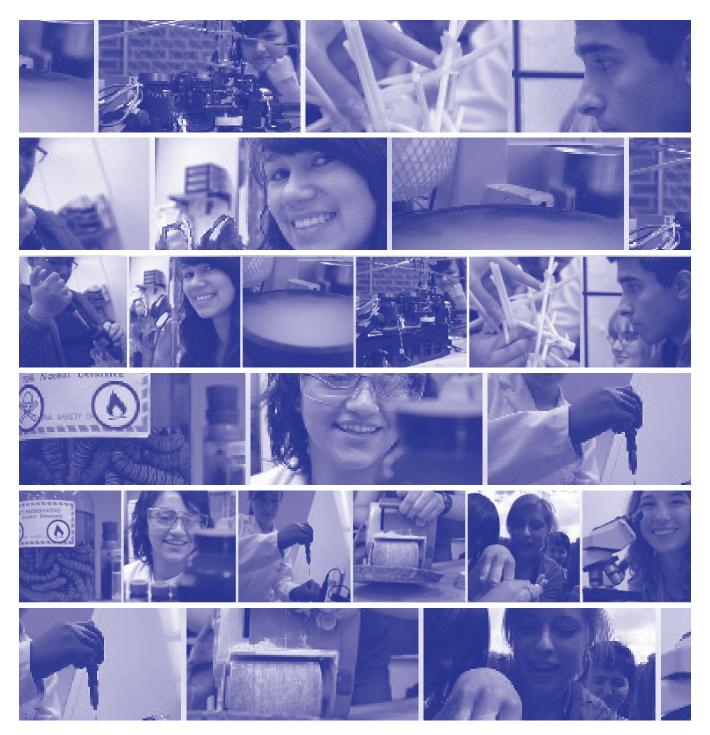
# <u>M</u>SEST

women in scholarship, engineering, science & technology



# journal of student research 2009

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women in scholarship, engineering, science & technology

WISEST is a University of Alberta-based organization whose vision is to strengthen science by increasing gender diversity and to enhance choices in science, engineering, scholarship and technology for women of all ages. Our programs foster collaboration and communication with partners in industry, in academia and education, and in government and non-governmental organizations in the community.

WISEST was founded in 1982 with a mandate to investigate the reasons why few young women are choosing careers in the sciences 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.

The purpose of WISEST is to initiate action to increase the representation of women in all fields of scholarship. The studies and actions of WISEST are concentrated in the under-represented decision-making fields of science, engineering and technology.

### WISEST

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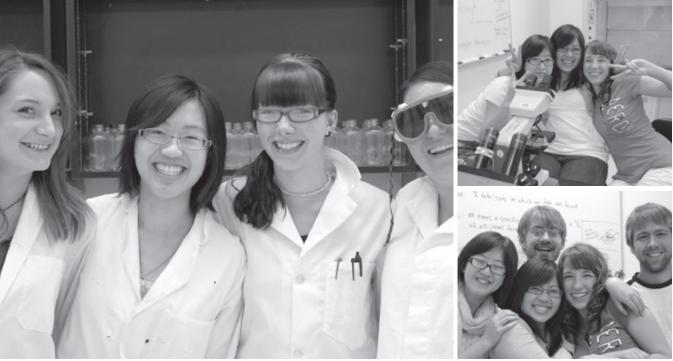
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# 义 ISEST summer research program 2009





# journal of student research

# students from the 2009 WISEST summer research program





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<b>Carmen Chornell</b>
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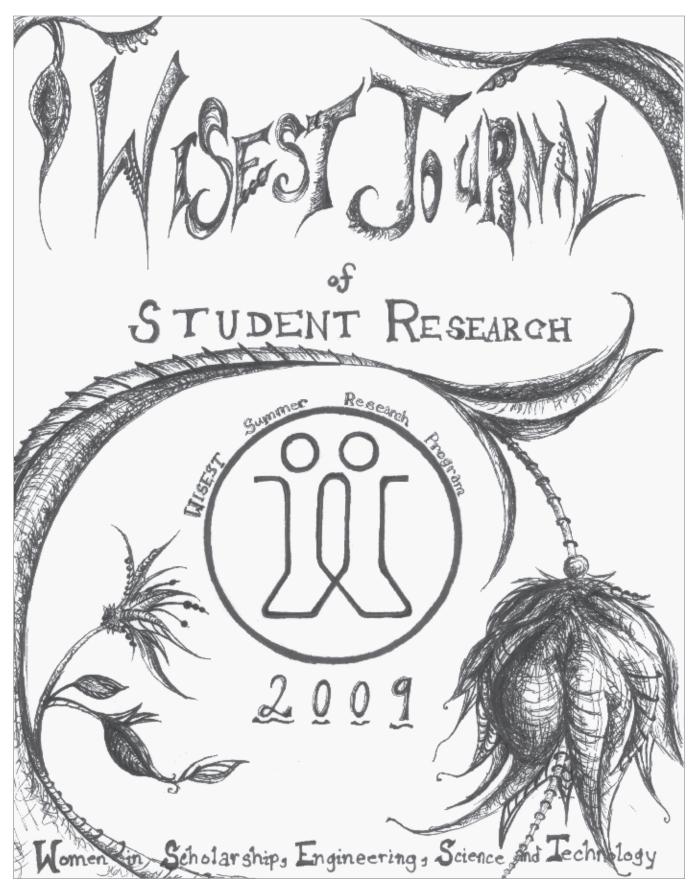
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<b>Daniel Javier</b>
<b>Elizabeth Otto</b>
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# **WISESTsummer research program**



# the annual wisest summer research program

by: Grace Ennis (WISEST Coordinator) and Denise Hemmings (WISEST vice-chair)



left to right: Misha Hartfeil, Kerry Humphrey, Denise Hemmings, Grace Ennis, Jen Duffy.

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 underrepresented 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.

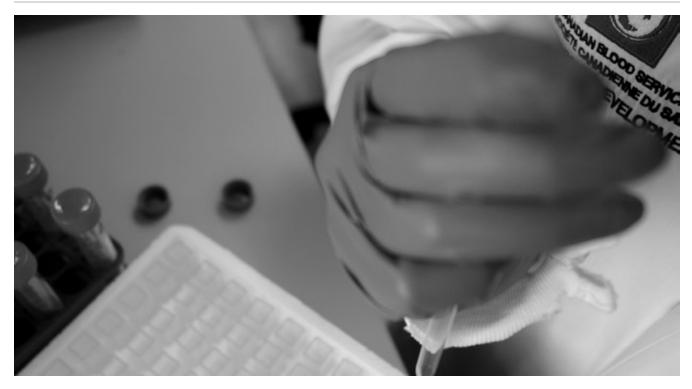
The success of the WISEST Summer Research Program is due to the support of many, many people, including high school science teachers, faculty supervisors, and research team members. We offer our thanks and words of sincere appreciation to all high school teachers who sparked their students' interest 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 so 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 25-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.
- 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. To 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 2009 partners and contributors







### Partners

- Alberta Advanced Education and Technology
- Alberta Heritage Foundation for Medical Research
- Alberta Employment, Immigration and Industry (STEP)
- Alberta Environment
- Alberta Ingenuity Fund
- Alberta Education
- Alberta Women's Science Network (AWSN)
- Allard Foundation
- Canadian National Railways
- Alberta Health Services (Edmonton Area), Research & Design
- Edmonton Glenora Rotary Club
- Elk Island Public Schools Regional Division No. 14
- Epsilon Chemicals Ltd.
- GlaxoSmithKline
- Human Resources and Skills Development Canada
   (Canada Summer Jobs)
- iCORE, Informatics Circle of Research Excellence
- Merck Frosst Canada Ltd.
- NSERC PromoScience
- Prosess Solutions Canada Ltd.
- Suncor Energy Foundation
- University of Alberta
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  - Faculty of Engineering
  - Faculty of Medicine and Dentistry
  - Faculty of Nursing
  - Faculty of Science
- Department of Civil and Environmental Engineering
- Dr. Eleni Stroulia, Professor, Dept. Computing Science
- WISEST Golf Tournament 2008

### Contributors

- Alberta Research Council
- Centre for Math, Science, Technology Education
- Ms. Nancy Manchak, WISEST Student 2008
- Ms. Esther Ondrack
- New Paradigm Engineering

# partnership with wisest



WISEST invites you to become a **Partner** or a **Contributor** to the WISEST Summer Research Program. Your donation will allow students:

- to become active members of a research team at the University of Alberta
- to learn about research in science and engineering
- meet and be inspired by the people who work in these fields
- broaden their awareness of the diverse career opportunities.

Partnerships are \$3000 per student placement. Contributions of less than \$3000 are gratefully accepted. More than 90% of the sponsorship goes directly to the students as wages and costs for their student program activities.

Official charitable tax receipts are issued to Partners and Contributors by the University of Alberta.

There are several funding opportunities for **Partners** or **Contributors**:

- to be directed where most needed
- sponsor one or more student researcher positions
- long-term sponsorship (e.g. 3 years)
- sponsorship of special WISEST Summer Research Program events
- partial sponsorship of student researcher positions
- contribute to separate endowment fund to support rural students who need financial assistance to temporarily relocate to the city for WISEST summer employment.

Partners and Contributors see the impact of their donations at celebratory functions with the students, in the media, in comprehensive program publications, and in our publicity material (e.g. newsletters and website).

# become a partner or contributor with wisest



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□ three years		two years	one year				
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# professional development

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# tour of research facilities - on-campus

by: Finola Hackett



Working in a single lab in a single building for six weeks, one can almost forget that there is a vast and diverse world of research being conducted at the University of Alberta. Luckily for us though, the WIS-EST team made sure we not only were aware of it, but got to see and explore other labs first-hand! On Monday, July 13, the WISEST summer researchers branched off in small groups, each touring one of about a dozen different labs around campus. These labs ranged from agriculture, mechanical engineering, psychology, chemistry, paleontology, environmental engineering, to biological sciences, just to name a few.

The University of Alberta has access to some of the most cuttingedge equipment in research, and seeing these was a privilege. In a geochemistry lab visited by WISEST students, for instance, all sorts of instruments are used to prepare and analyse soil, water, and mineral samples. One does not find a shaker, centrifuge, "microwave" to extract mineral from rock, or instruments of high pressure liquid chromatography just anywhere, and even more rarely all in the same room!

The possibilities for creativity in research became apparent to many of the WISEST researchers. Whether seeing Lego robots programmed to mimic group behavioral psychology, checking out the incredible collection of vertebrate fossils in the paleontology lab, learning about how a Mars rover studies out-of-this-world weather, or watching the creation of a blown-glass animal on a stick in a chemistry lab (then taking it home!), we could observe that with passion for a certain field, in research anything is possible.

This passion was obvious when the dedicated men and women who were kind enough to take the time to show us around their labs spoke about their work. Though the excitement of a new discovery may be interspersed with days, months, or even years of painstaking hard work, many researchers find joy in simply making an idea reality, or by designing, creating, testing, and improving a project before sending it out to perform its "real world" application. As WISEST students, just beginning our academic careers, hearing these researchers talk about their own experience in school and about the potential jobs in the research field was great; it helped us to look beyond courses and studying and into the big picture of our futures. Thanks to all these researchers and their work, on-campus tours were memorably eye-opening!



# tour of research facilities - off-campus: iRSM

by: Isha Ober



The world of the 21st century is the progressive world of advancement in science and technology which has made the seemingly impossible possible. Today, archaeologists have revealed the hidden secrets of the ancient world, medical and technological institutions have discovered treatments to life-threatening diseases ensuring prolonged and comfortable survival of human race. Our WISEST team of 20 students were given a golden chance to visit one such institution – iRSM (the Institute for Reconstructive Science in Medicine).

iRSM was established in 1993 with an aim to provide state of the art patient care through innovative health delivery models, adoption of leading edge technologies, integration of research and clinical care and knowledge management and translation. Based at the Misericordia Hospital, Edmonton, Alberta; iRSM has its origin in head and neck reconstruction and rehabilitation. Our tour guide, Ben King, took us to various laboratories and showed us how these laboratories work collectively to provide a second life to patients with facial defects resulting from cancer, trauma and congenital conditions.

We met Interfacial Biomechanics Lab personnel who specialised in preparing osseointegration implanted devices. We were told that these implants are made from titanium because titanium allows bone to grow in it. The laboratory exhibited various implants ranging from those for the teeth to those for eyes and ears. Next we visited the 'Finishing Room' which was more like an artist's place. Here, the implants are made to look natural using a vast variety of colors and effects. They are matched with the color of patients' skin and, once done, are very hard to distinguish from real organs. We also went to the Medical Modelling Research Laboratory where the first stage wax models are prepared. The lab technicians do a CT-Scan to generate a 3-dimensional image of patients' defective organ which is used to make 3-dimensional wax and acrylic models. These models possess the same hardness as the bone and are used to simulate a surgery before hand, which familiarises surgeons with the patients' condition and also help save time during actual surgery. Besides this, we were also told how rib cartilage of patients is used to reconstruct the framework of their ear and how a missing part of the nose is replaced using the skin from the forehead.

iRSM is a pioneer in the application of advanced technologies to support clinical and research activities. It is a place worth worship for people born with parts of the head and neck missing, or who have lost some of these features through cancer or injury. Though having already established a benchmark in medical reconstructive science, iRSM is fully committed in finding new and better solutions to problems in order to significantly impact the quality of life its patients are able to enjoy. Believing that better health care is a result of putting excellent research into practice, iRSM focuses on innovation, knowledge leadership and technology commercialization which will support their quest to provide hope and excellent care for patients. We all are very thankful to WISEST for giving us this opportunity and highly appreciate the work being done by the iRSM.

Reference: www.irsm-canada.com

# tour of research facilities - off-campus: Scanimetrics

### by: Shibian Balasubramanian

The world today revolves around making things smaller such as slimmer cell phones, Ipods/Iphones and many more. Scanimetric is one such company driven by the semi-conductor technology to enable "wireless chips". Scanimetrics does not manufacture chips, but designs and retests them to make sure they are efficient. Multiple chips are produced for cost-efficiency as they can be marketed more quickly.

The first step in making a chip is to design it. The chips are designed on a computer. They are location specific and function specific, which limits their placemen. A single chip has many layers of information embedded in it. If there is a defect on the surface layer, it can be fixed. However, if the defect occurs below the surface layer, the chip is discarded and a chip with a new design is manufactured. Once manufactured, the chips are re-tested and surrounded by a 'wafer' for protection. An interesting aspect about these chips is the way they communicate with one another. Like cell phones or internet, they send wireless signals. This ensures faster chip-to-chip communication enabling faster computers at a low price.

One might think that this is the start and endpoint of electrical engineering. However, there is more! The electric engineers in Scanimetrics take into consideration the medical and the environmental aspects as well. A nano chip; inserted in an animal to report on its health; is one of the many medical uses of the chips. The chips are also environmentally friendly as "less power is required" which enables the system to run "cooler and longer". Of course, the field is advancing in semiconductor and nanotechnology that has enabled the medical and environmental aspects to work together. Electrical engineering, in Scanimetrics, has its perks. The job timings are flexible according to changes in one's life. Most importantly, since electrical engineering is constantly evolving according to the demands from the public, the work is always different and fresh. One never finds boredom.

Perhaps one of the important points of knowledge gained from this tour is that one can move between different fields of engineering. Even marketing involves knowledge of the product, its features and attributes and all other aspects of work involved in the process. Programming too aids in the design of the chips before they are sent to the manufacturers. The trip to Scanimetrics has truly inspired me to take into consideration a field that I may never have thought about-Electrical engineering.

Reference: Scanimetrics Company Overview 2009 pamphlet

# tour of research facilities - off-campus: Schlumberger

### by: Carmen Chornell

Il cannot believe that I didn't know about Schlumberger before entering the WISEST program. I signed up for the tour hoping to learn, explore, and experience something new and innovative. That is exactly what happened.

We started the afternoon off in a typical manner. Seventeen of us from the WISEST program hopped off the bus in South Edmonton at the Schlumberger lab. We signed in and received "Unescorted Visitor" tags, and then headed into the conference room for a quick introduction to Schlumberger and its employees. A lab isn't a lab without hazards, so we received a safety overview about a lethal chemical, hydrogen sulfide, which was being used in the facility. We then jumped to the good stuff. At first, I knew little about the company, but I quickly found out how fascinating Schlumberger is. I found it interesting that you could have such a broad base of scientific interests (chemistry, mechanical engineering, chemical engineering, physics, or thermodynamics), and that you could get locally hired, trained, and employed, and then travel the world! The Schlumberger Company employs workers in over eighty different countries! Their goal is to have excellent products and innovations for oil technology and services once the oil comes out of the reservoir. Three employees, Marina, Feung, and Mila, introduced themselves and explained how they wound up working with such a unique company. Meeting them was great because they shared their advice about their experiences in the field of science, making

it much more than just a tour. We were then escorted into the humongous lab. Safety was obviously a concern in the lab, and all of us received fancy lab coats and protective safety goggles. When I took my first steps into the work area, I was overwhelmed. The lab had numerous activities going on. Massive machines were attended by busy workers dressed in snazzy Schlumberger lab coats in a variety of sealed, protected, or open rooms. Marina thoroughly explained to my group the mechanics behind each machine, and how they all contributed to discovering more about the properties and components of oil. We floated around the lab and learned about many different careers at Schlumberger. They ranged from grad students from the University of Alberta to lifetime employees. Following the tour, we received nifty Schlumberger notebooks as souvenirs and had just the right amount of time to ask Marina, Feung, or Mila guestions. Personally, this was my favorite part of the tour. It was a time to be personable with workers that had experienced more than I could imagine. They had traveled, networked, matured through hardships and success, and were open to share any of it with us. The opportunity to openly do this with people is very rare, so I was very appreciative that WISEST gave me this chance.

Overall, it was one of the most memorable days of the WISEST program. It opened my mind to a whole new side of engineering that I never knew existed. I hope one day I can be a part of something so incredible.

# lunch 'n learn: networking I: talking to strangers

by: Miruna Marin

The first Friday Lunch 'n' Learn was promising to be a great opportunity for gathering more helpful information about the paths we need to follow in pursuing our careers. We all gathered in a room in CAB where we met two friendly faces, Alynne and Brianna, who were going to introduce us to networking.

Our first task for the day was to forget what we were taught when we were young, and start talking to strangers (or at least the ones who might help us in furthering our careers). However, in order to create a lasting first impression we needed to know the Dos and Don'ts of successful networking. First off, Alynne and Brianne informed us that networking is necessary for planning a career as it enables meeting new people and broadening our career options.

Next our speakers talked about how we should present ourselves in front of new people. They suggested we should carry a professional contact card with us at all times, so that the people we meet have a chance to contact us later. Also, when talking to new people we should be genuinely interested in what they're talking about and if we have the chance, we should research their area of interest ahead of time in order to be prepared. Researching also helps when asking questions as it prevents us from asking general or obvious questions. Our presenters also advised us not to forget about the pleasantries and be nice and polite. Lateral thinking is another important step in networking as we should always ask for referrals. Towards the end of their presentation Alynne and Brianna gave us another task; this time we had to create our own "elevator pitch" and use it to trigger a discussion with a WISEST student who sat next to us. This is how I found out that Misha Schollie was going to attend the same talks my supervisor and I were going to attend. We also talked about our own projects and exchanged contact information. By the end of our Lunch 'n' Learn session all of us were able to make a lasting impression using our elevator pitches.

Lastly, Alynne and Brianne gave us a couple of websites that would guide us through all the processes that involve choosing a career and finding a job. They also told us about CAPS, the university's Career and Placement Services centre, and the various programs they offer such as mock interviews, career fairs and lots of other seminars meant to help us through the transition between our educational life and our career life.

This was definitely one of my favorite Lunch 'n' Learn sessions because it taught me how to introduce myself to new people and how to better present my interests in order to open new doors and it also prepared us for our Role Models Monday session where we were able to apply everything we have learned about networking.

# lunch 'n learn: networking II: maximising role models

### by: Miranda Stahn

In this Lunch 'n' Learn we discovered how to approach our potential role models and ask them questions in an effective and respective manner. Misha and Jen instructed us on how to maximize the time we may have with our potential role models, enabling us to get a slough of information from someone by spending no more then a few moments with them.



As students we discovered that we can't be shy about asking for information and that by being confident, we are often more likely to be remembered as well as respected, by not only professionals but our peers, as well. Our newfound skills were put to the test when Misha encouraged us to pose her questions about her life and her pursuit into medicine. Afterward we were divided into groups, and asked to repeat the same exercise with our fellow WIS-EST Students. This not only prepared us for next weeks session in which we came face to face with our role models, but also enabled us to learn about our friend's lab work.

This, to me, was satisfying because it opened my eyes to even more possibilities available to women in science, as well as gain more perspective on how the other girls felt about entering careers that are considered to be male dominant. The more questions we asked the more I realized that the role models we were about to meet on Monday are still ordinary people too, and if they are willing to share their expertise with us, why not let them? I came out of this session with a whole new array of friends, all with similar belief about science and our future.

It's sad to think if Jen and Misha hadn't encouraged us to speak up, and to ask questions I never would have even thought to go beyond hello with many people in the program, and how much fun would that be? I know I will carry this newfound skill with me throughout my life helping me interact and connect with people in all situations.

# lunch 'n learn: networking III: researching ethically

### by: Elizabeth Triscott

Is it right to kill one person to save the life of another? What about sacrificing one person in order to save the lives of millions? What is ethical and who decides? Scientists are confronted with moral dilemmas regarding many different issues, from stem-cell research to academic integrity, and even in a relatively small population, such as the scientific community, personal opinions tend to be as numerous as the people possessing them. For this reason, most professional groups have a code of ethics that is generally agreed on and complied with by all its members.

During the last lunch 'n' learn session we were discussing ethics in research. Strewn among the Twilight and Harry Potter references were the foundations of probity and morality upon which all science, indeed all academia, are built. We discussed two different situations. A Dr. Cullen with five dying transplant patients and Jacob Black, a positive match for all five patients. Is it right for this fortuitously named doctor to kill the equally coincidentally named Jacob Black for the good of his patients? Or consider a certain Hermione whose History of Magic paper was found to be plagiarized. What is the ethical action for her teacher to take? For the first situation it

was generally thought (considerations about werewolves and vampires being mortal enemies aside) that it was not, in fact, moral or ethical to harvest Jacob Black for his organs. Consensus on Hermione's problem was more difficult to come to. Whether her offence merited a slap on the wrist, a failing grade, or an even worse punishment was discussed. We then watched a short movie on research misconduct, and discussed it in small groups. We came to several conclusions, including scientists should not try to act, and claims of research misconduct should be taken seriously by everyone involved and should result in dire consequences.

All in all, it requires great courage to be the whistleblower on research misconduct, especially if the researcher in question has authority over you, and unmasking them may have serious repercussions professionally. Nevertheless, in order for science to continue to expand and enlighten the world around us, we need to be able to trust the scientists themselves. As they said in Spiderman: "with great power comes great responsibility", and a little science in the wrong hands could be a very dangerous thing.

# CMASTE - reading scientific research papers

### by: Shauna Thariath

The initial uncertainty from our first day together had definitely been forgotten and all WISEST students walked in Monday excited to share their work experience with new friends. Many of my fellow WISEST students had been asked to do some preliminary research before beginning their experiment(s). Monday Professional Development day seminar #1 was to be focused on 'Reading Scientific Research Papers' which was a perfect opportunity for us, who would be required to read and critique papers about our field of work. It was presented by Dr. Frank Jenkins of CMASTE who was accompanied by Dr. Marie-Claire Shanahan.

Dr. Jenkins had placed a Sobeys grocery bag before us claiming that by wearing this bracelet'The Magic Bracelet Which Gives You Strength' one would be able to lift the bag with ease. The volunteer student lifted the bag with difficulty but when given the bracelet, lifting the bag had become...easier? The moral of the story; when reading a scientific report we must ignore bias and false perceptions. The student did not expect the bag to be difficult to lift, but when lifting the bag with the bracelet, it was easier because the student was mentally prepared. Research papers are written by different people with different biases. When reading a paper we must critique it to find the truths and ignore any bias we or the writer may have.

The seminar covered the different aspects of a research paper which would help us choose the best from a collection. We learned about the types of studies used, how to interpret evidence, the variety of people who may write a research paper and how all these factors of a study effect the extent to which you can trust the data.

Dr. Jenkins covered all the bases ensuring that our research would be coming from the best possible material. We won't need a 'magic bracelet' to help us succeed this summer.



# networking fair

by: Nicole Baker



Networking is a term that many people are unfamiliar with and they are unaware of the potential benefits it has to offer. Networking is linking our personal and professional contacts to essentially, create a "net" of contacts that can provide more contacts.

Networking is an indispensable tool that can be used to achieve a variety of objectives. We can employ networking to gain knowledge, insight, and a plethora of opportunities. After utilizing the networking tool we could potentially, develop a different prospective, a support system, an array of contacts, and almost anything else we set out to attain.



The WISEST team prepared us for networking with workshops that equipped us with valuable networking skills and then put them to use in an actual networking fair! WISEST invited some outstanding individuals for this networking fair who all have very successful and well established careers in a variety of areas in sciences, engineering, medicine, or technology. The WISEST students and mentors were divided up evenly into smaller groups, where each group was given the opportunity to partake in an "information interview".

These personalized information interviews gave the WISEST students the chance to become well informed about pursuing postsecondary, career choices, and entering the work force. The main topics discussed in the sessions were: career options, career paths, strategies (work-life balance), and successes/obstacles. Every role model gave their own insight into each subject area and the WIS-EST students were able to ask questions that would usually generate group discussions that were irresistibly engaging and nothing less than inspiring.

Some helpful advice that was shared at the networking fair was to get to know ourselves and establish a value system that can be referenced when making career choices or any life changing decisions. For example, determine what kind of hours we would want to work, how much responsibility we are willing to take, or is there an opportunity for advancement. Some suggestions to assist in post-secondary, and life in general, were; to master efficiency and time management skills, take a variety of courses to gain experience in a wide range of areas, to not limit ourselves, do not feel rushed or pressured because there is more time then we think, and follow our passions because ultimately, we all just want to be happy now, and when we grow up.

# bridging the gap and exploring diverse career options

by: Idel Riemer



On Monday, August 10th, we walked into our final Professional Development Seminar of the Program: Bridging the Gap, Student Tools and Diverse Careers. This session was particularly special, as it was split into two mini sessions, each dealing with our futures. The first half, taught by Dr. Roy Jensen, discussed the transition between high school and post-secondary, and the second half, with Richard Tang, was a presentation on the Learning Clicks CD-ROM which helps students learn about post-secondary, potential careers and scholarships.

Dr. Jensen, a chemistry professor at Grant MacEwan College, believes that to be prepared for post-secondary, you have to keep an open mind and be willing to learn more about a topic and not be complacent when you see topics again. He says that high school and first-year courses give you an overview of all the aspects of the course, and the more specific topics start in your third or fourth year. The "been there, seen it, already know it" attitude gets students in trouble, as well as other learning barriers, such as not learning the established standard. This point was emphasized with many chemistry and math questions, forcing us to go back to our previous year of high school.

Through his presentation, the biggest thing we learned was that, even if we think we are immune to transitions, we're not. In fact, he says that 31% of high school students just aren't prepared for the course load, and that 13% of them believe that high school did not prepare them for post-secondary. If you took anything from this presentation, it was that you have to be prepared for post-secondary. In high school, you were taught until you understood, but in post-secondary, you have to be organized and responsible for learning on your own. Practicing and understanding that you can get through

challenging times by seeking help from your professors or peers can help you excel.

But how do you know what to study in post-secondary, where to go, or how to pay for it? That's where Richard Tang, a Learning Clicks Ambassador, came in. Richard had his own experiences of unpreparedness in post-secondary, and urged us, much like Dr. Jensen, to be ready. Each student was provided with a Learning Clicks CD-ROM, a tool to help us prepare for our future. As he gave us a tour of the CD, he explained how to navigate through the various post-secondary institutions and pointed out valuable career and scholarship websites. He urged us to use this valuable tool as much as possible, as being prepared never hurt.

In the end, the final Professional Development Seminar provided us with valuable knowledge that we need to succeed. It was a great ending to a set of awesome sessions, and it really got us thinking about our future and what we can do to make it a success.



# student events & activities



# orientation to the wisest summer research program

by: Daniel Javier



Going into the Conference Room on the second floor of the ETLC was at first unnerving – not only due to the fact that I was representing the minority gender wise, but also because of the tension of waiting and uncertainty that was emitted by those who were already seated. Most or some of the people inside had either known each other because of attending the same schools, or were already getting acquainted with other peers. After receiving a form to fill out, I sat down with another student who I had never seen before, but was fortunately my future research partner in bioethics (and also representing the gender minority). Soon, a conversation started and the tension waned with the addition of other friendly students.

The orientation started with a warm, opening speech given by the WISEST coordinator, Mrs. Grace Ennis, focusing on the foundations of the WISEST program and the impacts that were made due to its establishment. Afterwards, a sweet Dr. Margaret-Ann Armour delved into more detail about how the WISEST program came to be and what it meant to her, as well as to her other colleagues.

When Ms. Teresa Bisson began her informal narration about her past WISEST experience, most of the audience felt more relaxed and excited about what was going to happen in the things to come. Our student coordinators, Jen Duffy and Misha Hartfeil; as well as Dr. Kerry Humphrey, the assistant coordinator, filled us WISEST students in with general things that we were expected to do throughout the six-week experience. We were expected to be more open, to ask more questions; to make sure we continued to keep track of our journals we were given; and to make the most of the WISEST experience.

After the lectures and introductions were over we were awarded with refreshments. During this time, the others and I were able to have more meaningful conversations that included life stories, funny narratives, and the ideas we had about the program. Upon finishing our snacks we then participated in a scavenger hunt so as to get us familiar with the university grounds (which I fail at miserably, even now). More free lunch followed after we had completed every task, and like before, we spent the time mingling and talking.

With lunch over, Lana Appelt and Dr. Dan Dragon discussed WHMIS (Workplace Hazardous Materials Information System) and biosafety respectively. Though the topic was not pertinent to my research placement, it gave those who were participating in any lab set-up an overview of things they had to keep in mind during the program. The final part of the day was then spent meeting with our supervisors, which some would be anxious for and others, terrified (myself included). As it turns out, I met our group which contained 2 other WISEST students and several great post-doc researchers, who had given us a one-of-a-kind welcoming back in the office. Orientation was overall very much what it was intended to be- welcoming and backed with the information needed to start off our experience here in the WISEST program.



# meanook biological research station

by: Alanna Howell



The sun shone on the dewy grass. From its perch a bird trilled its familiar three-note melody. The smells of clover and wild strawberries greeted one's senses. Various researchers could already be seen milling about, performing simple though nonetheless important tasks. It was another glorious morning at Meanook.

This year I was chosen, along with Supraja Rengan and Nikita Robinson, to be placed as a student researcher at Meanook Biological Research Station. The station is located seventeen kilometres south of Athabasca, Alberta and is situated to take full advantage of the amazing biological diversity found in the Northern Boreal Forest.

Upon arriving at Meanook, we were welcomed with open arms into the ever-changing company of researchers who came and went, each offering their own unique knowledge and interests. We were encouraged to make ourselves at home, and for the next six weeks we did. We expected to be treated like high school students who could not possibly comprehend the complexities of each researcher's project, but we were pleasantly surprised. Here, we were researchers as well, and were treated as such. In-depth conversations and debates were had with researchers about topics ranging from the healthfulness of breakfast cereal to the sustainability of driving a car. We were a part of the camaraderie that transforms Meanook from being simply a biological research station to being a place a person enjoys spending their summer.

While many of the WISEST student researchers performed research on only one topic, those of us at Meanook had the opportunity to assist with an incredible diversity of projects. One day we might be helping to measure and sort hundreds of fathead minnows, and the next day checking field sites to observe whether forest tent caterpillars had pupated inside their enclosures. Another day we could be observing vegetation in forest burn sites to determine the likelihood of another fire, or traveling to a nearby Environment Canada site to collect samples of the air. Three times during our stay, we traveled to Edmonton to give presentations about the research station to the Discover-E science camps for six to eight year olds. Not only did we have the opportunity to communicate with people doing their Masters and PhDs, we were able to observe how young children react to the science taking place at Meanook.

Although all of the WISEST students put in long hours of work each day, there were many opportunities for recreation. Volleyball games took place several nights a week, and a Cranium challenge had everyone sculpting, acting, spelling, and humming. Just in case we hadn't thought about the pressing issues facing society enough during work hours, we watched documentaries dealing with issues ranging from the history of corporations to the race to reach Absolute Zero. Many of us took advantage of the beautiful landscape and trails on the station land by jogging and hiking. When it was absolutely too hot outside to do anything else, we went to a nearby lake for fishing and swimming.

How many other places to work include this much fun?

After spending most of a summer at Meanook Biological Research station, it is without hesitation that I declare it "a good camping place." It is not simply a place to visit once or twice; it is a place to immerse yourself in biological study, while enjoying being part of a family which welcomes researchers from all over the world.

# science olympics

by: Heidi Johnson



WISEST places a large emphasis on breaking gender stereotypes in science, technology, nursing, and human ecology along with many other careers and areas of study, but it turns out that they are also shattering the stereotypical definition of "Olympics". Although most people would normally associate Olympics with sports, we as WISEST students were given the opportunity to participate in "Science Olympics".

Science Olympics took place on our second day of WISEST, and thus, our first day in our labs. It was a great chance to continue meeting people in the program. We now knew a little bit more about what was going on and had spent a day in our labs. Everyone was full of excitement and anticipation for a summer that still seemed quite unknown. The atmosphere was open as everyone shared their experiences of their first day.

After the initial excitement we were split into twelve teams and sent off to compete in four mysterious events. We traveled from event to event with four teams of about five people each. From science charades to an egg drop to paleontology trivia, we competed in friendly, and often funny, challenges.

The science charades tested our knowledge of basic science terms. We took turns attempting to get our teammates to guess our term, without speaking. This resulted in comical gesturing, wriggling, and dancing. Nothing was withheld to get teammates to guess such obscure words as amoeba, ellipse, fossil, Newton, volcano, and test tube. Apparently we all knew our basic random science words quite well; the majority of the words were eventually guessed correctly.

We were not as successful in the egg drop. Of the twelve teams competing to drop an egg four stories without breaking it, only three teams' eggs survived. Many teams were quite confident with their eggs protected by multitudes of straws, sponges, corks, toothpicks, string, and of course tape, but apparently we still need to work on our egg engineering techniques.

The third event consisted of examining fossils and answering trivia questions about particular specimens. For most, it was initially quite difficult to distinguish a tailbone from a tooth, but now we are pretty much experts. Although most of the answers were guesses, everyone loved learning about the fossils and went away from the experience with way more knowledge regarding paleontology than they started with.

Our final event was the science relay. Consisting of film canister rockets and cornstarch goo, it was a wonderful way to end the afternoon. The Science Olympics provided us with a wonderful opportunity to get to know our fellow WISEST students better and share our initial WISEST experiences with each other.



# being a male in the WISEST program

by: Amir Soleimani and Matthew Green

**Amir:** Entering the WISEST Program, we both knew that the ratio of males compared to females would be in favour of the girls. The point of the WISEST Program is to expose people to non-traditional careers and the name of the program is an acronym for Women in Scholarship, Engineering, Science & Technology, so we expected to be outnumbered. However, we did not think this would be a big issue. Despite the large difference in numbers, we have still managed to make lots of friends and have a great time in our non-traditional careers.

When I got into the Orientation on the first day, I saw that as people were arriving, I was the only male there. I started to get really nervous and began to worry if I was the only guy in the program. A bit later, when we were getting closer to the beginning of the Orientation, another male came in and I felt extremely relieved knowing I wouldn't be alone.

The males were placed into three main careers: nursing, human ecology or nutrition. Most of the males were placed into the nursing category. Matthew and I were both placed into nursing and even had the privilege of being able to work in the same office, with another male. Working in ethics, our minds were expanded and we gained new perspectives. We have come to appreciate things which we never considered before and have gained a greater understanding of the world around us.

**Matthew:** On the day I went to the student counselor's office I thought I knew what I was getting into. My preconception was that it was a student summer research program where we would work in a lab and do a bit of job shadowing, get paid and then at the end

of the program I would have something of value as work experience (to compensate for being a bag boy for a year). Then I found out what the "W" in WISEST stood for. My initial thoughts were that I would have to settle for something else. I wouldn't be accepted to a program that would only take women. Then I was told that the program accepted guys as well. The placement of students was to be in non-traditional roles in which many of the girls would be placed in fields such as engineering whereas the guys would be placed in nursing and nutrition. After hearing this, my interest grew. I felt that this was an opportunity to change my outlook on what traditional and socially accepted roles of males and females in certain fields were. I also viewed change and "breaking the mold" as something that was exciting that we should embrace. So I applied.

Being a guy in the WISEST program didn't feel awkward or overwhelming at all as one might think. There is a barrier established in the mindset of society that places a kind of "sorting hat" on us as a population, whether it is gender, race or particular build, which seems to pre-establish where people think you will go in life. This is a barrier many women and men face in choosing their careers. In doing something "against the grain" this summer I have felt what it is like to break that barrier for myself and how I see career paths. I have learned that this "sorting hat" should not sort based based on gender, race or what have you. We should choose our future careers and professions based on who we are as individuals, not whether we are male or female or whether our choice is considered traditional or not. Harry Potter references aside, the program was great for helping me view career choice in a new light. I wish all future guys and girls the same great experience in years to come.

# living in grant macewan residence

by: Malithi Fernando

For myself and seven other lucky girls, the WISEST Summer Research Program did not begin each day at nine and end each day at five, it did not take a break over the weekends, and most of all it gave us a taste of the independence that comes with university life. It lasted twenty-four hours a day, from July 1st, to its culmination in August, for we were given the opportunity to stay in residence at Grant Mac-Ewan College for the duration of the six weeks.

As the last few weeks of June flew by, I grew more and more nervous. How were eight girls from all over the province, supposed to get along with each other while living in such close quarters for six entire weeks? From the second day on, the thought of having asked such a question was laughable: what started out as a 'Friday-night movie-night,' turned into a full heart to heart discussion lasting long past two am.

We were not alone in our late night chats, we were so fortunate to have Stephanie, our lovely WISEST Resident Advisor living with us. She joined in all our conversations, organized a myriad of adventures on the weekends, and was always there for us whenever we had questions or needed help. We can all credit our easy transition into residence life to Stephanie's willingness to go completely out of her way to ensure we enjoyed our time in Edmonton. In addition, the Grant MacEwan staff were very welcoming and made the transition as smooth as possible.

After work on a weekday, you would usually find all of us with Stephanie eating dinner in the lounge, playing games, watching movies, and talking constantly. Apart from our fairly low-key weekdays, there were several memorable trips to the concerts at Captial Ex, and to see Harry Potter on opening night. Being so close to Churchill Square also meant multiple visits to the Street Performers Festival and the Taste of Edmonton. The weekends were filled with Saturday morning excursions to the farmers' market, shopping on Whyte Ave., cooling off in the legislature fountains and—if we were lucky—a 'Stephanie's Pancake Breakfast.'

Now with only a few days left to go, as cliché as it sounds, time is flying by and I know I speak for all of us when I say we are dreading the last day. We are such a diverse group of girls, and without this experience may never have gotten to know each other. The friendships we have formed and the memories we have made, have amazed us all and we look forward to being reunited when we enter the University of Alberta in 2010.

# WISEST teachers appreciation day

by: Taylor Seal



I was delighted to have been chosen to take part in WISEST's Teacher Appreciation Day. A select group of students had the opportunity to either personally thank our high school teachers for their terrific reference letters that helped us gain acceptance into such a wonderful program, or to meet teachers from other schools who shared an interest for the area of research we were doing.

We met for a delicious breakfast at The Faculty Club where we heard speeches from fellow students as well as from members of WISEST. It was great to hear about Blair Warren and Nicole Baker's research and to hear from others the differences this program is making. We had the chance to chat with one another about what it was like to do research in a lab and to share the experiences and knowledge we've gained in the prior six weeks.

The group then dispersed around campus and we were able to provide our teachers with a tour around our labs, and explain our projects to them. I had the chance to show my teacher, Josie Rehmann, around my lab, along with a fellow student, Supraja Rengan and her teacher Joulieta Slavova. I was thrilled for the opportunity to share what I had learned, especially with my chemistry teacher as she was the one that had inspired me to pursue chemistry for my field of study. I loved being able to show off the cool equipment I got to use, and answer any questions they had about my project.

When we finished touring the labs, everyone guided our teachers through the ever-confusing Biological Sciences building to meet back up as a group for a presentation. We learned about the Science 100 program, and watched liquid nitrogen experiments making items float, smashing flowers, and nailing into wood with a banana. I couldn't have come up with a better way to end our wonderful day together, being united by science, then to say our goodbyes over liquid nitrogen-made ice cream.





# research team thank you

by: Malithi Fernando



It's funny, no matter how many statistics you read, or graphs you look at, you don't fully understand how 'non-traditional' a career in engineering or science is for women, until you try and find a washroom in your building. You tend to pass at least a few men' washrooms, before finding the women's bathroom tucked away in a corner. When there is such a discrepancy, it is wonderful to be a part of programs like the WISEST Summer Research Program, that are seeking to address it.

The last six weeks have been one of the most eye opening experiences of my life. I was hoping, going into this program, that it would help narrow down my choices and that I would come out of it having a really concrete idea of what I wanted to do with my life. Obviously, WISEST had other plans. Rather than help narrow down my options, I've learned of fields and niches in engineering and science, I never knew existed. In our research teams alone, each member's area of expertise was unique.

Many of us were placed in fields that we didn't know anything about. I worked in a materials engineering lab this summer, and before



WISEST, I had never even considered such a field to be of interest to me. It's amazing how much you learn in six weeks when you are fully immersed in the work you are doing. The hands-on learning: preparing samples, running tests, analyzing data, re-running tests. It is not even comparable to the classroom studies we have been exposed to up until now. However, more important than knowledge of lab techniques and the scientific terminology, is the insight we've gained into what could be possible in our futures. Whether we choose to pursue studies in the fields we worked in, or if we learned that maybe a different route would be best, we will just be that much more confident when we do make our decisions. I cannot believe how fortunate we are; we could not be better prepared for university.

And of course, none of this would have been possible without all the research teams. Who, six weeks ago, welcomed nervous, inexperienced high school students, who knew little more than how to pipette and light a Bunsen burner, and trained them to undertake a research project of their own. It cannot have been easy to explain everything to us, when we did not have the background to comprehend the concepts quickly. And in the time it took to guide us through the experiments and make sure we were comfortable on our own, you could probably have completed three times the amount of work we were doing. But yet you were always there to answer our questions and help clean up our mistakes. I know I speak for each one of us, when I say we are so grateful for your faith in our abilities, your patience with our struggles and most of all your willingness to go completely out of your way to ensure we got the most out of our experience in your lab.

We were told on our first day, that the next six weeks were going to be 'mind blowing'. Thank you so much, for making that happen.

# celebration of research

by: Natasha Kootenhayoo



The celebration of research was the ultimate way to end our research experience. We were all very proud to exhibit the significance of the WISEST program and the research it involves. I am sure that all those attending could feel our pride as we explained our summer projects which covered a wide range of topics.

We had a great chance to use the skills we developed over the last six weeks, as well as an opportunity to exercise scientific expression within a professional mindset. The development sessions offered us a great way to meet others who were already involved in the sciences that we shared a passion for as well as those we had just begun to appreciate. To both teach and learn about different subjects was very fun, and sharing our own projects was especially rewarding. Not only was the event a celebration of research but it was a great opportunity for people to network, compare data and information, and talk about their own personal opinions about science in general.

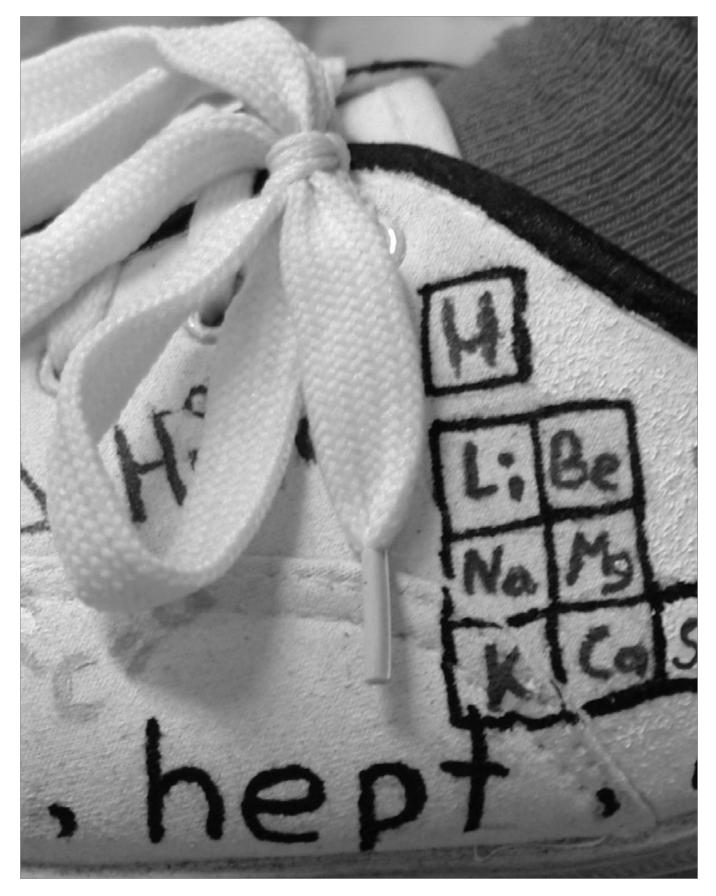
To see others enjoy their work and what they do was an inspiration for someone like me considering a career in science and research, especially when one could see the diversity in opportunities available. We learned, we applied, and we taught, in turn learning even more. This has been a perfect representation of the research process; what an awesome way to end the best summer ever. To share knowledge is beautiful, and that was exactly how the day went. With the much appreciated attendance of a remarkable scientist (Dr. Valerie Sim) who played violin as well, everyone could feel the passion that was undoubtedly present during our celebration. The energy at the event was truly inspiring.

Working hard on a project and then having the chance to showcase that project was a valuable experience for me, both personally and professionally. I have a much better idea of the rewards that come from pushing through what can sometimes be painstaking research processes. I plan on keeping my poster intact as a reminder of the eye-opening results that can come from hours of staring at statistics, demographics, and dirt. Being able to take my own little souvenir home felt rewarding but what was especially important was the spirit that attended our celebration of research. I hope I get to attend this event again in the future, and hope that everyone involved acknowledges the value and experience that it holds.



(27)

# student reports



# aala abdullahi supervisor: Dr. Gerda deVries / Mathematical and Statistical Sciences

**Sponsor**: Alberta Education



"I have been exposed to knowledgeable people who have so much advice to give..."

My experience through the WISEST Summer Research program has enabled me to grow as a person by exposing me to a summer of exploration. I heard about the WISEST program through daily announcements at school and was interested right away. I saw this as an opportunity to gain hands on experience, and a program that would help me make informed decisions about my future career path. It would also allow me to meet people with whom I share interests, and gain knowledge of the various jobs available in the field of science for women. My expectations for this program were indeed fulfilled. I have been exposed to knowledgeable people who have so much advice to give, eager to share and willing to donate their time and offer guidance. I have been exposed to the field of mathematical biology that created a bridge between my two favourite subjects – an area of science I did not even know existed!

GAME in the Schools is a program created by graduate students in the Department of Mathematical and Statistical Sciences that brings math workshops to students in elementary and high schools. After working through these workshops, students learn to approach mathematics in various ways, and see how math is used in everyday life. These workshops engage the students, get them active and incorporate interesting concepts that are outside the regular curriculum, which enables teachers to take leave from traditional lectures. Carmen Rygh, my partner in this project, and I were given the task of designing math games and creating activities for this outreach program, that would help high school students approach mathematics in diverse ways, and grasp the idea that mathematics is present everywhere and used in many areas such as mathematical biology and economics. This will also encourage students to apply various aspects of math to real life. For each workshop, we chose an interesting math concept and created activities based on that topic. Each workshop includes a detailed description of key topics, interesting facts and "Aha!" moments, and activities that engage the students while teaching the concept. We completed five workshops this summer, the topics being: Pythagorean Theorem, Tower of Hanoi, Probability, Game Theory, and Platonic Solids. Though Carmen and I did not have a traditional "science lab" where we carried out experiments with test tubes, we enjoyed daily meetings with our Principal Investigator and supervisors, where we solved puzzling math problems games, trying to find solutions and strategies that would help players win every time! Creating these workshops led me to discover new, interesting aspects of mathematics and so many fields of research where math is used that you would not normally expect. It allowed me to meet mentors who offered advice and support. Mathematics has many different perspectives. I am glad I have been given the chance to realize that.

The Monday Professional Development and Friday "Lunch 'n' Learn" sessions were filled with constant surprises that I enjoyed, and topics that were intriguing. My favourite session was the off-campus tour to the Institute for Reconstructive Science in Medicine. I was given a chance to discover the world of research. Jen, Misha and Kerry have put in so much effort to make these sessions helpful and a success. I am deeply thankful for their efforts.

Though the work I have been doing in the lab and the discoveries I have made these past six weeks have made this summer a blast, I cannot forget the people who have been involved in making this a truly remarkable and one-of-a-kind experience. I am so happy to have been paired with Carmen Rygh throughout the program, whose enthusiasm made this program an enjoyable one. I could not have asked for a better partner. I would also love to thank those who welcomed us and gave us their constant support and guidance that enabled us to complete our project, making this summer a huge success!

# alanna howell supervisor: Mr. Brandon Nichols / Meanook Biological Research Station

Sponsor: Alberta Advanced Education and Technology



By the end of grade eleven, people begin to ask what you plan to study after finishing high school. Luckily for me, the WISEST program helped me come up with a more definite answer.

From the moment that I was notified of my acceptance into WISEST, I knew that this would be a summer that would have a profound effect on what I choose to do with the rest of my life. As a student from southern Saskatchewan, I was excited to have the opportunity to experience a summer at Meanook Biological Research Station, situated on the edge of the Alberta Northern Boreal Forest. Not only did this research station have significantly more trees than I am used to, it would give me a glimpse of biological study beyond anything I had previously experienced.

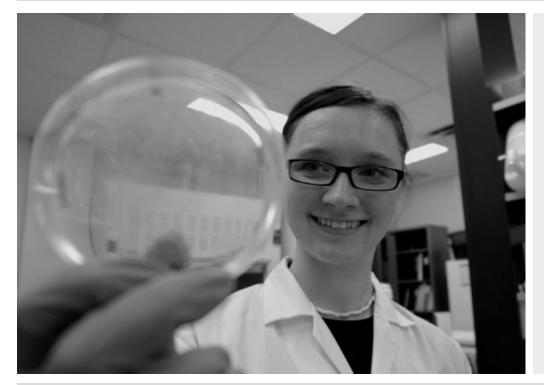
At Meanook, I suddenly found myself surrounded by people who studied many of the things I am passionate about. From measuring carbon dioxide levels and the effects of climate change to studying the nesting patterns of swallows, there seemed to be more going on than I could possibly take in. I began each day after breakfast by checking the traps for the Researching Amphibian Numbers in Alberta (RANA) project alongside Nikita Robinson, a fellow WISEST student. After several days of weighing, measuring, and observing frogs and toads, I began to appreciate just how crucial these small amphibians are in monitoring the health of our environment.

My research focus was a study of the feasibility of wind energy conversion in the Athabasca Region. Along with the assistant manager, Esther Sinn, I walked out to the meteorological station located in the east field at Meanook to download the weather data from the past month. I sorted the data and performed research to find the type of wind turbine most suitable for the weather conditions in the Athabasca Region. I then performed calculations to determine the amount of power which would be generated using various wind turbine tower heights. Allowing local acreage owners and farmers access to this information will assist in helping them determine how wind power may be effectively utilized on their property.

My exposure to biological research was not merely limited to these areas, however. I had the opportunity to go with several grad students on day trips to their field sites. One day I was able to observe the behaviours of forest tent caterpillars and how parasitoids help to regulate outbreaks in their populations. Another day, I traveled to a nearby peat land which had recently been the site of a large fire. I assisted in collecting vegetation which would be later analyzed on the grounds of whether it was a source of fuel for a potential fire or an inhibiting factor in a blaze's advance. Twice during my time at Meanook I traveled to a site controlled by Environment Canada where samples of the air are collected. These samples are then sent to a lab in Colorado where they are analyzed to determine the parts-per-million content of various greenhouse gases.

My experience as a part of the WISEST program has helped me to realize just how dynamic and diverse research in a biological field can be. It has allowed me to explore my interests and connect with people who are motivated to advance our knowledge of the world around us. Thanks to my involvement in the WISEST summer research program, I now am able to say that I would be delighted to make biological research a vital part of my career. allison brown supervisor: Dr. Stefan Pukatzki / Medical Microbiology and Immunology

**Sponsor:** Alberta Health Services (Edmonton Area)



"This entire experience has really opened a very important period of my life, putting a new perspective on university..."

When I originally heard about WISEST two years before I could actually apply, I did not realize there was so much more to the program than just working in a research lab. I was assigned to Medical Microbiology and Immunology in the Pukatzki lab with Dr. Stefan Pukatzki as my principal investigator. This lab is looking at the Type VI secretion system in bacteria, which bacteria such as the V52 strain of Vibrio Cholerae use to be virulent against the amoeba, dictyostelium discodium. There are only 2 sero-types of Vibrio Cholerae that cause actual cholera, and V52 is not in either of them, yet the pandemic strains N16961 and C6706 do not use the Type VI secretion system and are therefore eaten by the dictyostelium. There are numerous projects in our lab investigating the genes required to activate the Type VI secretion system, including mating of V52 and C6706 to attempt to activate the secretion system in the C6706. My supervisor and I have spent the past 6 weeks working on activating the secretion system in C6706 so that C6706 will be virulent towards dictyostelium. We have also spent a lot of time attempting to knock out the Vas-H gene in V52 so that the Type VI secretion system cannot be activated and V52 becomes avirulent to dictyostelium. This has included making many plates, many hours of growing bacteria, and many hours amplifying DNA.

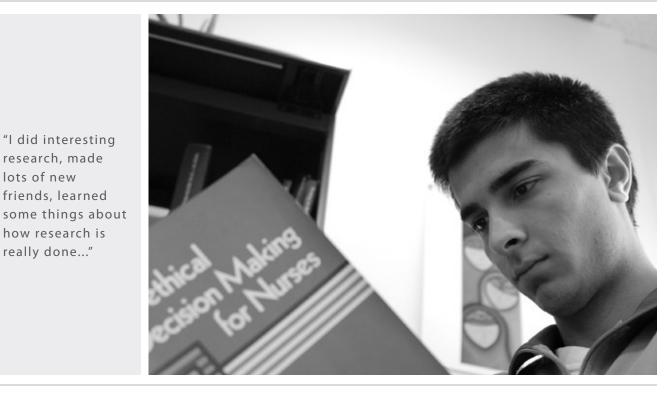
There is initially plating the bacteria, then mating with other strains and other bacteria, then eliminating certain mutants using antibiotics such as streptomycin. From this point, it is all about looking at the genes found in the bacteria to see if they have successfully mated to either add the gene and activate the secretion system or knock out the gene and prevent the secretion system from working. This involves a lot of use of a thermal cycler to perform the polymerase chain reaction, and then running the DNA on an agarose gel to be able to see whether there are any successful mutations. When I wasn't in my lab attempting to find Vas-H mutants, I was either back at residence at Grant MacEwan or in sessions with the WISEST coordinators. Through the Monday development seminars, I discovered that there was a lot more to university and to being in a scientific career than I had initially thought. The most valuable session would most likely have been the networking fair when we got a chance to ask and learn what it will actually be like to take science in University and how to specialize in a chosen field. I initially applied for the WIS-EST summer research program since I had heard about it from a previous WISEST student when I was selecting my high school courses before Grade 10. As soon as I heard, I knew it wasn't an option to not apply for such a great opportunity available before going into university to help prepare us for that transition and for a career in science. When I got the call saying I would be working in microbiology with Vibrio Cholerae, I was admittedly anxious about showing up and working in a biohazard lab. It was far more welcoming and fascinating than I could have imagined and my expectations were easily exceeded.

This entire experience has really opened a very important period of my life, putting a new perspective on university and I can't imagine spending my summer back in my hometown instead of living in Grant MacEwan Residence and working for WISEST at the University of Alberta.

I am also very grateful to my research team, and my sponsors, Alberta Health Services and Dr. Frank Jenkins, for allowing me to have this opportunity.

## amir soleimani supervisor: Dr. Wendy Austin / Faculty of Nursing

**Sponsor:** Faculty of Nursing



When I first applied to the WISEST Program, I was a little nervous. I arrived early at the orientation and sat through the introductions and instructions still feeling pretty nervous about what was going to happen. Looking back at it now, there was no reason why I should have been nervous. I did interesting research, made lots of new friends, learned some things about how research is really done and had an awesome experience.

At first, I saw I would be doing research in relational ethics in nursing. I did not know much about this topic, and it felt weird because high school kids think they know everything in the world. I did, however, go at it with an open mind and am grateful I did. Some of the things I learned were the different types of ethics, different methods of qualitative research and we broke down the components of nursing. I also got to visit a clinic and shadow nurses for a shift, which was an amazing experience.

I got to work with people who were always interested in finding out more and more, an attitude which I'm sure will help me with my research in the future. Everyone in our office made sure that we WISEST students were comfortable. The other two WISEST students I got to work with were very encouraging and we all had similar attitudes towards our work and our projects. At first, we knew nothing about one another and were pretty quiet around each other, but as the program went on, we found out more about one another and spent lots of time together. Although we all had different personalities and came from different backgrounds, we all enjoyed spending time with one another.

Not only did I get to work with awesome people, but WISEST provided me with experiences that I will never forget and has helped open the door to many more opportunities for me in the future. By providing me with experiences such as networking with professionals, learning how to read reports critically and tours of sites off and on campus, WISEST has helped to give me a better idea of what I want to do in the future. Not only am I more aware of the different career options available, I am more aware of what I need to do to get to those positions, how to be successful when I get there and some of the choices I will have to make along the way.

When people ask me about the WISEST Program, they are usually shocked by all of the benefits it provides. We get to do summer research on interesting topics, be with our friends, do lots of other activities and get paid for it all. The WISEST Summer Research Program was an incredible experience. I was surrounded by people who had the same general desires as I do, so working together, we had lots of fun and created many new memories that will last a lifetime. Though at times I felt like what I was doing was not as important as the other parts of the study I was working on, I learned that as Edward Everett Hale once said, "I am only one, but still I am one. I cannot do everything, but still I can do something; and because I cannot do everything, I will not refuse to do something I can do."

I would like to thank all of the people in Dr. Wendy Austin's research team, particularly Dr. Wendy Austin, Ms. Erika Goble, Mr. Stewart MacLennan and Dr. Nina Erfani as well as the Faculty of Nursing of the University of Alberta and all of the WISEST co-ordinators for their efforts in making WISEST such a great experience.

## anuja samuel supervisor: Dr. John Shaw / Chemical and Materials Engineering

Sponsor: iCORE, Informatics Circle of Research Excellence



everything from the properties of fractions of crude oil to proper lab

The past six weeks working in a chemical and materials engineering lab have been very enriching. The experience was eye opening in many ways and has taught me numerous things.

Asphaltenes, heavy fractions of crude oil are a major problem for the oil industry. Asphaltenes have a large economic impact upon production and refining processes as they have a tendency to form deposits and slow operations. Because of their low concentration in conventional oil, asphaltenes have not been thoroughly researched.

The petroleum and thermodynamics research team have been working on establishing the properties of asphaltenes and my work was a small piece of this ongoing research. My research specifically studied molecular interactions using density measurements of heavy oil fractions and their constituents within various solvents. I prepared solutions of Athabasca bitumen, Athabasca bitumen vacuum bottoms, maltenes and asphaltenes in solvents such as toluene, THF and n-decane at a range of concentrations. I then obtained density measurements at temperatures ranging from 20°- 80°C. To facilitate this, I used an Anton Paar DMA 5000 density meter. The inverse of apparent density, specific partial volume, is correlated with the intermolecular interactions in the solution. Therefore, we can make conclusions on the basis of density measurements to aid in explaining the behavior of largely unknown crude oil elements within hydrocarbon medium.

Researching heavy oil fractions within solvent systems is crucial to chemical and materials engineering research. The results and the conclusions of molecular interactions at a small scale have the potential to improve the refining process and better utilize elements of crude oil at a much larger scale.

I applied to the WISEST program in the hopes of exploring the different disciplines of engineering and science as well as to have a better idea of where my own interests lie. I did in fact accomplish that, however, I never expected to learn so much along the way. I learned everything from the properties of fractions of crude oil to proper lab procedure. I learned the value of precise measurements and patience. I experienced the ups and downs of research- days of great results along with days filled with frustration.

The insight that I gained outside the lab from both the WISEST activities as well as from my research team were perhaps equally significant and valuable as the skills I learned from my project itself. A WISEST student has the potential to benefit from so much more than simple lab competence but also benefit from acquiring a clearer picture of different fields and one's own inclinations. The WISEST seminars such as the networking sessions that we participated in were enjoyable and practical. We not only had the opportunity to learn about ourselves and appreciate various fields from professionals, but we got to talk to other students and build friendships at the Lunch 'n' Learns.

Working in a lab for six weeks and interacting with people with similar interests as my own cannot be simply qualified as just a summer job but as a tremendous learning experience. The hands on experience that the program allowed me to have is invaluable and something that I can apply to my future education and career.

I would like to thank the WISEST team for putting in time and energy to make this summer as rewarding as it was and iCORE, for their sponsorship which allowed me the opportunity to have such an incredible summer experience. Also, I sincerely thank the entire research team that I worked with for their guidance and contribution to these amazing past six weeks.

#### ariel raudsepp supervisor: Dr. Frances Plane / Pharmacology

**Sponsor:** GlaxoSmithKline Foundation



Pharmacology is a science that deals with the how chemicals interact with living tissues. In the lab of Dr. Frances Plane, the research team has been studying the correlation between endothelial cells in blood vessels and its role in contracting and relaxing resistance arterial blood vessels. Understanding the mechanisms involved in controlling arterial diameter could broaden our understanding of the cardiovascular system. For my project I looked at the endothelial cells of rat aorta, the main blood vessel stemming from the heart.

I prepare a section of aorta by cleaning it of all fat and other tissue surrounding the vessel. Then, cut it into small rings horizontally, much like you would cut a drinking straw into small pieces. The vessel is placed in a small organ bath containing Krebs, a solution, comparable to the fluid inside the body that supplies it all the necessary nutrients and ions to function separately outside the body. The vessel is placed on two hooks from the inside that enables us to stretch the vessel and record the difference in tension as the vessel contracts and relaxes as seen on a trace.

To test the tissue, the vessel is contracted with phenylephrine and then, if endothelial cells are present, the tissue will relax when acetylcholine is introduced in increasing concentration. Acetylcholine works through the endothelial cells and produces nitric oxide, which causes relaxation in the smooth muscle cells. Adding inhibitors will change the amount of relaxation due to blockage or alterations of certain pathways. These inhibitors, namely TRAM and Apamin, block potassium channels. The purpose was to determine if these potassium channels are involved in nitric oxide dependant relaxation of rat aorta. many general lab techniques such as making the Krebs solution from many solid salts, interpreting results and forming graphs, as well as more specific techniques for a pharmacology lab such as fine motor skills when dissecting out the blood vessel, dilution of the drugs. My lab experience has allowed me to be involved and independent at every step of the experiment, from dissecting out the tissue to graphing my results.

The WISEST program overall has broadened my perception of research and to the many and exciting opportunities. I decided to apply for WISEST, because I was unsure of what there was for choices of program in science. The mentoring session was especially helpful and I learnt a lot about the infinite number of career paths possible. This experience has narrowed my focus and I am looking forward to the various possibilities of post-secondary, future careers and lifestyles.

I would to thank all of the WISEST staff for their excellent work, the lab personnel for taking the chance of allowing high school students to work in their labs and mentoring us, the sponsors for their continued support and everyone else involved in this amazing summer experience.

Throughout my experience in the lab, I have learnt and perfected

## audrey dahler supervisor: Dr. Simon Landhausser / Renewable Resources

Sponsor: Merck Frosst Canada



"Not only did we gain valuable information about research and university but we learnt about balance."

"Ability is nothing without opportunity" (Napoleon Bonaparte), a statement which I had understood yet could never fully appreciate until participating in the WISEST Summer Research Program. First came anticipation. Acceptance, then preparation, and the move into residence. And on orientation day, I had an overwhelming feeling of vulnerability. With so little insight into the next six weeks I was left wondering if WISEST would measure up to my expectations.

Of course my worrying was a waste. Meeting my Principle Investigator Simon was easier than I could have hoped for. Then came the rest of the research team and my Supervisors, Amanda and Francois. Everyone in the lab was exceptional at making me feel comfortable, helping me understand my research project, and most importantly, assuring me that the research I would accomplish in the next six weeks was of value.

My first impression of the project Simon had set up for me was that it was simple and predictable. For the next six weeks I would be determining if spruce trees growing in boreal mixedwood forests here in Alberta would respond to receiving additional sunlight for one growing season. As Simon explained it, in the year of 2007, Alberta suffered a severe outbreak of forest tent caterpillars. These caterpillars devour the foliage of aspen trees growing high into canopy allowing light to filter through the trees and reach the understory white spruce thriving below. "It's like the spruce trees experience another winter without the aspen leaves to shade them," Simon told me. I remember thinking to myself "Of course the spruce will respond to additional light, there's no challenge here." Once again, I was wrong.

Not even two days into the job and I was waist deep in my work. As every detail of my project was laid out before me, I started to comprehend the intricacies and complexity of doing research. It all started with one extraordinarily long day in the field, collecting samples from forests near Whitecourt, Alberta. Once collected, the samples would take weeks to analyze in the lab. It was at this point when I realized how much work this project was going to be. What I was unaware of is how much I would enjoy it.

"When you start to have dreams about spruce trees, that's when you're doing a good job," the summer students joked. I'll admit the work was tedious, but time in the lab flew by as I progressed. Measurements were taken, needles were counted, tree rings were analyzed. Once all was said and done I was surprised by the results. Shocked to find that the spruce had responded to the light, not necessarily by growing taller, but by adding mass to their stem instead.

Our WISEST Monday and Friday sessions were the icing on the cake. Not only did we gain valuable information about research and university but we learnt about balance. The art of finding equilibrium between our work and life outside of work. Talking, face to face, with those who have travelled the beaten path before us and having the opportunity to question our role-models and in return be given a genuine answer was extremely rewarding. Our sessions also acted not only as a time to receive instruction, but as a time to check up on other students, and interact with those whom with we share common interests.

Overall, this summer was a blast. Words can't express how appreciative I am of the opportunity WISEST provides for high school students. The chance we've been given to put our abilities to use and to discover, for ourselves, the world of research. WISEST didn't live up to my expectations; it blew them out of the water.

#### bing jie (julia) jin supervisor: Dr. Ania Ulrich / Civil and Environmental Engineering Sponsors: Dept. Civil & Environmental Engineering/Human Resources and Skills Development Canada - Canada Summer Jobs



As I reached the end of my grade eleven year, I realized that the decision that I had been avoiding for so long was right around the corner: what career path was I going to choose? I knew that no amount of online research could prove as valuable as handson work and being able to discuss concerns with others who had gone through the same uncertainties. In my time at WISEST, I have been provided with these opportunities and more.

"This has

to examine careers I had

before, and

Upon my acceptance, I learned that I would be working in the department of Civil and Environmental Engineering on a snow pile project. After meeting the rest of my research team, I was excited to discover that this project was only started this year, and was specifically focused on Edmonton.

Every year, the snow that is removed from Edmonton's streets is delivered to four snow storage sites around the edges of the city. There, the snow melts and the runoff is allowed to enter the North Saskatchewan River with very little treatment. Due to the salts that are used on Edmonton's roads in the winter, there are many possible contaminants that could be entering the river. This project aims to identify those contaminants in a variety of categories. The runoff samples were tested for metals, organics, cations and anions, as well as conductivity, alkalinity, and pH. This project had been running for a few months before I joined the team, and as a result, there was already a substantial amount of data collected. Therefore, my tasks consisted of both work in the lab and on the computer together with another WISEST student, Erica Cramton.

Typically, we would first test the samples using the conductivity and pH meters, and then determine alkalinity using titration. It was reassuring to find that the techniques used in university labs are not completely different from the ones I learned in high school.

However, there was also the use of machinery that I had never encountered before, such as the ones used to test for metals and certain organics. As well, during my second week, I was given the opportunity to go on a trip to the snow storage sites to collect samples and data. The variety in my work ensured that it always remained interesting.

In addition, the afternoon and lunch sessions also added to my enthusiasm, as they provided opportunities to learn about different careers, as well as research in general. I particularly enjoyed talking to other women working in non-traditional fields, as it gave me a chance to talk to ask questions to others outside my own lab.

WISEST not only allowed me to participate in a university research project, but also gave me a new perspective on the work available in each department; for example, I never knew that the project I worked on would be considered engineering. This has compelled me to examine careers I had not considered before, and re-examine ones I thought I had no interest in.

None of this would have been possible without the WISEST program, the coordinators who have worked so hard, and my sponsors. My thanks go out to Dr. Ania Ulrich, my supervisors Travis Hnidan and Bret Shandro, as well as my entire research team for their patience and willingness to provide advice. This is an experience that I will keep with me for a long time to come, and I am grateful to everyone who contributed to these past six weeks. With my newly acquired knowledge and experience, I am much better prepared to make that critical decision when the time comes.

#### **blair warren supervisor:** Dr. Diana Mager / Agricultural, Food & Nutritional Science **sponsor:** Human Resources and Skills Development Canada - Canada Summer Jobs



"From learning essential research skills employed in a qualitative setting, to acquiring new methods to cooperate and demonstrate respect in the workplace."

When I first got the call for the WISEST program I was ecstatic, I would be spending my summer doing something to help towards my future rather than just a summer job. It turns out it has been all of that and more, meeting great people, developing qualitative research skills, and learning a little bit about myself. I was slightly intimidated by the fact that I would be working with people with such high levels of education and distinction, but once meeting them my fears were shed instantly. Working with Dr. Farmer and Dr. Mager has been a great experience which I would repeat again in a heartbeat.

I was placed in the Department of Nutrition at the University of Alberta on a project whose overall purpose is to provide an understanding of perceptions and motivations to reduce dietary sodium intake across different contexts, the first of its kind in Canada. The project aims to reduce dietary sodium intake in the Canadian population through various fashions by assessing the most efficient methodology of delivery both cost and time wise. In order to determine said methodology both qualitative and quantitative research has been employed to evaluate the state of knowledge from a macro level, food production, government, and health care systems; and to a micro level, personal, social networks, and physical environment.

My first day on the job I was given plenty to read, which ended up taking me three days, but I'm happy I did it for I would have been lost without the literature. The literature delineated the basic protocol for transcription and qualitative data management. My particular place on the project was to listen to audio recordings from key informant interviews and transcribe them verbatim according to a predetermined protocol. I then reviewed them to ensure accuracy while maintaining the context of the conversation. Following the revision I began summarizing the transcriptions and looking for key ideas and repeating ideas which then developed into a long list. That list had many similarities and many contradictions coming from different participants so naturally my job was to group them into themes so we could find the trends in the data. While I had expected the work to be a little slow after establishing a good working system I found it quite fascinating to hear these people's perspectives and knowledge on the matter of dietary sodium. While trying to develop themes I had to think creatively to finally arrive with three key themes based off three pages of various ideas drawn from thirty plus pages of transcription.

All the opportunities the WISEST program has given me to learn while furthering myself are invaluable. From learning essential research skills employed in a qualitative setting, to acquiring new methods to cooperate and demonstrate respect in the workplace. This diverse range of skills that I acquired will help me further my future endeavors in post secondary education while enriching every aspect of my life. The Monday and Friday seminars have complemented the WISEST program perfectly. The various topics covered have offered real world perspectives and mentorship.

I will miss spending lunch with my new friends in SUB and discussing food and science with the people in the nutrition department. I must thank all those who have worked hard to make summers such as this one a reality. The WISEST team has been great and my principal investigators Dr. Farmer and Dr. Mager are spectacular for giving me the opportunity to work with them. This experience has been one that will remain with me for the rest of my life where I will continue to promote the WISEST program because I believe anybody with any remote interest in it should apply; they will be taken for a great ride as I have.

## breanna cheek supervisor: Dr. Walter Bischof / Computing Science

Sponsors: Elk Island Public School District



Whoever came up with the phrase, "it's not all fun and games," was really on to something there.

For the past six weeks, I probably had to utter this phrase ten times daily to my fellow WISEST Researchers, visitors from summer camps to the Advanced Man-Machine Interface (AMMI) lab, and probably more than any other, to myself while taking part in the WISEST Summer Research Program.

Upon arriving to orientation on the first day, I felt welcomed into a large group of peers that shared common interests, goals, and excitement. But at the same time I still felt a bit like a fish out of water. I was surrounded by aspiring engineers, chemists, biologists, etc., but I still felt that I was entering a field of complete unknowns. That was, until, I met my research team.

I remember the first meeting we had for everyone working as a part of the AMMI lab. As I looked around the table, I could tell that all the people surrounding me really knew their stuff. All of the research projects were absolutely incredible, and it seemed that my research couldn't hold a candle to theirs. As the time for explanation came to me, I was shocked and proud to see that the other researchers had a genuine interest and fascination in what I was doing. I think it was in that moment that I really thought "Hey, I could do this, and it'd be pretty amazing."

For someone like me, with a strong pull towards arts and creativity, a desk job at a computer isn't a likely recipe for success. My whole perspective on that changed the minute I walked through the lab door. Surrounded by a whole array of confusing and incredible 'toys,'I began to get a really good feeling about my research here. My research team put in an amazing amount of effort to make sure

each of our projects suited the researcher involved. I was ecstatic that I got to use leading animation software, and really use my artistic abilities in my work. With the help of my research team, I had the chance to explore a whole new world of rehabilitation, keeping it engaging using the technology of virtual reality. Using the software, Virtools and Maya, was a lot easier than I thought it would be. This opened a lot of doors for me in my research project and allowed me to use a lot of my creativity. I created games for rehabilitation with controls using the Wii Fit Balance Board. During my research, I completed two games; 'Snowball Fight', and 'Mouse House' with the skills that I learned. I was able to create fun and interactive environments for rehabilitation patients, and give presentations to the Glenrose Rehabilitation Hospital. I also got to take part in some really great things in the lab such as 3D scanning and printing, the CAVE, and playing with all the new 'toys' that came in. Everyone in the lab was absolutely amazing. They were all really positive and helpful. Although they have earned my upmost respect, I would sooner refer to them as my friends than my supervisors.

I would like to thank everyone working in the AMMI Lab, (with special mention to Fraser, Michelle, Walter, and Pierre) and WISEST for all of the field trips, tours, demos, and all of your help and support.

Taking part in WISEST was an amazing experience that can't really be described. The Monday and Friday sessions were fun, engaging, and informative. This whole experience offered far more than just a job. I met some wonderful people, did some amazing things, and most of all I learned hands-on what's really out there.

#### **brenda le supervisor:** Dr. Dean Spaner / Agricultural, Food & Nutritional Science **Sponsor:** Alberta Advanced Education and Technology



"Now I know there are boundless opportunities in agricultual sciences since they play such a vital role in society.."

Participating in WISEST was one of the best decisions I have ever made. At first, I was anxious about working mainly because I would be researching wheat. I didn't learn much about agriculture at school, and this was very different from what other WISEST students were doing, since the wheat fields in South Campus would be my "lab". This made me worried because I had pretty limited understanding of crops and farming (I mean, agriculture isn't science...is it?)

Fortunately, with the mentorship and guidance of my research team, my knowledge of wheat and crop science immediately broadened. I began to understand the science behind wheat breeding and competitive wheat lines. By further expanding my knowledge through research papers, I gained a thorough understanding of my project, which focuses on plant traits associated with the competitive ability of organic and conventional wheat. Since organic production does not allow herbicide usage, it is more difficult for crops to compete against weeds in low-input systems. Therefore, it is important to breed wheat with many competitive traits to overcome environmental limitations. The wonderful balance of indoor/outdoor working environments was particularly enjoyable for me. My supervisor was so kind to allow me some lab experience in the plant genomics and pathology labs, so I received a break from data collection on the farm once in a while. I began to love working for WISEST, contrary to all my anxious feelings at the start.

The most significant improvement that WISEST gave me was a change in my perspective. I have to admit that in the beginning, my restricted understanding made me think that there was no potential in studying crops. I believed that an individual had to get into medical school to be successful. Now I know there are boundless opportunities in agricultural sciences since they play such a vital

role in society. WISEST taught me the importance of approaching unfamiliar tasks with open-mindedness and enthusiasm. I had the chance to work in a completely new and strange environment, and it was something truly phenomenal.

WISEST also provided helpful, informative sessions twice a week on everything from perfecting research posters to networking with role models. These sessions were great for socializing and for temporarily forgetting that we were at "work". Besides meeting new people, we also went on tours at facilities on and off campus, enabling us to see all the action first-hand. The coordinators were always cheery and made the seminars so fun I looked forward to attending them every time.

WISEST was certainly an amazing six weeks, and the only unfortunate part is that I won't be able to do this again next summer. I have met plenty of interesting people, and obtained a vast amount of knowledge from this experience. I am so eager to share my achievements and wonderful memories with others.



## britnee briault supervisor: Dr. Denise Hemmings / Obstetrics & Gynecology

Sponsor: Alberta Ingenuity Fund

"It is an amazing opportunity to have been able to work in a research lab; doing something that one day may have a real world effect."



The past six weeks have been absolutely incredible. By being a part of WISEST I had hoped to gain a greater understanding of possible career opportunities, meet new people with similar interests as me, and experience life in a research lab. Before coming to WISEST I thought I had everything planned out, I was going to become a doctor, nothing else, but WISEST rearranged my plans. Many more possibilities have been brought to my attention. Now I realize it is perfectly okay to have no idea what I want to do, life is a journey not a destination. The friendships I have made thanks to WISEST will last a very long time. It is an amazing feeling to connect with a significant amount of other teenagers passionate about science.

The research lab in which I spent my six weeks was an obstetrics and gynecology research lab. For me, this was an extremely exciting placement due to my fascination with the human body. Most of my lab team works on projects related to the functions of the vascular system in pregnancy; dealing specifically with the effects of high blood pressure as well as the effects of cytomegalovirus on blood pressure and in turn the mother and the fetus. I had the opportunity to work under the vice chair of WISEST, and the opportunity to work on my own project. My specific project was focused on the effects of cytomegalovirus on the levels of a lipid called sphingosine 1 phosphate in cells. This lipid is along the pathway in the production of a vasodilator that can ultimately improve blood flow, or cause problems if over produced. The things I learned in the lab are things that I could not have learned anywhere else. It is an amazing opportunity to have been able to work in a research lab; doing something that one day may have a real world effect. Lab work, I have learned is not something simple, it requires diligence, passion, physical consistency, meticulousness, as well as social skills, teamwork, and applications from far more than just scientific knowledge. My experience

in the lab, and connecting my project from a perspective smaller than a cell, to the big picture of the function of the human body, is absolutely astonishing.

The Monday and Friday WISEST sessions were greatly beneficial. The information presented will be applicable to future endeavors, not only to the WISEST experience. There were so many opportunities to gain knowledge from people in positions and places where they had so much to offer us, if only we asked; which is something we were taught to do as well. Despite the importance of the sessions, they were always light and balanced learning experiences that will be applicable throughout life. The role model and networking session concepts being learned young are going be useful in the future.

I owe my once in a lifetime experience to so many people who made it to be as fantastic as it was. Firstly, I owe thanks to the Alberta Ingenuity Fund, who sponsored my placement in the program without whom I would not have had this opportunity. Secondly, I would like to thank Dr. Denise Hemmings, for allowing me to work in her lab and everything I have learned thanks to my position made available by her. Ashley Davey deserves a thank you for all the time she devoted to me and my project, teaching me all the hands on techniques I needed. I would also like to thank Jana Teefy, for being my friend in the lab, and including me in everything. In fact, my entire lab team deserves a great acknowledgement for their patience with me, because I did not know everything and I made mistakes, but it was accepted and a learning experience.

## carmen chornell supervisor: Dr. Phillip Currie / Biological Sciences

**Sponsor**: Alberta Advanced Education and Technology



"I realized that as long as you are passionate in life about where you want to be, then life will take you there."

I still find it difficult to wrap my mind around what I did this summer. While I always had an interest in evolution, the idea of working with dinosaurs seemed unrealistic. The first realization of how I would be spending my six weeks in WISEST hit me on the second day of work when I was going through the dinosaur collections room at the University of Alberta. I came across a page of the Saturday Evening Post newspaper from May 14, 1921, wrapped around bone fragments, that was advertising Ford's Hupmobile and Campbell's Tomato Soup. That tiny piece of paper took me back to the 1920's when G.F. Sternberg was first collecting dinosaur bones from millions of years ago. I knew then that this was not just a regular summer job; I was in for the best weeks of summer in a job I would never forget.

The study of palaeontology is much different from other areas of science. I came to this conclusion when I was given three diverse research projects. I began working on a Euplocephalus tutus specimen that was from the G.F. Sternberg excavation of 1921. This ankylosaurid dinosaur had lived in North America 70 million years ago during the Late Cretaceous period. This specimen was important to prepare because it had a rare, fairly complete skeleton. My days were spent picking, chiseling, and tooth brushing at the rock surrounding its pelvis, ribs, armour, and femur. I also discovered that CT scanning is useful in palaeontology. I was fortunate enough to visit the Royal Tyrrell Museum in Drumheller to collect a Daspletosaurus braincase. We CT scanned it to view its brain cavity and structure of the skull. My final project consisted of me sorting through a sample of dirt from the Milk River Formation from southern Alberta under a microscope. I identified microvertebrate fossils such as fish vertebrae, theropod teeth, crocodile teeth, and pieces of various skulls. All of this work was undertaken in order to discover more about the different species. In palaeontology, this is the reason for research—to find out more about

extinct species and relate that knowledge to the species existing today. For instance, information such as what it ate, its environment, how it died, and how many species were found in an area, tells us more about the species' lifestyle. These projects contributed to the work of my supervisors and their determination to understand more about dinosaurs.

Before I knew it, I was talking to my friends in a foreign palaeontology language. Although I may not pursue a career in paleontology, this experience enhanced who I am as a person and the knowledge I gained will never leave me. The program's Monday and Friday seminars made me more comfortable with the campus, introduced me to fellow WISEST students, and further established my future in science. My favorite day was the Networking Seminar. I had the incredible opportunity to talk with successful female scientists working in nontraditional fields. This seminar gave me the confidence I was looking for in the program. I realized that as long as you are passionate in life about where you want to be, then life will take you there. With this realization came a great feeling of relief. This was perhaps the greatest gift I have received from WISEST.

I would like to thank Dr. Philip Currie, Victoria Arbour, Derek Larson, Lara Shychoski, Nicola Howard, Susan Owen Kagan, Idel Riemer, Jen Duffy, Misha Hartfeil, Kerry Humphrey, and Grace Ennis. All of you created a wonderful work atmosphere that I enjoyed each and every day. I would also like to thank my sponsor, Alberta Advanced Education and Technology.

#### **Carmen rygh supervisor:** Dr. Gerda deVries / Mathematical and Statistical Sciences **Sponsors:** Faculty of Science / Human Resources and Skills Development Canada - Canada Summer Jobs

"I feel that this dreamlike adventure at WISEST has established ceaseless opportunities that will shape my future."



After hearing amazing feedback from my sister and cousin who previously attended WISEST, I immediately strived to become part of the adventure and not let the opportunity pass by. When I received a call of acceptance, I was thrilled and motivated to make the most of such a treasuring opportunity that will never surface again. Now, the past six weeks have gone by astonishingly fast in the Department of Mathematical and Statistical Sciences with Dr. Gerda de Vries, but it has definitely been a summer to remember.

Just like most of the other WISEST students, I was nervous walking through the university campus into the ETLC on the first day. However, it only took me a couple of days to feel comfortable in the midst of my friendly supervisors and research partner. I have always hoped to pursue a career that revolves around science and mathematics, so I felt that I was placed in the perfect field of study. The unique research project that I received this summer entailed researching high school math concepts and developing math games to reinforce these concepts. This research contributes to the outreach program, GAME in the Schools, which has visited elementary schools to explore math concepts outside of regular curriculums. Our mission has been to broaden the spectrum of people reached by the program by creating five hands-on workshops/activities directed toward students in higher levels of math.

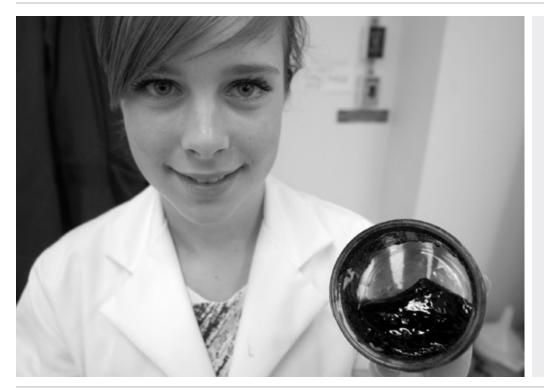
My partner Aala and I have an office within CAB, where we have created math activities that introduce the diversity of math, inspiring students to continue in the subject. In addition, we have also acquired an understanding to how mathematics is applied in everyday life and is used as the basis of scientific communication. Our knowledge has been flourished, especially in the five specific areas that we explored: the Pythagorean Theorem and Visual Proofs, Platonic Solids, Probability and its Applications, Game Theory, and the Tower of Hanoi. We were lucky to actually perform three outreach sessions at the university with kids in summer camps, where we could provide direct assistance to teach them special strategies for mind-boggling games. This creative math journey has enhanced my outlook of mathematical applications and research skills, gaining greater insight into many strategic situations of the world.

On another note, the WISEST sessions were also highly enlightening because we saw research in action from new dimensions, and the WISEST coordinators shared many words of wisdom. The Monday Professional Development days and the Friday Lunch'n'Learns always gave us WISEST students something to look forward to. We met up with all of the WISEST students of similar scientific interests in order to experience tours or discuss essential future material. My favorite WISEST activity was the Science Olympics because every group, using diverse sets of minds, worked together in the exciting relays.

This six-week research experience at WISEST has provided me with remarkable awareness of university life, the opportunity to meet countless amazing people, and the knowledge of crucial research skills through first-hand perspectives. I strongly recommend this program to anyone else who is in search of a scientific career because it has greatly exceeded my expectations. The truth behind the wise words once suggested by Sun Tzu have also been proven to me, "Opportunities multiply as they are seized." I feel that this dream-like adventure at WISEST has established ceaseless opportunities that will shape my future. In conclusion, WISEST has been an experience-of-a-lifetime because of the knowledge built, the fun embraced, the friends inherited, and the gaining of greater insight into myself.

## carolyn cepuch supervisor: Dr. Zhenghe Xu / Chemical and Materials Engineering

**Sponsor:** Suncor Energy Foundation



"I have not only gained a new willingness to pursue a postsecondary education in science, but an excitement to match."

What an experience! This program has been an amazing academic opportunity as well as a prime chance to meet lots of new people my age with similar interests. I have gotten so much more out of my six weeks at the university than I had ever expected coming into the program.

I was placed in a chemical engineering research lab, concerning oil sands. I was glad to have been working in this field because it is an area of interest and a field of work I am considering for a career. I have learned so much while working with the students as well as professors in my lab, and would want to pursue this further should the opportunity ever come up again. I worked on a project studying the effects of remaining Al-Polyacrylamide, a polymer used to improve bitumen quality in the extraction process, in the froth cleaning stage. I pipetted, prepared and weighed samples of a naphtha-diluted bitumen and polymer solution, used lab instruments to measure the water content in the samples and compared our findings to the droplet size of the water in bitumen. Everything was new to me in the beginning and I had no clue what I was doing. Everyone was helpful though and I quickly learned everything I needed to know, and much more. Not only did I become more knowledgeable within the field of work I was exposed to, but I attained surplus knowledge of great worth through interaction with surrounding students, professionals and people who are potential mentors. I was excited to be able to use all of the lab instruments myself; it made me feel supremely privileged. I felt motivated to work hard because everyday brought another victory.

The academic aspect of the WISEST Summer Research Program is exceptional, but there is so much to be gained from the social aspect of it as well. Many of the speakers and former WISEST students emphasized our chance to make lifelong friends as well as connections to further our studies. Whether we were believers of that originally, it is obvious to me now, after having been through the program, that that is nothing but the truth. The people I have met here, whether they will remain a part of my life or not, have shared so much with me that will be of immense value through everything that is to come.

My perspective has been changed so much due to this program, and I am forever grateful. I have not only gained a new willingness to pursue a post-secondary education in science, but an excitement to match. I couldn't have asked for a more productive and inspiring way to spend my summer with people as keen as I to expand our realm of knowledge and choices. It is enlightening to be a part of a program that encourages us to branch out and explore what could come of us, should we be so courageous as to go against the odds.

I am immensely grateful to my research team, Dr. Zhenghe Xu, Dr. Xianhua Feng and to my sponsor, Suncor Energy Foundation, for their time, effort and funding to provide me with the fulfilling summer I had.



## chantelle tatum supervisor: Dr. Amos Ben-Zvi / Chemical and Materials Engineering

Sponsor: NSERC PromoScience

"I'll never forget these six weeks; attending this program was one of the best choices I've ever made."



At the beginning of the WISEST summer research program, I found myself anxious about working in a lab, meeting my supervisor and principle investigator. What if my lab partner doesn't like me? I was deeply concerned about all of this until I met my principle investigator Dr. Amos Ben-Zvi, and my supervisor Hector De La Hoz Siegler, and after that all my worries disappeared. Everyone in my lab was extraordinarily helpful; whenever I had a question it always got answered. It was a fun and exciting work environment. My research lab was in the Chemical and Materials Engineering Building, and my lab's main goal was extracting bio-diesel from algae. The main focus for my research project is determining the most efficient way for algae to produce the most oil by monitoring glucose and nitrogen levels and taking daily samples.



Normally, I would be spending my summer vacation shopping, hanging out with friends, or traveling. I'll never forget these six weeks; attending this program was one of the best choices I've ever made. If I could come back next year for six weeks in the summer; I would be here in a flash. This experience was a lifetime opportunity, and I wouldn't trade it for the world.

For some period of time, I've wanted to be a chemical engineer. This program really opened my eyes to what life is like in that career path. It made me realize that I would enjoy my life thoroughly if I decide later on that's still what I really want. Being in WISEST wasn't only just working in a lab; we also had networking sessions, off- and on-campus tours on Mondays. On Fridays we had the Lunch 'n' Learn sessions. I enjoyed them because we got to sit and talk with some of the other people in the program and get to know what goes all in all the different kinds of labs, not just one aspect of WISEST. In the networking session we got to talk to women that have been working in the science field for years now, which was very eye-opening. They explained to us that it's okay if you change your mind when dealing with your career, and that you can have a family.

I would thank to thank my supervisor and principle investigator for making this experience very educational, enlightening, and inspiring. Also I would like to thank my lab partner for brightening my days, and making working in the lab even more enjoyable. I got much more out of the WISEST program than I ever could've expected, it all went by so fast and I'm sad it's already over. I wouldn't change anything that happened during these six weeks because it was a wonderful journey of science, meeting new people, and trying new things. That's all I could've asked for.

 Image: Student reports

# chelsie ralph supervisor: Dr. Amos Ben-Zvi / Chemical and Materials Engineering

**Sponsor:** Alberta Advanced Education and Technology



"I fell in love with chemical and biochemical engineering during my summer..."

I sat and wondered for a while what my most vivid memory of WIS-EST was. When I consider it, it could've been anything, but I think the memory that is most clear to me is walking into the Solarium and believing there was no way I could fit in with all these people signing papers during orientation, each appearing as self-assured and powerful as a board director sitting snugly behind a thick, dark oak desk.

I realized during the speeches by the coordinators, Dr. Armour, and Dr. Dragon that WISEST isn't a measure of your confidence or your intelligence. It's not a competition. It's a learning experience, it's an opportunity, and it's an introduction into what life beyond high school is like. Nothing I could've done with my summer could possibly have been better. WISEST, with its seminars, tours, and discussions, opened my eyes far beyond anything I had imagined.

Take the lab, for example. All my life I've had this image in my head that a laboratory is a neat, organized, clean environment where a single hair out of place would be too much chaos. I instead fell in love with an atmosphere where everything is out of place, but easily found, where people work constantly but always have the time to devote to you, for whatever reason you might have. I fell in love with chemical and biochemical engineering during my summer, and I only got a brief taste of it and the type of people who also enjoy it.

Over the summer, we were to test samples of algae, given different concentrations of a carbon source and a nitrogen source, for biomass concentration. The more algae, the more potential for mass oil production, which is what the lab's main goal is. In short, they're focused on optimizing oil production: finding what creates the most oil in the most algae (nutrient starving is what makes algae produce oil, so the right combinations of nutrients, taken away, can maximize it) and also finding the best way to extract it. I was working with glucose concentration and what effect it had on algae's growth rate and biomass concentration. I came up with way more data than I had imagined, and knowing the numbers, charts, and graphs are all my own made me feel more proud than anything I've ever done.

With other things thrown into the mix — seminars about how you can make connections in life with those who can help you get ahead, tours that show you the real world careers, and informative sessions to help us along in our research and our futures — WISEST became one of those things I'll probably always remember as a stepping stone in my life. I'm proud when people come to me and ask me how I got into the program and what steps they should take to be involved. It makes me feel like I've accomplished something by seizing an opportunity many people don't get the chance to have. I don't think I could have enjoyed any other summer activities as much as I did this one.



#### daniel javier supervisor: Dr. Wendy Austin / Faculty of Nursing Sponsors: AWSN / Human Resources and Skills Development Canada - Canada Summer Jobs



Each of the 60 WISEST students, with males in the minority, are placed in a 'non-traditional' field of research for our gender, and it so happens that I landed in one that fits into my career goals. As a type of bioethics researcher in the field of nursing and healthcare, I study the core components of relationships, and the 4 main aspects of medical bioethics. And by the sound of it, it seems like a bunch of homework. But aside from the long, distressful papers we write and the ominous group meetings we participate in, there are plenty of laughs and stories shared among my two partners and with our direct supervisor.

Throughout the WISEST program, I created and continued to develop, a website based on the moral distress seen in some healthcare professionals, specifically within the paediatric setting (heavy stuff). Moral distress is usually caused when your moral values contradict with what you're told to do by your superiors. The website I'm developing would offer distressed individuals consultation, advice, and choices. The publication would also provide information, the research that has been going on in the area, and some excerpts that will act like a phenomenology paper to evoke feelings or empathy. The process of making a website does not entail the job of a professional website designer- the audience we seek are healthcare professionals, both seasoned and in residence.

Reading several excerpts about my project usually gave me a perspective that comes from a class not often noticed for their exemplary work in patient caring. Therefore, I considered several things for when I decide my future career path in medicine, and to remind myself about my fellow healthcare professionals.

On Mondays I participate in several professional development events, such as off-campus tours and meetings with profession-

als in the field of engineering, science, and medicine. Fridays are 'Lunch n' Learns', where I spend the time mingling with the generous amount of female WISEST students and where I can also receive more information on our posters and projects. One particular Monday seemed always fresh in my mind, and it was during the off-campus tour at iRSM (the Institute for Reconstructive Science in Medicine). I learned several new things from that occasion, such as the innovative and diverse pieces of equipment used for reconstructive purposes, and about the jobs that are found within that setting. That tour inspired new ideas into my head and provoked a wanting to divulge into a new field.

Overall, I am thankful for being in the WISEST program. This program offered me the prospect of continuing the goal I developed through my experience living in five countries; to work as a medical professional in an effort to reach the less fortunate and provide them with care. This opportunity gave me an overview of what I should be after, in terms of university courses, and provided an alternate route that I could consider as I continue in my life.

Before I end this, I would like to thank the whole WISEST staff for offering this once in a life opportunity. I give the same amount of gratitude to my sponsors, the AWSN (Alberta Women's Science Network) and Canada Summer Jobs, for without them, this opportunity would not have been available. Furthermore, I would like to acknowledge my direct supervisor, Erika Goble, and the rest of the team: Dr. Wendy Austin, Dr. Nina Erfani, NP Stewart MacLennan, and Tim Anderson because each and every day is the moment I look forward to.

## elizabeth otto supervisor: Dr. Farbod Fahimi / Mechanical Engineering

Sponsor: Allard Foundation



"I am an extremely kinaesthetic learner, so this summer's research opportunity in robotic was the ultimate fit for my learning strength."

Where to begin? The past six week of the WISEST Summer Research Program has been a phenomenal learning experience and what I am about to share with you will only just scratch the surface. The people that I met, the projects that I worked on, the technical laboratory work that I experienced and the unending encouragement from everyone around me is what made these six weeks unforgettable.

I am an extremely kinaesthetic learner, so this summer's research opportunity in robotic was the ultimate fit for my learning strength. I have interests in several engineering fields; robotic, biomechanical, computer, process control and I felt that this summer's research experience in robotics helped bring together all my interests and gave me a glimpse into the potential of each of these fields.

I would like to thank Dr. Farbod Fahimi for giving me this wonderful opportunity and Michael Dawson for his supervision and dedication to me over the summer.

I was able to work on two projects this summer; building a robotic arm and designing a chair to house the arm. The robotic arm was designed to be a light weight less expensive training model for amputees above the elbow. The aim of this project is to send an amputee home immediately with a practice arm so they can start learning how to use their nerves endings to control an artificial arm. This project permits the amputee to learn and function for the several month duration it takes for the building and fitting of their final prosthetic.

Spending three weeks designing a chair for the robotic arm may seem like a lot but in reality I would have liked another few weeks. Determining exact specification on what needed to be in the design was one of the easier aspects of this project; things such as size, weight, materials, cost, accessibility, comfort and wiring had to all be taken into consideration. Then brainstorming different ideas on how to keep the arm attached to the chair, designing it so that it was adaptable for left or right handed amputees and that the computer was attached correctly was the tricky part. I spent a week coming up with twenty or so designs and then input them into a computer program along with proper dimensions. After this a meeting was held to discuss the implications and complications of each design on the arm and how some of the designs could be combined to make an even better attachment.

The Friday Lunch 'n' Learns provide us with the schedule and details for the Professional Development seminars following week. These Monday sessions were very informative. I particularly liked the networking session, where we met professional women in nontraditional roles and learned how they dealt with issues like career development, parenting, and acceptance by male peers. Being able to visit other labs throughout the six weeks also helped to open my eyes to the variety of research being done and the specialize equipment being use. I was most impressed by the Scanimetrics lab off campus and it was quite neat to see how the nanotechnology is built into the chip.

This summer WISEST research opportunity has really opened by eyes to the diversity and opportunities available for anyone wanting to pursue a technical career. A big thanks goes out to all those who work so hard to organized this sensational summer experience. It would not have been such a success without your foresight and dedication. Thank you.

#### elizabeth triscott Dr. Christine Szymanski / Biological Sciences

Sponsor: Alberta Ingenuity Fund



It is generally agreed that most first year university students say they want to be either a medical doctor or a lawyer. If they go into the sciences, they want to be MD's. But the truth is there is a plethora of careers in the various fields of science that most of the general population does not even realize exists. The WISEST Summer Research Program has opened my eyes to a profusion of career paths in scientific research in all manner of fields, from mechanical engineering to molecular biology.

I had the pleasure to be placed in a microbiology lab studying the polysaccharide capsule of Campylobacter jejuni, a bacteria responsible for the majority of food poisoning worldwide. The capsule is the protective layer of carbohydrates the bacteria coats itself with to protect it from the outside environment and shield it from our immune systems. It is uniquely organized to maximize the protection it offers the bacteria. My particular project concerned three enzymes that transform certain sugars so that they fit properly into the capsule. I learned many microbiology lab techniques and was able to talk to and work with many interesting researchers from many points in their various career paths. I also got a behindthe-scenes look at how research labs are run and gained a greater insight into the lifestyle of a researcher and the amount of work it takes to get there. To be a scientific researcher I believe you have to love what you do. You have to be dedicated enough to do the same thing over and over again one hundred times in the hope that it works on the hundred first, and to never guit when things seem too difficult. A researcher needs to be able to invent different ways of approaching a problem, with only a few vague notions of what the problem is in the first place. In short, the researcher needs to possess the tenacity of an ant, the staying power of glue and the creativity of an artist.

As interesting and instructive as my research placement was, the WISEST program offered so much more than an interesting summer job in a research lab. Each week we had a professional development seminar and lecture. During these times we did things as diverse as touring on and off-campus research facilities, were taught the importance of networking, and learned about the significant role of ethics in research. During these sessions we were also able to get to know the other WISEST summer research students from all over the province and get a glimpse what they were doing in their labs. It was quite refreshing to be surrounded by so many people my age who shared a similar interest in science and scientific research, many of whom I hope to see in the future pursuing their interests in university.

Overall, my WISEST summer research experience was overwhelmingly positive. I met so many mentors and role models, explored the fascinating field of scientific research, got to know the university campus and met peers who share similar interests to my own. I would especially like to thank my research team for putting up with a confused little high school student for six weeks and all people, sponsors, organizers and volunteers, who made the WIS-EST Summer Research Program possible.

## emily dombowsky supervisor: Dr. Maya Evenden / Biological Sciences

Sponsor: NSERC PromoScience



"The early exposure to the equipment and procedures used in a university laboratory was stimulating."

The past six weeks have been incredible. My time as a lab assistant was highly enriching, and the myriad of other experiences were ridiculously rewarding. I am so overjoyed that I was given the chance to participate in the WISEST Summer Research Program.

By working in a university laboratory I gained immensely valuable experience and knowledge into lab techniques and etiquette. In my lab we were studying a parasitoid wasp that uses the larvae of an ash leaf cone roller moth as its host. The moth has become guite overpopulated and is destroying the aesthetic value of the ash tree, by rolling up the leaves into cone shapes and making their cocoons in them. The goal of the lab is to be able to better understand the mating behaviour of these wasps, so eventually we could be able to use the parasitoid wasp to be able to better control the population of the moth. Also the Monday sessions and Friday lunch n' learns were highly informative, there is so much that I learned that is going to be very useful not only when I go to university but right now in building networking skills and researching future job opportunities. What I gained from the WISEST Summer Research Program is three fold: I have gained more knowledge about my potential career choice; I networked and built many strong friendships with other students; and all the skills and techniques I learned are very appreciated.

There are several different educational and social aspects of the WIS-EST Research Program that greatly benefited me. The opportunity to do independent research in a university setting under the direction of accomplished professionals was a challenge that was exciting to meet. The early exposure to the equipment and procedures used in a university laboratory was stimulating. Getting a "feel" for the atmosphere and layout for the University of Alberta was another important aspect for me as a small town high school student wanting to attend the University of Alberta upon graduation. The chance to meet many different people in the science field, from professors to students to actual working scientists, was a really awesome experience. This program has also gave me much needed knowledge pertaining to what area of science I would most like to study, and from talking to different university students I was able to discover an area that I never even knew about before that is exactly what I wanted. Also the fact that this was a paid summer position made it possible for me to participate and keep my financial goals, regarding saving for university, in tact. There are many great benefits and opportunities that WISEST has to offer and I am honoured to be able to take advantage of all of them.

The WISEST Summer Research Program was more amazing than I ever expected a nerd camp to be. The people I met and things I got to experience were unforgettable. It gave me a tremendous amount of confidence in my ability to not only be able to make an informed decision about what I want to do in university but also that I will be able to achieve what ever goals I set. I would like to thank my sponsor NSERC, without them I would not be able to work in this amazing summer position, and also the support of the Evenden lab. Every aspect of this program was amazing and I could not imagine a better way to have spent my summer.

### emma kerschbaum supervisor: Dr. John Spence / Renewable Resources

**Sponsor:** NSERC PromoScience

"When people have such high expectations for high school students that they place them with grad students, you can't help but do your best."



When you first leave home there is that feeling of independence but there also is a feeling of anticipation, the fear of the unknown. That was the emotion I was feeling when I first walked in to the WISEST initiation meeting at the beginning of July. Now almost two months later; I am walking out of WISEST with the feeling of independence, like I could do just about anything.

My project focused on what attracts beetles to their habitats, whether it's through the use of pheromones or just random chance. If we could pinpoint the attraction we could find ways to keep these beetles in the forests through proper forestry practice. Most of these beetles are required for the return of nutrients naturally to the soil through decomposition. However, when you remove their habitats you lose these beetles, which they have discovered in harvested areas of Europe. To determine beetle-habitat we used window traps and baited them with polypore fungus, wood and extracts of both. We collected samples weekly and sorted them to "Order" for arthropods and "Family" for beetles, being careful to collect everything (even those as small as a pinhead). With this data we were able to see the frequency of the beetle families to the different baits and compare this to the control. My favorite part of this project was the field work; as we did our duties my supervisors would stop and tell us all about every bit of nature we saw.

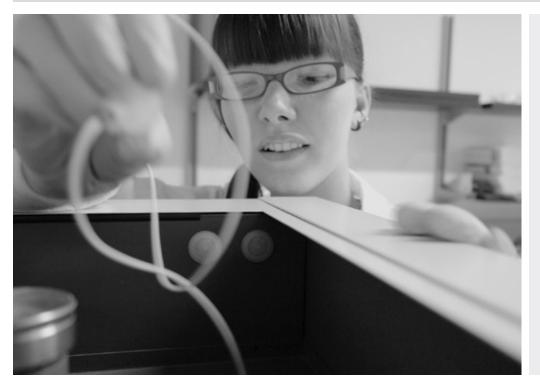
With two instructional meetings a week, WISEST has been a very informative program for me, providing me not only with career insights but lessons I can apply to my everyday life as well. Our very first Professional Development Seminar explained how to get the most information out of scientific reports without becoming overwhelmed. As a student who plans to attend University this would be a most beneficial skill to possess as I'm certain there will be several papers

to be studied in many of my future classes. There also were things that could be applied to someone who'd head right out into the work force, such as networking and how to make those connections.

WISEST has given me a new sense of confidence through my many experiences in the program. When people have such high expectations for high school students that they place them with grad students, you can't help but do your best. The benefits of this program are so many that others should not be hesitant to get involved. Through this program I learned more about University then I have anywhere else. This program also forced me to leave my comfort zone causing me to expand my safety net. The people I met through this program were amazing and even if we lose touch I will always have the wonderful memories of these events.

I would first off like to thank my Mother and Father who allowed me to leave the farm and my chores to participate in this program; I love you!! Thank you to my teacher Mr. Klemp for recommending the program. I also want to thank my supervisors, Charlene, Sonya, and Stéphane, who made this an event to remember. Thank you Stephanie my constant companion and berry competition in the field. A great big thank you goes out to Dr. John Spence for allowing WIS-EST students into his lab and NSERC my sponsor, thank you both for making this possible. Finally I would like to thank WISEST and their team leaders for all their hard work and the fun memories. Thank you to everyone else who made this experience possible for me. erica cramton supervisor: Dr. Ania Ulrich / Civil and Environmental Engineering

Sponsor: Epsilon Chemicals



"This summer has stretched me to broaden my view of university, and the options available."

WISEST has been a great opportunity to learn about the many possibilities of the future. As a grade eleven student I was expecting to get a simple summer job to pass the time. I did not even dream that I could have a job and an experience that would make me grow, and learn about so many things. The Monday and Friday sessions were mandatory, but they were definitely looked forward to. The time it took to learn new skills like how to talk to strangers, create an elevator pitch; a simple introduction to who you are and what your interests are, and a few others have been very worthwhile. I will not forget my WISEST 2009 summer research job because it has been all that I expected. I wanted to join this program to build a foundation for my life. Hopefully this will lead me towards making decisions once I graduate from high school. I expected to learn about different career options, and working in a lab has not only taught me how to cooperate with co-workers, but it has allowed me to see into a world of working in non-traditional roles for women. Some buildings in the University have very few women's washrooms, which reminds me that being able to work in a job such as engineering is a great opportunity that couldn't have been done in a previous generation. This summer has stretched me to broaden my view of university, and the options available. Being in an environment with people from all over has let me see education from many different views. PhD, grad, and undergrad students all have different advice to give. Though they may not have known where they were going when they were in our place, they have helped me to learn from their experiences. Working the summer in a university lab has been a great start to my journey towards a career.

My eyes have been opened this summer in many ways. I did not expect that an engineering job could be so enjoyable to someone

who has a strong interest in chemistry. Working in the civil and environmental department allows me to be in a lab for most of the day; which is what I was looking forward to. I was surprised to find that computer work is crucial to the project. The summer I have had has been a great mixture of the two work components. Some water chemistry tests like pH and alkalinity were familiar to me because they were done in school. Doing these procedures in the lab has helped to secure the knowledge, and has given me opportunity to share the differences in procedures with others at school. I also encountered machines that tested for metals and ions. These were much more advanced, and I enjoyed working with them to further my knowledge of technology. My research project was about determining what is in the snow that is taken off the roads in winter. I was able to go out into the field twice during the summer with the research team and take water samples from the snow dump sites. Seeing the four sites made this project more understandable because I wasn't just reading about the different sites, I was at them seeing for myself where the snow pile, weir, and ponds are located. I would like to thank my research team for making my experience so much more memorable. Someone was always ready with an answer to my questions. Thank you to Epsilon Chemicals Ltd. for their sponsorship.

erika rodning supervisors: Dr. Grace Strom, Dr. Heather Prior & Dr. Peter Mahaffy / The Kings University College - Chemistry and Biology Sponsors: AWSN / Human Resources and Skills Development Canada - Canada Summer Jobs



The WISEST program was an amazing experience that I am so grateful to have had. Not only did I gain experience in a research lab, but I also made friends and had fun.

At the beginning of the summer, I was very nervous about starting the program. I was worried that I would be given a difficult project and that I would either make a major error or be useless. In addition, I barely knew any of the other participants, and I had been placed at King's University College while almost everyone else was at the University of Alberta. It turns out the first day was not scary at all. I met numerous new people, including my principal investigator and one of my supervisors. It pleased me to hear that I would be working with many different people, including professors and students.

I was thrilled—and a little nervous—to discover that I would be working with honeybees. My interests include biology and the environment, so this project seemed to fit well.

The goal of the project is to find a natural product that can control a disease that is killing honeybees. American Foulbrood, caused by the spore-forming bacterium Paenibacillus larvae, has caused a worldwide diminution in the population of honeybees. The contagious disease affects the developing bees, killing them before they pupate. Synthetic antibiotics are currently available to control the disease; however, the bacteria are developing resistance, those types of antibiotics are expensive, and the antibiotics are leaving residue in the honey. Therefore, using antibiotics is not a long term solution to the problem. It is important that a solution is found as honeybees are a vital part of ecosystems. Garlic, thyme and oregano were chosen for the project as they are known to have antibacterial and antioxidant properties. The aim of the research is to find a concentration of essential oil that can kill the bacteria but will not harm the larvae. My day-to-day tasks included Minimum Inhibitory Concentration testing, preparation of Basic Larval Diet (Food for the larvae), grafting and even working with the bees! I had my own bee suit, and I would smoke the bee hives while we looked for 1st instar larvae (less than 48h old). In addition, I did some photo documenting of the project to facilitate the learning of techniques for future students. As time passed, I gained knowledge of honeybees and the complexities of life in the hive.

After having researched many combinations of essential oils and having done several experimental groups of larvae, we did make some progress. It was very clear that the essential oils are very strong and effective against the bacteria. It seems that combinations of the oils are occasionally more effective than either of the oils were individually. The oregano oil appeared to be the most effective solution. Tests are currently being done to verify whether the oil can effectively kill the bacteria when fed to larvae.

This position has given me a feel for life as a researcher and I have learnt many techniques used in the lab. In addition to this incredible part of my experience, I had the opportunity to attend sessions at the University of Alberta. Among these were a couple of tours that were useful, as they provided us exposure to other fields.

Overall, the WISEST program was an awesome experience. I would like to thank everyone who made this possible- the WISEST staff, my research team and my sponsors. I appreciate all of the work that you have dedicated to the program!

#### esther wong supervisor: Dr. Lee Foote / Renewable Resources Sponsors: AB Environment / Human Resources and Skills Development Canada - Canada Summer Jobs



"I was encouraged to not just read about science..., but to actually interact with and engage myself in my research."

It seems like it was only yesterday when I was a naïve grade six student attending the Choices conference. I remember deciding right then and there that I would be a part of the WISEST Summer Research Program when I was in grade eleven. I had no idea how I was going to get there, but my will was strong enough to firmly embed the goal in my mind.

I can't believe that WISEST is now over. However, I am happy to say that I have no regrets and that I am so privileged to have had the opportunity to attend both Choices and WISEST. I truly believe that WISEST has been one of the most rewarding experiences of my life. Not only did I gain knowledge and information, I have also gained life lessons and friends that will be a part of my life long after this summer is over. I was challenged daily to step out of my comfort zone. I was encouraged to not just read about science or look at science from behind the glass, but to actually interact with and engage myself in my research.

This summer, I had the pleasure of working in the labs of Dr. Lee Foote and Dr. Colleen Cassady St. Clair. I worked on four ecology projects, all of which required different skills and thinking. My navigation skills were put to test immediately when I had to find my way around the Biological Sciences building; but thankfully, the research projects were much more enjoyable.

In Dr. Foote's lab, I worked with my supervisor Kim on a project that consisted of daily field work in the River Valley, where we investigated coyote densities and activity patterns. Because the research was just getting started, it was neat to see all the nitty-gritty details that go into a project. We were really put to the test.

At the end of July, I began working in Dr. St. Clair's lab, where I worked

on three separate projects with three different supervisors, Darren Proppe, Adam Cembrowski and Ian Warrington, respectively. Our first project investigated the frequency of chickadee songs. Even though we sat at a computer for most of the day, we also had the opportunity to feed the chickadees three times a week, which was a great break from working on a computer. Field work and lab work was involved in the second project, where we analyzed the diet of coyotes in the River Valley. I definitely stepped out of my comfort zone when I was given the job of collecting and carrying the scat. The coyote scats were then autoclaved, which was an entire experience on its own, and the hairs within the scat were analyzed under a microscope. Our last project taught us the importance of sharing information and ideas in the science community. We worked on manuscripts and literature searches on the Web of Science, where I focused on an oil sands project that Dr. St. Clair had previously worked on.

WISEST has not been just a summer job. The Professional Development seminars and Lunch 'n' Learns contributed to a well rounded experience where we gained precious advice from a panel of role models who were all very open and receptive. I gained tools and tips that are actually applicable and useful in my life.

To my incredible research team; my two WISEST colleagues, Hayley and Lina; the WISEST team; and my sponsor, Canada Summer Jobs, thank you for this adventure! It has been a life-changing summer.

## finola hacket supervisor: Dr. Brian Fleck / Mechanical Engineering

Sponsor: Edmonton Glenora Rotary Club



Participating in the WISEST Summer Research Program is a decision I am incredibly glad I made. Over the past six weeks, I have learned a great deal about the wide array of career and life opportunities available to me in engineering and other disciplines at the university. I have learned that there are many interesting careers which I could pursue in diverse engineering fields. And though I may not end up an engineer, I am now much more aware of the university's general research and study atmosphere.

I was placed in mechanical engineering, studying two-phase flow through a spray nozzle. The experimental setup simulated the flow of steam and bitumen in coker reactors, using air or mixed gas and water. Methods of studying this include a laser method to study the droplets, an oscilloscope to measure the force of the spray, and taking images of the bubbles in the feeding conduit and the droplets of the spray. We focused on this last method, studying the two-phase flow under different gas-liquid ratios and mixing pressures, trying to identify any correlation between conditions of the bubbly flow and the quality of the spray produced. The consistent formation of small, round, uniform droplets is required for the spray's purpose in the heavy oil industry - to evenly coat particles of coke in a reactor. Our results showed that the size of the gas bubbles in the two-phase flow decreases with increased gas-to-liquid ratio or increased mixing pressure. This information will help the research team determine the effect of the flow conditions on the spray, and help to significantly improve the efficiency of the bitumen refining process.

In addition to introducing me to research methods, the WISEST program allowed me to meet many other researchers, from other high school students and undergraduates, to graduate students and professors, to corporate researchers, each of whom had invaluable advice to offer. One of the most enjoyable parts of my research experience was simply talking to these people and learning about the different paths they took to achieve a fulfilling career in science and engineering.

Twice a week we WISEST researchers convened for enlightening educational sessions. Monday Professional Development Seminars and Friday Lunch 'n' Learns gave insight into the world of academia, particularly the challenges faced by those in non-gender-traditional careers. Furthermore, they provided a great chance to catch up with fellow WISEST students and hear about the fascinating research being conducted in other labs. A standout session for me was the opportunity to meet and network with women at different stages in their scientific careers and hear the stories and advice they had to offer. I have always felt I could do anything I set my mind to, but I now feel more aware of the obstacles I might have to overcome to achieve my goals. It was also inspirational to see the joy and satisfaction evident when each role model talked about the life she had chosen and why science was the right path for her. The WISEST coordinators themselves were equally inspirational, as they did an outstanding job of organizing these informational sessions and ensuring all our needs were met. Thanks Misha, Jen, Kerry, and Grace!

Through my weeks in the lab, I have learned a great amount about the research environment. Though research work is at times dull and repetitive, the reward of seeing the results of not just your work but the combined efforts of those around you makes the effort worthwhile. I have discovered that research, like many other fields of work, is truly collaborative. I look forward to taking this newfound knowledge of the engineering research and study environment as well as the wonderful relationships with other researchers with me as I leave the WISEST program, perhaps not the wisest but certainly a little bit wiser.

## gabriella azevedo supervisor: Dr. David Stuart / Biochemistry

**Sponsor:** Alberta Advanced Education and Technology



"Touring chemistry helped me understand that just because you pick one particular field doesn't mean you stop exploring others."

I had prepared myself a week in advance on how to get to the ETLC solarium for our first day of orientation, but that seems to be the only thing I could have prepared myself for in the WISEST Summer Research Program. I loved this though, WISEST always kept me on my feet for what was in store – and there was a lot.

This is especially true when it came to my project. This summer I got to experience six weeks in the life of a genetic engineer, in the biochemistry department with Dr. David Stuart, Kwesi Kutin, Xiao Dong Liu, and Matt Rawluk. Here I was given the opportunity to do the type of lab work undergrads dream of. It is in this lab that I got to help in harvesting and manipulating yeast cells to increase their ability to synthesize the biofuel butanol. Butanol can be put straight into ones vehicle without modification and run it, it has the same energy output as gasoline and burns more completely, but best of all this approach to fuel lowers greenhouse gas emissions. By synthesizing new genes from bacterium and transforming them into yeast cells we hoped to create yeast that produce this useful biofuel. But the process is not that simple, since there is just one problem, butanol can be very toxic to the yeast cells in concentrations of about 2%. So my job over this summer was to make these cells more tolerant to butanol through mutagenesis and adaptive growth so they can produce more. Through actively doing these processes I learned that it's the little things done right that really matter. All the little steps I had to go through really began to add up. Even though my project was purely experimental with no fixed results, a lot of the materials needed to be prepared just right. I don't think one truly understands the behind the bench work that goes on in the lab until you've experienced it. Now I can truly appreciate the work and effort one must put in to achieve something so small that can lead to something so big.

And speaking of the small things that can make a big difference, seminars, and Lunch 'n' Learns come to mind. From networking to campus tours these little group activities have truly aided me when thinking about some of life's big decisions. One of the biggest helpers was the on campus tour of the chemistry department with Avena Ross. Touring chemistry helped me understand that just because you pick one particular field doesn't mean you stop exploring others, in many ways when it comes to sciences they are all interconnected. Avena and others also helped me understand that it is ok if you don't know what you want to do just yet, and that you have time to explore your options and self before making the big decisions. I now see that yes, university is a place for hard work but it also provides the atmosphere for that exploration. These sessions have provided me with the different perspectives that will allow me to view prospecting paths with fresh eyes. I know that from these sessions I have developed some great tools and skills that will only further me in school and life.

I had no idea how much of a life learning experience WISEST would be, there could not have been a better way to have spent the summer. I would like to thank WISEST, Alberta Advanced Education and Technology, Dr. Stuart and supervisors, teachers, and the friends I've made along the way because without them none of this would have been possible.

## hayley johnson supervisor: Dr. Colleen Cassady St Clair / Biological Sciences

Sponsor: Human Resources and Skills Development Canada - Canada Summer Jobs



Do you know that feeling when you think you can't do something and then one day that is exactly what you accomplish? When you feel proud of yourself? That is how I felt every day for the past six weeks. My supervisors and principal investigator taught me an unbelievable amount of information related to science and research during this summer. They and the WISEST team are the reason I am telling you about the best and the most useful summer I have ever experienced.

I was one of the lucky students to be put into a lab with two different projects, both in the field of biological sciences. One of the projects focused on chickadees and their songs. Our supervisor, Darren Proppe, had recorded hours of chickadees singing in Elk Island Park and within Edmonton. The purpose was to see whether or not the frequency of the chickadees song changed when present around loud noises. Esther, Lina, the two other WISEST students on my research team, and I helped Darren finish his project by using different computer programs like Signal and Audacity. The results we recorded proved Darren's hypothesis correct, the chickadee's song does change frequency when surrounded by noise. Along with computer work, we received the chance to take a course so we could feed and catch chickadees and finches in the university. Three days out of the week, we fed the birds worms and eggs. A job that requires sitting in front of a computer all day seems tiresome, but Darren, Lina and Esther made it more fun than I ever thought possible.

The other project that I worked on this summer dealt with analyzing coyote scat. Two days out of the week we would hike around the River Valley and surrounding park trails to find coyote scat. After scat collection we would then return to the lab, autoclave the scat, wash it, air dry it and then it would be easier to observe. The purpose of this lab was to discover the coyote's diet, which can lead to how we can

control the population and determine if human food is present. In the first week, I had to learn an entirely new concept, hair. Our supervisor, Adam Cembrowski, taught us the parts of the hair and which parts can help us identify the animal in which it came from. I imagined this lab to be a little revolting since it dealt with scat, and at times I dare say it was, but the people I worked with brightened up the lab and my day, making it easier to forget I was working with scat.

The WISEST coordinators organized Professional Development and Lunch 'n' Learn sessions, which helped immensely with things like the design of this article, my poster and in learning more about the researching science field. They also helped in the making of new friends during ice breakers like the Science Olympics and the scavenger hunt.

This summer has exceeded my expectations by a long shot. I would never have imagined that I would have this much fun while learning as much as I did. I want to thank Dr. Colleen Cassady St. Clair, Adam, Darren, Ian and the people who helped me when it wasn't their job like Patrick, Sophie, Michelle and Katie. The WISEST coordinators, Jen, Misha and Kerry deserve a thank you as well for choosing me to be part of this fantastic summer program and organizing it as wonderfully as they did. I'd like to thank my sponsor Canada Summer Jobs too, for supporting me throughout the entire summer. It was an experience I will never forget.

#### **heidi johnson** *supervisor:* Dr. Brian Fleck / Mechanical Engineering *sponsors:* Faculty of Engineering / Human Resources and Skills Development Canada - Canada Summer Jobs



"Some of my greatest discoveries this summer happened while talking to people, both in formal settings and over coffee."

I am an explorer, always looking for ways to develop and learn about the world around me, experiencing things to the fullest. I have often felt that my explorer tendencies have been stifled growing up in a small town, longing to stretch my wings and fly. When I heard about WISEST I knew it was the perfect chance for a journey unlike any I had experienced before. So I prepared to embark on an adventure, wondering what resources one needs for a trip across the river of applications, and to survive the campus jungle, and impress the native inhabitants of the University on the other side. This would be the ultimate test of my explorer skills.

Although it may be alluring to take the easy way out, an adventure is always more worthwhile if you are challenged. WISEST challenged me in ways that I did not imagine it would. The initial difficulties I faced tested my navigational skills: multiple maps, tall buildings, busy roads, and this mysterious public transit.

Now that I could physically get from place to place, the next part of my journey was to navigate the inner workings of a mechanical engineering lab. At first it seemed like I had brought all the wrong supplies. I had packed for order, cleanliness, regulations, and supervision. The seemingly chaotic arrangement of the lab was foreign to me, but extremely exciting. I quickly adapted to this new structure and went to work. The particular project that I was assigned to studied two-phase flow through a coker spray nozzle. Although this project used many techniques to optimize the refining of heavy oil, my particular mission focused on the analysis of bubble images taken in the feeding conduit of the spray. My lab partners and I analyzed a total of 40 000 bubbles. Despite the overwhelming presence of bubbles in our days, we were also able to participate in other undertakings on the side. We ventured to the wind tunnel to calibrate equipment, tested robots, and built airplanes, meeting people with wisdom to offer at every turn.

Some of my greatest discoveries this summer happened while talking to people, both in formal settings and over coffee. It is wonderful to acquire insight from seasoned explorers. They have been on the trail you are currently on, but they have also gone further, they offer advice for your current trials, but also prepare you for future endeavors. I am thankful for this experience allowed me to meet fellow voyagers. The WISEST-run networking session allowed me to learn about the trials of working in a non-traditional career, but also taught me how rewarding an experience it can be. A valuable lesson I learned from all of the mentors I have met this summer is to follow your passion. No one that I met this summer would settle for satisfactory in their lives; they were all explorers too.

I also learned while working in my lab that not all things are always the most thrilling, but when you know that there is a bigger picture that you are passionate about, even the most menial tasks can be viewed in a different light. So although parts of the journey may be hard or even boring, if you are enthusiastic about the destination even the most fatiguing parts are worthwhile. I am so thankful to all those around me during this adventure that helped me stay on route. It was definitely worth it.

I went on this journey to develop a greater understanding of what I want to do with my life. WISEST has provided me with the skills to continue on many more adventures. I am more excited than ever to step out into the world and discover this wonderful universe. I hope that I will always be an explorer and never stop learning. There are so many amazing things in this world to see and so many interesting people to meet. Every journey has a beginning, but I believe that although my experience in WISEST has an ending; it is only the beginning of a life filled with learning and adventure.

#### idel riemer supervisor: Dr. Phillip Currie / Biological Sciences sponsor: Alberta Summer Temporary Employment Program (STEP)

"I was also provided with the skills and knowledge I would need to pursue those careers through the Lunch n' Learn sessions..."



I had wanted to be a part of WISEST since the day my dad saw an article about it in the newspaper a few years ago. I had no idea where I was headed, and I figured this program would help me narrow down my choices for my future career from 'science' to something more tangible. Since that day, it was my goal to get into the Summer Research Program. So, when I received that fate-ful phone call, or, well, the message left on my answering machine, I was ecstatic.

I was placed in Dr. Philip Currie's palaeontology lab with another student, Carmen Chornell. We primarily worked with three of Dr. Currie's graduate students on their projects. Overall, their goal was to spread knowledge about dinosaurs, since this knowledge is able to help us study animals in the present. They needed our help to tackle some of the larger, more time consuming activities that contributed to their individual projects. The work was tedious, but the experience was mind-blowing. Our first week was spent with Victoria Arbour who studies ankylosaurid dinosaurs, which are large, armoured dinosaurs with club-like tails. We prepared a large Euoplocephalus pelvis and delicate osteoderms with dental picks and glue in order to help her determine the diversity of these dinosaurs in North America compared to Asia. Learning the basic structure of the dinosaurs helped us with our next project with Lara Shychoski, who studies the biomechanics of size in tyrannosauroid dinosaurs. She looks at how stiffness and increase in stress influenced the likelihood of bone failure. This will hopefully contribute to the study of the evolution of large size in terrestrial vertebrates. We CT scanned braincases of a Daspletosaurus and Sinraptor at the University hospital in order to properly see the brain cavity and determine the effects of stress on the skulls. We also worked with Derek Larson who studies turtles and the significance

of microvertebrate fossil abundances in the Milk River Formation. We prepared a turtle that is believed to be a new species since it was found in an area that was five million years younger than other similar turtles. We also sorted through dirt from the Milk River Formation under a microscope for teeth and bone fragments. I am extremely grateful for being exposed to such a variety of activities, and I have gained a greater appreciation for palaeontology.

The WISEST Summer Research Program was able to show me a variety of career options through the Professional Development Seminars which contained On and Off Campus tours to other student labs, and, in my case, to the iRSM at the Misericordia Hospital. I was also provided with the skills and knowledge I would need to pursue those careers though the Lunch n'Learn sessions where we learned how to make research reports and networking skills. I also gained lab and academic skills that will help me throughout high school, university, and life after that.

I would like to thank Dr. Currie, Victoria, Lara, Derek, Mike Burns and Nicola for allowing me to work with them and teaching me more in one summer than I have ever imagined I would, and the WISEST team, Grace, Kerry, Jen and Misha, for running this program and allowing students to benefit from this amazing opportunity. I would also like to thank STEP for sponsoring my involvement in this program, and Carmen and the other WISEST students for providing me with a summer I will never, ever forget.

#### isha ober supervisor: Dr. Gina Rayat / Surgery Sponsor: Edmonton Glenora Rotary Club



"We had a chance to meet rolemodels who dared to go against the trend and pursue a non-traditional career."

I remember sitting at the lunch table with my friends in the school cafeteria crunching on the delicious Mexican fries when suddenly my eyes went pass the clock hung in the room front of me and I began cursing myself of being forgetful. I collected my books at the instant and rushed to the 'Student Services' where I had an appointment with the Student Counsellor. Though having heard about the counsellor from many teachers that was the first time I took time to meet her in person, in return getting the golden opportunity of becoming a WISEST Summer Student Researcher, 2009.

The six-week WISEST experience was not just full of learning but was also filled with fun, amusement and excitement of being a part of the 'Diabetes research' project. I was placed in my first choice of departments-Surgery. My principal investigator, Dr. Gina R. Rayat's, laboratory was working on a xenotransplantation project which then became my project. In their earlier research for finding alternative treatment for Type 1 Diabetes, they had transplanted immune-deficient and immune-competent diabetic mice with micro-encapsulated Neonatal Porcine Islets (NPI) co-cultured with bone marrow and/or Sertoli cells and found that most of the mice were able to achieve and maintain normoglycemia without the use of immunosuppressive drugs. Having found that bone marrow and Sertoli cells aid in enhancing the survival and function of NPI, they transplanted the same groups with NPI co-encapsulated with bone marrow and/or Sertoli cells. My days at the laboratory were usually spent taking blood glucose levels of mice and preparing the animal sheets and graphs. But, undoubtedly the best part was the realisation that I was contributing towards the betterment of the society, looking for better alternative treatments for Type 1 Diabetes patients ending their long-term dependency on insulin injections. In addition to that, I also made and diluted

solutions (where my Chem-20 formulas certainly came into use), and did Immunohistochemistry (IHC) staining.

Besides getting a hands-on experience in the research laboratory, I attended the 'Professional Development' seminars and 'Lunch 'n' Learn' sessions which completely blew my mind. 'Professional Development' seminars organised every Monday were very informative. We had various Networking fairs where I got a chance to meet role-models who dared to go against the trend and pursue a non-traditional career, inspiring me to never give up but keep toiling until I become what I aspire to be. I also visited the Institute for Reconstructive Sciences in Medicine (iRSM) based at the Misericordia Hospital which was the best tour ever. The 'Lunch and Learn' sessions were very informal and tonnes of fun. We were taught how to write articles, reports and design research posters.

In a nut-shell, WISEST was the perfect blend of learning, researching and exploring accompanied by loads of fun, and whole lot of new relationships I made. It amazes me how a small step of taking time to meet the counsellor opened the doors of a whole new experience for me, which I'll cherish throughout my life.

## jia-yee (vanessa) hon supervisor: Dr. Jason Carey / Mechanical Engineering

Sponsor: Alberta Advanced Education and Technology

"This amazing experience has confirmed my interest in the science and engineering field."



WISEST, Women In Scholarship, Engineering, Science & Technology, a program that used to be a goal for me to participate in, now represents the experience of a lifetime.

I was never one of those people who had a career path already planned out or had their dream job in mind. The WISEST program has given me the opportunity to not only explore different careers but also experience research.

I worked along with my supervisor, Daniel Romanyk, in the lab of Dr. Jason Carey, on Dan's maxillary expansion project to create a new device to widen the upper jaw. I was able to witness both the ups and downs of research. Background knowledge of the project was of course needed and that would be done through reading, it would not be thrilling but worthwhile in the end. It soon got interesting as we headed over to NINT where we used the tensile machine to perform proof of concept tests for the maxillary expander. After I had the chance to use the ProEngineer computer program to create 3D models. I quickly appreciated how some 3D models that may look simple are actually very time consuming and difficult to create.

For my last project, I was to independently try to bust the phonebook myth, that two interlaced phonebooks would not be able to be separated. It was different than solving problems that you would typically get at school; it was a chance to find information for yourself without someone telling you where to go and exactly what to do. I was of course given help from both Dan and Jason when needed, as I went through the process. In the end I was unable to bust the myth, as when we made a third attempt, the books had been damaged and easily slid apart with minimal force applied. I also worked with Jonathan on the orthodontic simulator machine (OSIM). It was enjoyable to use such a complex and fascinating machine and to use the faro arm to take precise measurements.

It was not all about work in the lab, people would always be joking around and having a good time, and it was a great atmosphere to be in. Everyone in the lab was at different stages in university studies; some were undergraduates, while others were doing their masters or doctoral degrees.

Outside of the lab, I had the chance to tour campus, sit in lecture and seminar classes, and witness a well done Master's of Science Thesis defence by a lab member, Alessandro. I also sat through a couple of meetings as I listened to what other lab members were doing as everyone updated each other on their work. At two meetings I was given the opportunity to do a presentation to update the other members on what I have been doing. The presentations were nerve wracking, but in the end turned out to be a great experience as everyone was very supportive.

It is a big step up moving from high school to university and WISEST has created an intermediate step for me, giving me a chance to see what university is like before entering as a student. The WISEST sessions every Monday afternoon and Friday at lunch have taught me skills that will definitely help me excel in the future.

This amazing experience has confirmed my interest in the science and engineering field. Without the cooperation and efforts of many people, this wonderful program would not be able to function. I would like to thank the sponsor, Alberta Advanced Education and Technology for sponsoring the program. Misha, Jen and Kerry have been terrific student coordinators throughout. Thank you to everyone in the research lab that has been there for guidance and support. Lastly, I would like to thank Jason and Dan for the encouragement and time that they have put in, to make my six weeks at the university worthwhile.

## jordan fordyce supervisor: Dr. Jillian Buriak / Chemistry/NINT

Sponsor: Alberta Ingenuity Fund



"I have a new outlook on life as well as an amplified and renewed curiousity in science."

The WISEST program was my opportunity to grow as an individual; getting away from the same people whose mindsets never change and jumping into a curious new world full of questions and unexplored knowledge. I learned what it was to ask questions that didn't have answers until an experiment was conducted. I wanted to broaden my knowledge of various science fields to make an informed decision on my career path while getting a 'head start' at the University experience. WISEST was really great because I have acquired new lab skills, made new friends, and can proudly say I helped the research team with their solar cells. Originally I had thought I would only be learning the simplest end of their research but I was able to take the front seat in the research as opposed to the back seat.

I was placed in the National Institute for Nanotechnology working on third generation photovoltaic cells. These solar cells used inexpensive material; organic and inorganic semiconductors, to harness the sun's energy in thin films. Through colloidal synthesis we grew cadmium selenide nanorods creating pathways in the photoactive layer deposited on the films pairing them with photoconducting polymers. I found real life scenarios to apply most of the Physics 30 course I had taken – work function, Planck's energy formula, the visible light spectrum, band gaps, and absorption versus luminescence. That doesn't begin to cover the graduate level chemistry I learned as well as some of the undergraduate physics. And yes, I've become fluent in the acronym language. There was the equipment used to characterize films: UV-VIS, AFM, SEM, TEM, and RMS values. These tiny solar cells were information monsters.

Throughout the course of the program, I met many new people and everyone in my group was great. They were all nice, patient, and

funny. They always took time out of their work to answer any questions I had and always invited me to the activities they did like soccer or baseball. It made me feel welcome and like a permanent member of the team. I spent some lunches and breakfasts with my WISEST friends and always had someone to giggle with during the Lunch 'n' Learns or Monday sessions. However, these sessions weren't just an opportunity to catch up with my friends; they taught me valuable skills and equipped me with assets that I can use throughout my whole working life. Things like how to present myself to prospective employers and what I can do to prepare for that. I was also introduced to the concept of role models and how they can help you make informed decisions. I feel that the WISEST program was everything I wanted and more. I have a new outlook on life as well as an amplified and renewed curiosity in science.

The person that made this possible is my grade 9 science teacher, Mr. McIlroy who encouraged me to apply because he new I'd love it here. Without him, I probably wouldn't have known about this program. My family has also been very supportive and my other science teachers very helpful. Of course, my sponsor, The Alberta Ingenuity Fund, made my placement possible. I thank them for allowing me to explore the vast and growing world of Nanotechnology. I couldn't be happier with the experience and wish I could come back next year and spend my summer with WISEST again.

## kathlyn moores supervisor: Dr. Ania Ulrich / Civil and Environmental Engineering

Sponsor: Alberta Summer Temporary Employment Program (STEP)

"With programs such as WISEST, not only do doors open, the windows aren't shut anymore either."



Somebody very intelligent once said, "Life is like a box of chocolates. You never know what you're going to get." After my six weeks as a student researcher I now believe that life is more like an unknown vial of sample and a pH meter. You have a general idea of what your result will be but you could get any sort of outcome. Being part of the WISEST Program was just like that. I had expectations but I didn't really know what I was in for. Meeting all these new and really intelligent people opened my eyes to how much is out there. Coming to the WISEST Program showed me how many different careers and opportunities I have to choose from. Being female in today's world is definitely not a set-back; as I see it it's an advantage. With programs such as WISEST, not only do doors open, the windows aren't shut anymore either. It's impossible to comprehend how much the world has to offer. I could be an environmental engineer and work with something as common yet as complex as water. Or maybe I'll be a neuroscientist and work with microscopic brain cells to discover the cause of a neurological disorder. The possibilities are endless for young people in today's society. Everything is at our fingertips and we need to embrace that fact. That is why I'm so thankful for programs such as WISEST. It gives today's youth the chance to explore non-traditional professions as well as learn about all the different career options available.

My time in WISEST was more than exceptional. Even on the very first day I learned new things and had a fantastic time. When it was time to finally join my research team and enter the lab I was ecstatic. I was welcomed into the environmental engineering lab of Dr. Ania Ulrich but worked with grad student Lisa Brown; my direct supervisor.

My research started with some inevitable reading but soon turned into full work days. Some days seemed longer than others with tedious or mind-numbing tasks while other days the time flew by with us begging for another hour or two to finish. But then again, that's all part of doing research. No matter the type of work we did, every day was worth it and all part of the experience.

The basic purpose of my research project was to determine the sorption capacity of different soils native to the Athabasca oil sands region. The types of soil we used were clay, sand and muskeg. The water we tried to sorb to the soil was process affected water that came from Suncor's South Tailings Pond near Fort McMurray. We used a dissolved organic carbon digester and fluorescence scans to help figure this out. It was very interesting using the dissolved organic carbon digester and working with the soils. Much of the equipment in the lab was similar to what I use in my schools chemistry lab but it was great seeing the more high-tech things as well. I also really enjoyed and appreciated learning more about the environmental harm being done by the oil sands operations. I have always been passionate about the topic and feel more informed than ever.

The WISEST program has given me a whole new appreciation for the vast amounts of knowledge available to us. This has been the only summer I have ever done something where thinking is required. I had an amazing time learning all that I did and meeting everyone that I have. I definitely recommend WISEST to anybody and everybody, well, who meet the requirements anyway. The past six weeks were without a doubt an unbelievable experience and a time I will never forget.

# **kathryn orydzuk supervisor:** Dr. Michael Ganzel / Agricultural, Food & Nutritional Science **sponsors:** Faculty of Agricultural, Life & Environmental Sciences / Human Resources and Skills Development Canada - Canada Summer Jobs



"We were able to speak to role models in our fields of research ...all of whom are amazing people who have excelled in their fields... "

Before entering the WISEST program I had a certain idea in my mind of what it might entail. I visualized myself working in a lab doing cutting edge research, using fancy scientific equipment, wearing a lab coat and most of all working alongside a group of extremely intelligent researchers. I was not disappointed. I was assigned to a microbiology lab in the Agriculture and Forestry building where I worked with a strain of bacteria known as Lactobacillus reuteri. This particular strain of bacteria is important because it can be used to produce a low molecular weight antibiotic called reutericyclin. My small part of a much larger project surrounding this bacterium was to sequence the strain LTH 2584.

The six weeks of WISEST flew by while I learned to do things such as prepare medium for growing bacteria, make subcultures, gram stain, extract genomic DNA, prepare agarose gel, design primers, use electrophoresis to determine molecular weight, use a centrifuge, purify DNA and, my favourite, carry out the polymerase chain reaction (PCR). I also know that I have improved note taking skills as well as lab skills and have learned how to write an awesome lab report and how to make a fantastic research poster. I have not yet taken Biology 30 but I know that due to my work this summer, genetics will be more than easy.

Of course one cannot forget to mention the unforgettable experiences that the Mondays and Fridays with the other students participating in WISEST had to offer. We were able to speak to role models in our fields of research, go on a tour of a building at the U of A and also go on an off campus tour and of course participate in the Science Olympics. I, in particular, was able to speak with four wonderful ladies, Lindsay Austrom, Perrin Beatty, Samia Sarkar, and Sarah Routier, all of whom are amazing people who have excelled in their fields and were able to offer meaningful insight into university and careers, which I found most helpful because I had not yet decided on a career. I was also granted a tour of the mechanical engineering building at the University given by Dr. Carlos Lange where I got to see a model of the weather sensor that was designed at the University of Alberta for the Mars Rover Mission. For my off campus tour I was able to see a Scanimetrics lab where they were designing chips to send instructions through wireless frequencies with the purpose of protecting the chips that were receiving the instructions from damage. The Science Olympics which took place on the second day of WISEST was an opportunity to meet the other students participating in WISEST and get geared up for the science filled summer ahead. As Jen might say, it was wicked!

These experiences were unique and unforgettable and I am so grateful to the WISEST program for them. I am also grateful to the WISEST coordinators Jen, Misha and Kerry for their time and effort. I would also like to thank my Principle investigator Michael Ganzle. Furthermore, it is imperative that I thank my Direct Supervisor Marcia Shu-Wei Su for allowing me this opportunity and being so patient with me and teaching me more in one summer than I might ever have learned in a semester of school.

# **katie kinaschuk supervisors:** Dr. Keri McFarlane & Dr. Heather Prior / The Kings University College - Chemistry and Biology **sponsors:** AWSN / Human Resources and Skills Development Canada - Canada Summer Jobs



The WISEST Summer Research program is one that presents high school students with the opportunity of a life-time, and has provided me with an experience that I will never forget.

When I first learned that I had been accepted into the WISEST program, I was extremely excited but also nervous. I was told that I had been placed in the biology department of the King's University College, but that was the extent of it. I had no idea what exactly I would be working on and was nervous it would be something I would find boring or tedious. Upon my arrival at King's, much to my relief, I learned that I would be developing a working protocol for a microbiology lab that was to be used in one of King's microbiology courses. The lab protocol entailed bacterial growth and colony isolation, bacterial DNA extraction through cell lysis, DNA amplification through polymerase chain reactions, DNA purification, as well as genome sequencing of the gene 16S rRNA using a LI-COR 4300 DNA Analysis System.

The opportunity for me to explore the field of microbiology and DNA analysis was extraordinary as I have always had an interest in these subject matters. I've always been intrigued by bacterial pathogens and I find DNA analysis fascinating, so when I was presented with the opportunity to work on a project that combined components of both, needless to say I was ecstatic.

Also, I have to admit, I learned a lot more in these six weeks than I could ever have imagined. Not only did I learn things in regards to research, but I also learned more about myself and what sort of things I like and what sort of things I don't like to do. I believe that this further insight into my own self interests is an invaluable asset that will greatly assist me far into my future. I have also gained an exalted confidence in my skills and abilities through the work that I have done with the WISEST program. I think this confidence can be greatly attributed to my PI's at King's, Dr. Keri McFarlane and Dr. Heather Prior. Not only did my PI's push me to my academic limits in regards to teaching me the basis of researching techniques, but they also pushed me to learn, and more importantly understand, the biological component behind the work I was doing. This was a little difficult as I was dealing with genetics and have never taken any course work on it in school, but with the patience of my PI's, I can now say I have a basic understanding of genetics which will surely aid me in the future.

The knowledge that I have gained from the WISEST Monday seminars and the Friday Lunch'n'Learn sessions will also prove to be quite beneficial in the future. From the Monday seminars I learned important skills in regards to networking, and explored various career options through the touring of research facilities. From the Friday sessions, I have gained further networking skills, for example developing my own 'elevator pitch', as well as learnt about the forgotten details of research concerning such things as posters and ethics.

Although being involved in the WISEST program required a fair bit of work, there was still some time for fun and games. We did social activities like the "Science Olympics", and just being able to socialize with like-minded people my own age was incredible. The WISEST coordinators Jen and Misha were also awesome as they provided me with support and guidance throughout the duration of the program.

The WISEST summer research program has been an incredible experience, and I'm sure that the many opportunities it has presented me with will continue to aid me far into my future, in more ways than I could have ever imagined.

## lara chehayeb supervisor: Dr. Glen R Loppnow / Chemistry

Sponsor: Alberta Ingenuity Fund



"I found the most educational and interesting sessions to be the off-campus tour and the networking fair."

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

Although the WISEST participants entered their labs on the first day knowing next to nothing about their projects, we left having learned more than we could have possibly expected from just six weeks. However, even with all the information we have absorbed, we are left with infinite questions and a greater thirst for knowledge that will support us along our paths in the world of science.

My project over the summer was to help the research team discover new ways to quantify how UV-C light can damage DNA over time, and therefore help to relate DNA damage to disease. A microarray is a pattern of solutions printed onto an epoxide coated glass slide. The advantages of using microarrays are that many experiments can be conducted at once using several solutions.

A short single strand DNA, internal standard, and fluorescent probe solution were used for our microarrays, which were created using a robot printer. After printing, the probe is hybridized to the ssDNA (single-stranded DNA) and the microarray is subjected to UV-C damage. Scans are then taken of the microarray to determine the change in fluorescence of the probe and quantify the damage. Doing so with different internal standards and fluorophores and causing damage at varying time intervals allows us to find new ways to relate DNA damage to disease.

Not only did I learn in my laboratory, I also learned during the WISEST sessions in which people of various backgrounds and education spoke to us about many topics to guide us toward our futures in science. I found the most educational and interesting sessions to be the off-campus tour and the networking fair. I was lucky enough to visit the Institute for Reconstructive Science in Medicine at the Misericordia Hospital and discover a whole new area that I had never even thought of exploring on my own beforehand on my off-campus tour. After seeing this wonderful institute, I have become very interested in reconstructive science and may even pursue this path in the future. The networking fair also brought to light many new topics such as obstacles that we may face during our education and career, and the best way to work through them. The role models that attended shared their extensive wisdom and made the participants feel comfortable in an intimidating situation. Speaking with people who have achieved what I hope to in the future has removed nearly all doubts and questions I had on a more personal level.

At the end of the six weeks, all I can wish for is to be back at the beginning and be able to do it all again. On the first day I was not sure what to expect from other participants, research teams and WISEST coordinators. However, within the first hour it was obvious that everyone involved were not only friendly, but more than willing to help their fellow scientists and encourage involvement in every aspect of the program. I think it is safe to say that all the students left at the end of the summer with more wisdom and experience, and even more ambition to further pursue their futures in science. Having interest in a non-traditional career can make one feel as though there are endless barriers in their path, but with programs such as WISEST those barriers are removed. I would like to thank everyone that has been striving to allow young men and women to live their dreams despite whether those dreams are considered traditional or not.



I had to stop myself from screaming out loud when the WISEST office phoned my house. I saw WISEST on call display before I picked up, I was excited to find out if I got into the program. Since I wrote this article, you probably guessed that I did get in. I went to school the day after and came to know that some of my friends have also made it. I knew I would have so much fun, and WISEST did not disappoint me. This is indeed one of the best summers I've ever had.

On the first instructing day, all of us WISEST folks were told to let our minds be blown; I thought they were kidding until I started working the second day. Our daily work includes computer analysis of bird songs and coyote scat analysis. We were given the chance to feed chickadees and finches three times a week. Although I thought computer analysis would be repetitive and boring, my supervisor Darren made it super fun. The coyote scat analysis is a complete different story. Scats are commonly known as poo, we went out hiking as a group, and picked up poo. On our lucky days, we found numerous, dry, hairy poo which are easier to process and analyze; and you can probably guess what it's like when we were out of luck, we find fresh, smelly diarrhea! I was worried that six weeks of work would last forever, and I wouldn't be able to have any fun, but turns out working in labs is amazing and fascinating. The research projects are phenomenal, the people we met are all great mentors, and I'm overwhelmed by how much we learnt in the labs through working and chatting.

As well as the skill and knowledge I gained, I made such great friends! Thanks to Hayley, Esther, and our research team, we have accomplished so much while enjoying ourselves. By the end of the program, we were so sad about splitting our science family. Being with my research team, I learnt the most important thing in the field of research – teamwork. During the six weeks, we worked collaborate, openly discussed opinions and helped each other out at work. We even go shopping and watch movies together now!

Other than working in labs, the WISEST program itself offered us tons of opportunities to explore research fields, find out career options and ways to get there through post-secondary education. It was such an organized program that provided us with a relaxing environment for learning. The Monday Professional Development sessions and Friday Lunch 'n' Learn sessions broadened my view, I feel privileged with all the information we learnt. WISEST truly prepared each one of us for entering post-secondary. Everyone on the WISEST team are friendly and helpful, they shared their experience with us and helps everyone out with problems.

Time goes by so fast, I don't even realize WISEST is ending already. The experience with WISEST is absolutely priceless; it transformed all of us from ordinary high school students into young non-traditional researchers. How cool does that sound! And I would like to thank WIS-EST, my research team, and Canada Summer Jobs, for giving me such a great summer adventure. I thoroughly enjoyed every minute of it!

## malithi fernando supervisor: Dr. Dongyang U Li / Chemical and Materials Engineering

**Sponsor:** Suncor Energy Foundation



"It was immeasurably gratifying to actively contribute to a legitimate research project..."

I was fortunate to learn of the WISEST Summer Research Program in my grade ten year, and had been looking forward to applying ever since. The thought of working in a university lab, before graduating high school, was what impressed me most about the program. However, I never anticipated that I would participate in the key aspects of the research project. I expected to be given the 'easy' tasks, and allowed to observe another team member in the crucial elements of research. I was thrilled to learn otherwise.

I was placed in the materials engineering lab of Dr. Dongyang Li, where my supervisor Reinaldo Chung, was researching more erosion resistant metal alloys to replace the current metals used in oil slurry pumps and pipelines. My project involved studying the erosion behaviour of a set of three different experimental alloys, at varying slurry speeds and impact angles of particles. The first step was to prepare several samples of each alloy using silicon-carbide paper and a grinder. Once the samples were polished to a specific roughness, they could be tested using a slurry erosion tester. The sample holder held samples at different angles and the main body of the tester was filled with a sand-water slurry. The samples were rotated at different speeds and the tests were repeated until each alloy was tested at every combination of the speeds and angles. The data we collected from the tests was in the form of the weight loss of the sample, which indicated the erosion resistance of the alloy. After plotting and analyzing the data, we arrived at our final conclusions regarding which alloys perform better at specific speeds and angles. It was immeasurably gratifying to actively contribute to a legitimate research project which plays a significant role in improving oil slurry pump and pipeline integrity. Thus, making them safer and saving companies millions in damage costs.

Though working in my research lab was the bulk of my WISEST experience, twice a week we attended Professional Development (PD) Seminars and Friday Lunch 'n' Learns. The Lunch 'n' Learns taught us more practical, academic skills, while the PD Seminars provided some of the most inspiring and 'mind-blowing' experiences. The networking session with a group of accomplished women in nontraditional fields allowed us to learn about their individual career paths and of their struggles along the way. I also had the privilege of participating in a tour of the Institute for Reconstructive Science in Medicine at Misericordia Hospital, which exposed me to cutting edge technology and scientific developments I never knew existed. These key learning experiences made the Summer Research Program even more enriching.

There are several individuals who played a key role in making this opportunity possible for me. I would like to thank Dr Dongyang Li, my Principle Investigator, for accepting me into his lab and entrusting me with a research project. My sincere gratitude goes also to Reinaldo Chung, my supervisor, for the countless hours of explanations, and his contagious excitement in our research. I would like to acknowledge Suncor Energy Foundation for their contribution in sponsoring me. Without such sponsors this program would not be possible. My heartfelt thanks to my parents and my aunt, for the support and encouragement they have provided. Finally, a huge thank you to all the individuals behind WISEST. This is an exemplary program, and I am truly grateful for the amount of organization and commitment they put in to making it possible.

#### matthew green supervisor: Dr. Wendy Austin / Faculty of Nursing

Sponsor: Alberta Summer Temporary Employment Program (STEP)



Summertime. It is the ultimate time to get my bronze on, sleep in late, hit up the lake and the cabin, and ultimately accomplish what I have never failed to accomplish during a summer vacation... nothing. Up until this summer my two months were spent in a state of mental comatose where the most stimulation my brain would receive was from summer novels, comic books and blockbusters. By the time the next school year came around my mind would be as slack and limp as my motivation for waking up early. However, as I now testify, this summer that all changed. To say working in the program was enlightening is an understatement. It was mind blowing. I was placed in the Relational Ethics department in the Faculty of Nursing. Working in Dr. Wendy Austin's office taught me new dimensions of viewing the world around me and seeing and guestioning things from an ethical perspective, other people's perspectives, the media's perspective, a researcher's perspective, and even looking at myself introspectively. So much of what the guys and I learned was applicable not only to the field of relational and research ethics but also to our own lives which makes the experience that much more worthwhile.

One of the most memorable experiences of working in the program was making new friends. For me, the fact that I was able to share this experience with the other guys that were placed in the same department I was in created an environment that we could work in where we didn't feel alone in feeling totally befuddled or in achieving success. In being able to share those feelings of apprehension and excitement going into the program and those little moments, ranging from times of laughter to awkward silences, we were able to become close friends and what makes an experience truly great is when you have others to share it with. I will never forget some of the conversations and jokes Daniel, Amir and I were able to share. The research project I took part in was to look at compassion fatigue to gain a broader understanding of what it is and how it is affecting healthcare professionals in Canada and finding methods to treat it. My job was to read and help in the analysis of transcripts from interviews and find common themes that held. We also got a chance to write from our own perspectives in the form of phenomenological writing which was a challenge but at the same time helped bring to light a different aspect of what it is like to do qualitative research.

Another highlight of the experience was being able to go shadow at Health First. We were able to observe much of what we learned about in terms of the interactions between patients and healthcare professionals in action and what working in a health care setting is like.

I would like to thank Dr. Wendy Austin and Erika Goble for letting us work in the department and educating us, Nina Erfani, Stewart MacLennan, and Tim Anderson for showing us the ropes and setting up jeopardy for us, all the co-ordinators and sponsors that made the program possible, and Daniel and Amir for being the best of chums

### mavis chan supervisor: Dr. Walter Bischof / Computing Science

Sponsor: iCORE, Informatics Circle of Research Excellence



"This experience has definitely helped me on deciding what path I should walk down on when I pick my courses for university."

Summer of 2009, this is the last summer that I will spend as a high school student. Instead of just sitting around and wasting my summer, I left myself a memory in my heart that I will always remember, by participating in the WISEST summer program. I remember on the first day when I took the first step into the building, I thought to myself "I can't believe I'm spending my summer doing this." At first, I thought it would be boring way to spend my summer, but as the program continued, my views started to change; it became interesting and fun.

On the first day at orientation, I found out I would be working in one of the computing science labs, and in the afternoon, when our supervisors took us to our labs, I found out I was working in the AMMI (Advance Man-Machine Interface) lab. I had no clue on what type of work was involved in the lab and I felt really nervous being there. The worries and panic slowly disappeared; my supervisors were super nice, they showed me what they did in the lab and what equipment they used, and they definitely made me feel very welcomed.

My job over the summer was related to programming and rehabilitation. You might be thinking, how do those two go together? Well, current method of rehabilitation involves the patient completing repetitive tasks daily, which they might not do because it is quite boring. So my goal was to create a more interesting method for the patients to practice their upper body rehabilitation, and what I created was a game and an application. Both of these require the patient to practice the movement of their arm, while at the same time, providing entertainment to them. The game was a balloon popping game, as the balloons rise from the bottom of the screen, the patients are required to reach out and touch the balloon, making them pop. A score is recorded and progress can be tracked. The application was a photo editing application, where a picture is loaded and the patient adds effects to it, the application also allows room for creativity besides practicing the movement of their arms.

At first, I did not have a single clue on how to program my own application, but after the six weeks, I finally understood how the process works and how an application can be built. Throughout the six weeks, I have learned lots, not just from the lab work itself, but also the WISEST components that we attend every week. This experience has definitely helped me on deciding what path I should walk down on when I pick my courses for university.

I would like to thank my supervisors, Michelle and Fraser, for the help throughout the six weeks. They have taught me lots and have endured through all the times when I have annoyed them when I needed their help. I would also like to thank my Principal Investigator, Walter Bischof, and my sponsor, iCore, and of course, WISEST, for allowing me to participate in such a wonderful program. It has definitely made my summer more interesting.

So if anybody asks me in the future, "so what did you do during your last summer as a high school student?" I will be able to reply back and say "I did something very special, I was in the WISEST program" instead of saying "I did nothing at all but sit around at home". I will be able to tell them that I spent my last summer doing something memorable.

## michelle zingel supervisor: Dr. Adam Lubell / Civil and Environmental Engineering

Sponsors: Faculty of Engineering / Human Resources and Skills Development Canada - Canada Summer Jobs

"I'd like to extend my deepest gratitude towards everyone from my lab, for all the knowledge they've given me in one memorable summer."



The blood rushed through my ears; a feverish orchestra of drums, pounding harder and more violent with every step. As the target destination came closer into view, the nausea hit. Butterflies scraped the insides of my stomach, and negative thoughts invaded from the unwelcome crevices of my mind. To put it bluntly, I was scared to death. I couldn't help but worry, no – picture, that I wouldn't fit into the WISEST program.

Waiting for my principal investigator, Dr. Lubell, steel-toed shoes in hand, was probably the hardest part of the entire first day. I was nervous and excited all at once, to meet the other WISEST students I would be working with, and my female direct supervisor. To my surprise, I found myself standing alone, the sole WISEST student working in the concrete lab. The nausea returned for round two. Walking around the lab, Dr. Lubell explained that mixing concrete was like using a recipe to bake a cake. That was comforting, cake was less scary than the solid slab of rock in front of me. I could handle cake. As my eyes wandered, I quickly discovered that not only was I the lone student in the room, I was also the only person possessing two x-chromosomes. The final round of nausea struck hard, but I had vowed to put myself out there. Taking a deep breath, I smiled, and told Dr. Lubell I would see him and my direct supervisor Samson the next day.

As the weeks passed, I found an odd appreciation for that slab of rock placed in front of me on day one. Who could have guessed that there was so much more to concrete than throwing components together? Adding too much water decreased its strength, adding too much cement made it stiff. The slump had to be just right, and the moisture content of the aggregate needed to be

tested. Rocks had to be sieved, soaked, baked, and everything in between. I guickly learned that my research project involved a vital aspect of concrete. I would be testing the compressive strength of three mixes with varying water/cement ratios. Simply put, I would make concrete samples with different amounts of water and crush them until they failed or even better, until they exploded. The twist to our project was that we would be using a lightweight aggregate in place of gravel. To our surprise, the lightweight material preformed amazingly, producing a compressive strength similar to regular concrete. This is important, because creating a mix design that is light and strong is ideal. In the end, lighter concrete is much more economical. Although, the most stunning part of the lab wasn't the concrete. It was the people I was surrounded by. Witnessing their pure love and passion for the work they did was extraordinary. I'd like to extend my deepest gratitude towards everyone from my lab, for all the knowledge they've given me in one memorable summer.

When I wasn't wearing my steel-toed boots, I enjoyed my time at the WISEST sessions. Meeting students my age with similar aspirations, questions, and fears was exhilarating. I didn't have to explain my love of science and math to them, or express my deepest anxieties of choosing university courses. They just knew. Making new friends was easy, because everyone came in with the same positive attitude and open mind. Looking back now, I can't help but laugh at my silly inhibitions on the first day. Sitting in a room with sixty of the smartest teens in the Edmonton area was intimidating, I'll admit that. Yet, now, as I look around the room, I see peers, role models, and most of all – friends.

## miranda stahn supervisor: Dr. Erin Bayne / Biological Sciences

**Sponsor**: Human Resources and Skills Development Canada - Canada Summer Jobs



"Personally my favourite part of WISEST was the people."

In the lab we looked intensively at bird behaviour and studied them through a variety of films that had been captured earlier by our boss Jeff Ball. Although, somewhat tedious work, I found it fascinating, birds like humans grow attached to their young and it was cool to see some of our behaviour reflected into their day to day routines. The overall objective was to determine what effect oil pipeline destruction has on the daily bird routine and their adaptation to the pipelines.

WISEST was first brought to my attention by my biology teacher, Ms.Warnok when I was in the 10th Grade, and almost instantly I knew I wanted to be a part of it. I applied to the program because I wanted to be a part of something bigger as well as help the movement of women who are crossing society's boundaries and entering non-traditional careers. Additionally, I felt it would give me a sense of what academic life at the U of A would entail, and most importantly the opportunity to introduce myself to a variety of people. WISEST enabled me to successfully experience all of the above as well as so much more.

Personally my favourite part of WISEST was the people. Through the program I have met a variety of friends all who share a deep passion for science. It's amazing how you can sit down and start talking about conservation of energy, medicine, or your thoughts about university as if they were daily conversations. I loved how the program helped us learn life skills as well as scientific ones, throughout "Lunch 'n' Learn" and Professional Development seminars, which included hearing from amazing special guest speakers, who helped prepare us for not only success in the program but success in our lives as well. Overall WISEST made me realize one thing; essentially I do not feel that I would like to pursue a career in research. The people I work with are so passionate about their work, and have pursued it for years, I am not sure if I would have the patience to carry through with something for so many years. Although, I honour the contributions they are making to science as well as society. WISEST further enriched my passion for science, opening doors to fields that I previously never would have considered.

In conclusion I would personally like to thank Jen Duffy, Kerry Humphrey, and Misha Hartfeil for the support they gave not just me, but all the students within the program. Furthermore I would personally like to thank Dr. Erin Bayne for letting me participate in his exciting research this summer. Finally, I would like to thank my supervisors Jeff Ball, Erin Cameron and her two undergraduate students, Mike and Heather, who willingly answered questions and jumped through hoops to ensure we all, got to experience the best biological research had to offer. I feel WISEST is an extremely worthwhile experience and I hope other students will receive this wonderful opportunity.



### miruna marin supervisors: Dr. Farbod Fahimi / Mechanical Engineering

**Sponsor:** Process Solutions Canada



At the beginning of May the fate of my summer was still uncertain as I was still waiting for a phone call from WISEST, so one day I decided to call the office and ask them about my application. That was when Jen said that she was just about to call to inform me that I had been accepted into WISEST in the Mechanical Engineering Department – Advanced Robotics under the supervision of Dr. Fahimi. I somehow managed to suppress my excitement (the squeals and the victory dances came after the phone call ended) and listened carefully to the details of what was going to be one of the best experiences of my life.

I knew I was going to enjoy my summer from the moment I walked into the Solarium in the Engineering and Teaching Learning Complex. All the unfamiliar faces expressed excitement and nervousness, so even though I didn't know anyone at that time I did not feel alone for one moment. Later on I met my supervisors, Michael and Richard, who took my coworker Beth and me to our labs.

For the next week, Michael and Richard showed us their projects. I was going to help Richard complete an error analysis of the Moment of Inertia test bed for an autonomous helicopter. We were also introduced to some of the computer programs engineers use for their projects: ProEngineering, a 3D modeling program and Matlab, a technical computing software. We started with modeling a screw in ProEngineering, and by the end of the week we were able to assemble a pulley system in 3D. The next week we managed to write a function in Matlab that simulated the responses of the elevators in the Mechanical Engineering building.

Finally, after two weeks of engineering prep Beth and I were ready to begin working on our specific tasks. Richard explained to me that the reason we are doing an error analysis of the Moment of Inertia test bed is that in order to analyze the dynamics of the helicopter we need to know the percent error of the test bed that will be used. During the experiments we realized that the percent error we were getting from the test bed was very high and I soon found out nothing ever works the way it's supposed to work in engineering – at least not on the first try. Richard and I talked to some of the research team members and tried solving the problem. We used the ProEngineering model of the test bed in order to better observe the origin of the problem. I redesigned a part of the test bed by adding another bearing in order to increase stability.

However, the six weeks I spent at the University of Alberta were not only filled with work. I will never forget the Booster Juice runs Beth and I always used to make or the day we played croquet with Michael and his friend. I also enjoyed the tour around the University's "seven wonders", as our supervisor called it. Not to mention the Friday Lunch 'n' Learns and Monday sessions that were always entertaining and provided a great opportunity of finding out what other people's labs were like.

I would like to thank Dr. Fahimi for giving me the opportunity of working with his research team and therefore showing me what a career in research in Mechanical Engineering is like. A big thank you also goes to Michael and Richard for having the patience to explain to us how things in the lab work and for giving us an idea of what university life is like.

# misha schollie supervisor: Dr. Mahdi Tavakoli / Electrical and Computer Engineering

**Sponsor:** NSERC PromoScience



"Whenever I had a question, they would stop what they were doing to help me out."

I applied for WISEST thinking that it would be a really interesting experience. Where else would I be able to see what working in a research lab was like? I was also hoping to be able to talk to some people who were engineers so I could learn what it was like to be in that profession. I hope to study engineering in university. I never expected that I would actually be accepted into the program! When I received the phone call from WISEST saying I was accepted, I was surprised and excited. I was also really nervous about working in this lab. This is because Jen, one of the student coordinators, had asked me if I knew how to use the computer programming code C++. I had never actually heard about it so I decided to learn the basics before I started working in this lab.

On the first day of WISEST, I was so worried because I had researched the computer code and I did not understand it fully. After meeting my principle investigator Dr. Tavakoli, and my direct supervisor, Shiyuan, I realized that I had nothing to worry about. Both of them were willing to help me to learn this programming code. Whenever I had a question, they would stop what they were doing to help me out. They gave me the project of programming the haptic devices. These devices provide force feedback to simulate the rehabilitation process for a stroke patient. The robots that we were using looked like a robotic arm with a stylus on the end. When the arm or stylus was moved, the graphics on the computer screen reflected that movement.

I assisted in creating programs that would help stroke patients to regain the functioning of their arms by attempting to replicate common rehabilitation exercises. We actually programmed the device to recognize the amount of force that the patient was applying and if the patient needed some assistance then the device would help the patient to move to the target point. Another task that we created was one that could be used to teach the patient to learn to write again. The program was able to provide force to pull the cursor on the screen and by extension, the haptic device to the line on the screen. Once the cursor was on the line, there was no force. But if the user tried to pull the cursor off the line then there would be a force opposing that movement. The goal was to keep to the cursor on the line.

The most important thing that I learned from this experience was that I can be whoever I want to be. I normally am a very shy person. But I learned that I can be a very outgoing person. I was also really nervous about going to university because I had no idea what life was like there.

When I joined this summer program, I had very high expectations that I would learn a lot about this field that I am thinking of studying after high school. I have learned even more than I thought would. It was amazing to be a part of WISEST and this extraordinary research. I would like to thank my research team for having me in their lab and the WISEST program for allowing me to have this opportunity. I would also like to thank my sponsor NSERC PromoScience for supporting me in the pursuit of this venture.

When school starts in September, I am going to have a lot of amazing stories to tell about my summer vacation.

## moses fung supervisor: Dr. Gwen Rempel / Faculty of Nursing

Sponsor: Faculty of Nursing



Being one of the six male WISEST students this year, I consider myself part of a rare breed. Without knowing what to expect that early July morning, I walked through the doors of the ETLC solarium. All I felt was the excitement of doing research this summer, but I had no idea what nursing research entailed. Regardless, I decided to give it my all and make the most out of this opportunity.

During these past six weeks, I worked under the leadership of Dr. Gwen Rempel in the Faculty of Nursing. Her team's research investigates the 'extraordinary parenting' involved in the process of safeguarding the precarious survival of children with congenital heart defects, CHD. Described as structural anomalies of the heart, CHD in infants can be developed while they are still in the mother's womb. Varying types of defects can cause a mild to severe threat to the baby's life after birth. However, surgical advances have allowed survival of serious life-threatening defects possible. The first survivors of CHD are now in their teens, close to my age. Listening to interviews conducted on these teens brought forth interesting parallels that I could relate to: a vantage point shedding new light in this research.

Dr. Rempel's research deals primarily with qualitative data, a collection and processing technique foreign to my high school background of straightforward quantitative labs. Data is collected by interviewing mothers, fathers, and teens of CHD multiple times to establish points of views and reoccurring themes and ideas. My work involved genograms and ecomaps which are tools constructed to illustrate both family and external relationships. I also investigated these teen's quality of life as perceived by the parents and as reported by the teens themselves. Being submerged in this data drove home the fact that the cause of CHD is undetermined and could have happen to anyone, even myself. My life could have been the similar to these teens that are just about my age. On a brighter note, this summer's research has been productive and sparked my interest in cardiology and pediatrics.

WISEST provided me with valuable learning through the Professional Development and Lunch and Learn sessions. I particularly valued the networking session that Misha organized for us: the six male WISEST students. Unlike the previous networking session, we were able to meet with male mentors. Here, we spent a lunch hour chatting with two registered nurses, Konrad and Richard. Instead of hearing more about the lack of women in engineering, we talked to two individuals who could actually relate to us. The conversation opened my eyes beyond the stigma attributed to men in nursing.

I would like to express my sincere gratitude to my Primary Investigator, Dr. Gwen Rempel, and her research team: Louisa Fricker, Sandy MacPhail, Vinitha Ravindran, and Catriona Richmond. They have provided me with abundant guidance, expertise, and knowledge throughout these weeks. Catriona, the nursing student, arranged for a tour of the nursing simulation labs. These simulation labs replica real life patient scenarios for student practice. Dr. Rempel has also been so gracious to provide me an opportunity to spend a day shadowing a nursing practitioner at Stollery's Pediatric Cardiology ward. The day was a highlight of my WISEST program as I experienced, first-hand, the reality of CHD. The mentors and role models I met shared advice and provided inspiration and assurance of my future decisions.

The experience I received is invaluable and for that I am truly thankful.

### nancy tran supervisor: Dr. Erin Bayne / Biological Sciences

Sponsors: Faculty of Science / Human Resources and Skills Development Canada - Canada Summer Jobs



"I am thankful to be able to have the opportunity to receive the advice and mentoring from my research team and WISEST."

One can never understand the true nature of anything unless they are able to be fully submerged in it. Thankfully WISEST allowed me the opportunity to see first-hand the nature of a career in research. These past six weeks of WISEST were truly priceless.

I remember how intimidated I felt on the first day walking into orientation, seeing all the other WISEST students. Then at the end of the day I felt intimidated again when meeting my research team. Initially the idea of working with intelligent and experienced people in the lab and field petrified me. After all, I am only a seventeen year old who knew about neither weeds nor birds.

Throughout the six weeks, I had the opportunity to work in the field to survey invasive plants and later review a nestling's journey from incubation to maturity. For ten days, under the guidance of my supervisor, Erin Cameron, I learned to identify various indigenous and invasive species throughout Northern Alberta. My field work included surveying and helping to identify invasive plant species at recreational and industrial areas. Thanks to WISEST, I developed a habit of walking down the street looking in the ditch to see what type of weeds there are by the end of ten days of field work.

The remainder of the six weeks my time resided at a biological science lab reviewing videos for data collection of boreal forest's songbird nests. The data collected will be used in Dr. Erin Bayne, my Principal Investigator, and Jeffrey Ball, my supervisor's research of the impact of energy sector activity, specifically their linear features, on the songbird population and their nest survival rates. Specifically for my research project, I used the data to focus on the effect of bird species' preference of the altitudinal location of their nests on predation. Unfortunately, my results did not fully support my prediction of ground nests being the safest tier for nestlings. However throughout the six weeks, there were questions that I could not answer. How was I making a difference by reviewing a bird's actions? And what was the significance of the bird's actions? Luckily, with the help of an article by Thomas E. Martin and my supervisor, I know the answer to the questions. As part of conservation biology, I learned that one must understand the way a species operates and adapts to change in order to understand human's impact on the species and reduce the possibility of an extinction.

There was also another question I was hoping to answer by the end of the summer. Was a career in research and science right for me? Although I am not sure if it is and I am still unknown to my choice in the future, WISEST allowed me to see that a non-traditional career is possible. Without the WISEST Summer Research Project, I would not have fully appreciated the importance of research and how lucky I am to be living at a time where engaging in a non-traditional career is possible and more accepting. Furthermore, I am thankful to be able to have the opportunity to receive the advice and mentoring from my research team and the WISEST team. Again I would also like to thank everyone for allowing me the opportunity to participate in this unforgettable experience. Most importantly, thank you WISEST for organizing a summer full of inspiration and innovation and giving me six weeks of adventure that I will treasure forever. Au revoir, WISEST!

## natasha kootenhayoo supervisor: Dr. Sylvie Quideau / Renewable Resources

**Sponsor:** NSERC PromoScience



I truly believe that research is the only way science can thrive.

Without science, our lifestyles would be rudimentary. To experience science in real-life, as it happens day-to-day, was a strong stepping stone for a young person struggling to find a path. This program helps educate our decisions. This job provides a great advantage; to experience how scientists work and research their respective passions gave an outlook that will only put us a step ahead in our understanding. This internship was informative. It reinforced what I already knew and revealed skills that I can strengthen for the future.

For example, I recognized how essential computer skills are. I thought my knowledge regarding computer programs was advanced before this summer, and yet I had never used Microsoft Excel before. It was challenging to get the hang of it, having no idea where to find applications. In order to do my project poster I had to organize data from spreadsheets and turn it into charts. It seemed creating appealing and inviting charts was near impossible but this program put me yet another step ahead in a positive direction.

I really enjoyed exercising field work as well as working in the lab.

I had the opportunity to work with scientists studying soil. My principal investigator was Charlotte Norris. Her project involved Aspen trees, which I have to say confused me a bit at first considering it was a soil lab, but science reminds you that everything is interconnected and dependant. Carrying out the experiment was an interactive way to learn, and applying methods and learning the reasons for those chosen methods was great fun. I also had a chance to tag along on a trip to Fort McMurray and help sample soil on reclamation areas on the minesites. This trip allowed me to witness first hand how the mines of Fort McMurray function. Not only did this add to my life experiences, but it also developed my knowledge of local industry. I did not realize, or ever even consider, the degree to which the condition of soil effects the environment. As an individual, I have deep respect for nature and this furthered my knowledge in regards to how reclamation sites are maintained. It was very reassuring to see scientists studying these areas.

Besides the experience of our individual labs we also enjoyed the chance to tour other labs on campus. I even held a sea-urchin! This summer has been an awesome way to expand my horizons. I will forever consider this experience as a keystone to my successful future. Without this summer my mind would not have had access to such valuable insight. Not only did I gain work experience, but also life skills, and social development. WISEST provided awesome professional development sessions that jump-started my professional mindset. This rare privilege has established an educated confidence on how to achieve my dream. My pursuit of a satisfying career in science has been strengthened thanks to the WISEST program. Although lab practices such as cleaning dishes can be mindless, my passion for science has not been stifled. I hope to continue my studies to contribute to the life of science via a career in research. Thank you sponsors, thank you WISEST team for your enthusiasm and direction, and thank you Biogeochemistry soil scientists from the Department of Renewable Resources for your time and your advice.

# nicole baker supervisor: Dr. Ania Ulrich / Civil and Environmental Engineering

Sponsor: Alberta Advanced Education and Technology



"I expanded my knowledge base in many aspects from science and research to career choices and determining worklife balance."

At first I was not going to apply for the WISEST Summer Research Program because I have completed high school and I am starting my first year of post-secondary studies at the University of Alberta in the upcoming year. I considered the fact that I have already picked a degree program and the opportunity should go to a student who still needs to determine that part of their future. However, my High School chemistry teacher convinced me otherwise. She stressed that any opportunity was a valuable one; it just depends a person's attitude and how they choose to benefit from the whole experience. Therefore, I came to the realization that I can benefit from this opportunity just as much as anyone else can.

Although I have chosen a field of study, I still have to determine a career path that correlates with my post-secondary education. I want to gain insight in the subject areas of Environmental Earth Sciences, Environmental Engineering, Chemistry, and Physics. I am, however, focusing my education on my strongest passion, Physics. The degree program that I will be working towards is a Bachelor of Science, Honors in Applied Physics at the U of A. This degree offers many opportunities that involve research. Thus, I concluded that the WISEST Summer Research Program could be an outstanding way to discover if I would enjoy doing research in my future.

There are also other reasons why I decided to be a part of the WIS-EST Summer Research Program, other than gaining hands on experience with research. Working at the U of A, North Campus has familiarized me with being in a university setting. Even one of the lecture halls that were used for our seminars I will find myself sitting in once university classes start. I value the opportunity to learn from other people's opinions, perceptions, experiences and wisdom; therefore, I was excited to participate in the WISEST networking fair. My research project is quite significant to me because of the impact that it has on my life, not only as an Albertan but, as a nature lover as well. My research is in the Faculty of Environmental Engineering. The research that I am involved in is being conducted for a major oil company, Suncor Energy Corp., to determine the adsorption capacity of soils native to the Athabasca oil sands region for naphthenic acids and other organic compounds found in oil sands process-affected water. I personally find this research important because I spend a lot of free time during the summer months in the Athabasca region, not far from the Athabasca oil sands. Therefore, I am pleased to have the chance to contribute my time to something that could possibly aid in the reclamation of oil sands extraction sites, and promote future sustainability of my country's environment.

Although I was hesitant to apply to the WISEST Summer Research Program I am very thankful that I did because it has challenged my academic abilities and undoubtedly surpassed my expectations. I have expanded my knowledge base in many aspects from science and research to career choices and determining the inevitable, work-life balance. I discovered the usefulness of networking and the benefits it can provide. WISEST has directed me in a positive career direction by providing me with valuable research experience and exposing me to the diverse career choices and path ways that an individual can take. I now realize that a person's education can be unique, but still effective in the work force. WISEST has not only helped to prepare me for university, but also for life in general.

## nikita robinson supervisor: Mr. Brandon Nichols / Meanook Biological Research Station

**Sponsor:** NSERC PromoScience



"Utterly enjoyable" pretty much sums up my whole WISEST experience as I got to learn a lot of new things. I really wanted to get into the WISEST program as I've always had an interest in science and especially biology and knew that it would give me a great experience to learn more about the field. I also knew that whatever lab I got to work in would leave me with a great experience to guide me in my future choices. As well I am very independent so I knew that I would be successful in leaving home for the summer and while I knew I would miss everyone at home I was excited to meet lots of new people and learn even more.

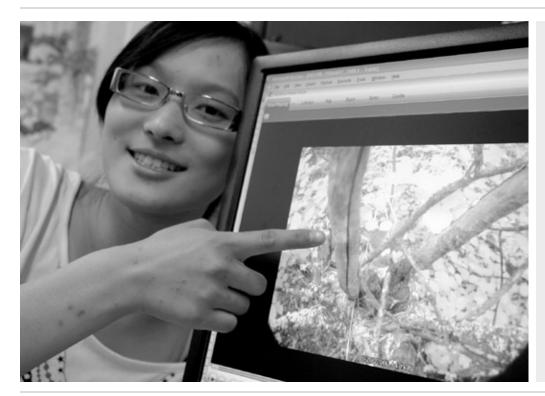
It turned out that I wouldn't be working in a conventional lab at all. Instead I had the opportunity to go to the Meanook Biological Research Station where I would be working on the RANA (Researching Amphibian Numbers in Alberta) project. At first all I could picture was "the great outdoors" and frogs, thousands upon thousands of frogs, and me running hopelessly after them. It turns out there is a system to catching the amphibians. Pitfall traps had previously been set up in the ground, as well as the fence, to stop the frogs from going into or out of the pond without being trapped. Every morning, bright and early, I went out and checked all 40 traps for frogs and toads. Then the mass, length, age, trap number, species, and whether the captive amphibian had a middorsal stripe or not would be recorded. I actually had a lot of fun with the frogs and especially the Boreal Toads or BOTO as I have begun to call them.

Though I learned a lot about amphibians I think I learned even more from all the other people living here at Meanook about life. They all had advice to give me about what to do after high school. They did not just teach me about life and what to do after high school, though. They also taught me that work can be fun. It didn't take long for the station to begin to feel like home to me as the people were nice and there was always something going on like volleyball or yoga. Though this made living at Meanook a lot easier than it would have been if there was nothing going on at night.

Living at Meanook I did not get the experiences of going to all of the Monday and Friday events which I imagine would have given me a lot of helpful information, but the ones I did get to attend were enjoyable. Instead I got the experience of helping multiple researchers here at the station. The only disappointing part of my summer is that after all the information I have soaked up I no longer am exactly sure what to do after high school as my eyes have been opened to so many options. Although this summer has caused many of my plans to change for after high school it has still been a great WISEST experience. I never would have gotten to enjoy this experience without the sponsorship of NSERC PromoScience nor would it have been as much fun without Brandon Nichols and Esther Sinn. I wish to thank all of them for making this summer one to remember.

## qi-ran (sophie) ru superviso: Dr. Erin Bayne / Biological Sciences

Sponsor: Human Resources and Skills Development Canada - Canada Summer Jobs



"I learned something new every day, and had lots of fun."

Ever since I heard about WISEST, I had always wanted to be a part of it. I felt very lucky to be able to join this program and the experience was way beyond my expectations. I learned something new every day, and had lots of fun.

During the summer, I was placed into the Department of Biological Science, which is one of my favorites. As a result, I participated in two projects about ecology. One was to review the pre-recorded video of songbirds' nests to study the behaviors of the parents on nestling. Then, we would record all the behaviors of the songbirds that we saw. At first, I thought it might be boring to watch videos every day, especially when the videos were only in black and white. But they turned out to be very interesting. Not only was the motion of the songbirds very adorable and attractive to me, I also had the chance to see the predation and some strange events, such as bears attacking the camera. Sometimes just watching the videos, made me feel like these little creatures were just right in front of me.

The other project was field work, and I got the chance to go camping! Also, it was where I spent most of my research time. Our goal was to examine the spreading of invasive species in Northern Alberta. Most of the work we did was to search for invasive plants within our 10m\*10m plot at various sites and record the percent cover of them. Campground and wellpad were the two types of sites where we work. Besides the enormous amount of fun we had during the two trips of 14 days, the most memorable experience was the change of my perception on environmental issues. I had always thought of the ideas about fighting against disturbed environments were strategies to catch attention as a topic in politics. As a result, I never took them seriously. How-

ever, this summer really changed my mind. Because this time, I truly felt the effects of invasive species, such as their effect on soil quality. This was unexpected, but it made me realize that I need to be aware of the environment we live in.

Overall, I really enjoyed the six-week experience as a WISEST student. Not only were the regular working days joyful, the Monday and Friday sessions were also very interesting. I felt that the more I learned, the more I realized what I was unaware of. But I enjoyed the learning experiences. Through my research, I got closer to the nature. Through the program, I learned a lot from the experiences of others, met many great people, learned a lot about various fields, and experienced life on campus. I also experienced a non-traditional career, which had broadened my views. Everything truly exceeded my expectation, in a good way.

At last, I would like to thank Dr. Erin Bayne, Erin Cameron, Jeffrey Ball, and the rest of the research team. As well, I would like to thank WISEST and Canada Summer Jobs. Without your support, I would not have had such a wonderful opportunity and journey. It really made this summer the best in my life!

### ricky kong supervisor: Dr. Diana Mager / Agricultural, Food & Nutritional Science sponsor: Human Resources and Skills Development Canada - Canada Summer Jobs



WISEST has truly been one of the best experiences of my life, and it was an honor being in the 25th anniversary of the program. I still remember when I first got the phone call, and the caller ID display said "University of Alberta". I was extremely nervous, and when I was told that I would be participating in WISEST over the summer,

all I could think about that night was, not surprising, WISEST.

The purpose of my lab's study is to understand the underlining mechanisms of nonalcoholic fatty liver disease (NAFLD) and determine the best diet to treat it. The project plays a small part in aiming to raise awareness of 'less known' liver diseases. Also, the research team is trying to make aware that NAFLD is one of the most common pediatric liver diseases worldwide.

Over the past exciting six weeks, I was able to watch the recruitment of patients for the study and see first hand how difficult it is to recruit people for research purposes. I was also able to learn how to use various computer programs, which include ones that show how many calories someone has consumed and what type of activities people are 'best suited to' based on their body type. In addition, I was also lucky to have been able to learn and observe how to use the BOD POD, which is used to calculate body composition of a person. I also had the opportunity to observe how to properly pipette and centrifuge blood. One of the biggest aspects of the study was learning to collect and analyze data. I found that it is extremely difficult and tedious, but it is extraordinarily important.

I realize that information that is needed by a researcher does not end up in front of them on a sheet of paper and sometimes information is missing, where further investigation is required to fill in the missing data. One of the biggest changes in perspective is seeing that research is definitely not as easy as it is portrayed to be

#### in school or televisions shows.

The WISEST sessions have opened my eyes to so many different career paths that are possible, and I learned about the many obstacles people face and how to overcome them.

One of the reasons why I wanted to join WISEST was to open my eyes to career choices and help me decide what I should take in University. WISEST has shown me many career choices in the field of research, many of which I have never heard of. The program has helped me see a vast number of possible career paths that sound interesting and fulfilling to me. Another major reason why I wanted to join WISEST was because I would be in an environment with others who are as curious and interested as I am about science. I was amazed to see a bunch of people, including the research teams, who are deeply involved in science. When I joined WISEST I hoped to learn new things while gaining experience and become familiar with the University Campus. Not only did the above come true but I also gained confidence with interacting with others.

WISEST has been an amazing experience I will never forget. I would like to thank the WISEST selection team, my sponsor Canada Summer Jobs, the WISEST student coordinators (Kerry, Jen, and Misha), and most importantly my research team (Dr. Mager and Carla). rongjia liu supervisor: Dr. Dongyang U Li / Chemical and Materials Engineering Sponsor: CN



"...my WISEST experience had been nothing but perfect."

Without a doubt, this summer with WISEST is one of the best experiences I have ever had. I have always liked science in school and WISEST seemed like the perfect place for me to experince more of it. When the program was only one week away, I started to feel a little bit nervous about all the unknowns. I wondered about all the new people I would meet, whether or not I would be able to get along with them, and most of all, I questioned about the sorts of jobs expected of me and if I would be able to meet those expectations. Finally, the first day of the WISEST program came and I arrived for orientation at the ETLC with many mixed emotions - nervousness, happiness, anxiousness, excitement. Here, all my previous fears quickly disappeared when I met many WISEST students who were just as nervous and excited as I was, and saw that all the speakers and program coordinators were being so friendly and enthusiastic about making our WISEST experience a positive one. I also met with my research team on this day and from there, entered my six weeks of research with a fabulous start!

The project that I had been working on this summer was an investigation on the slurry erosion behaviour of pipeline steel. A slurry can be described as a mixture of small, solid particles in a liquid (the Alberta oil sand would be an example of slurry) and slurry erosion refers to when a material is, over a long time, exposed to a highvelocity stream of slurry, causing wear and mass loss to the material. This is a problem to many oil and mining companies in the industry because slurry erosion is a common behaviour of pipeline steel when it is transporting oil sand. So far, the way to solve this problem is to replace damaged pipeline steel with new ones. However, it is a very time-consuming and expensive process to make this new steel because they are prepared with sand paper up to a very high grit number(the higher the grit number, the smoother it is). So the purpose of my project is to determine the effect of roughness of these pipeline steel on its slurry erosion resistance. I had been working with sample alloys belonged to a family of metals called the High Chromium Cast Irons(HCCI). I prepared part of the samples at a lower grit number(more rough) and part of it at higher grit numbers(less rough). They were then put into the slurry erosion tester under the same conditions to be exposed to sand water (a slurry) at a high velocity. When the test was over, the differences in mass before and after the experiment were calculated and analyzed to see whether or not there was a substantial difference between the grit numbers and therefore, determine the necessity for pipeline steel to be prepared at a high grit number. From the results of my experiments, we have learned that there was not a dramatic change in mass among the alloys prepared at different grit numbers. I hope that this would be an useful result to other people in the field, and that valuable resources like time and money may be saved from simplifying the alloy preparation process.

Apart from lab works, WISEST had also given me so much more. The professional development sessions on Mondays and the luch n' learn classes on Fridays were all valuable experiences hard to get anywhere else. I was able to have close conversations with people in scientific research, out in the industry and see the work they were doing, listen to their experiences, and feel their day-to-day lives in the jobs that I one day would like to pursue.

Overall, my WISEST experience had been nothing but perfect. It was an amazing summer and I would not trade anything for it!

### shauna thariath supervisor: Dr. Jason Acker / Laboratory Medicine and Pathology

Sponsor: Alberta Heritage Foundation for Medical Research



I first considered WISEST when my teacher told me about the program. To be honest my research began then. What was WISEST? What would I want to accomplish from such a program? What could I discover in those six weeks? After reading so much about the program and also the personal opinions of past students I really felt that this was a unique opportunity.

I started getting really excited just waiting for the phone call. Even after I got the call, the research continued to find out more about my placement in Dr. Jason Acker's lab in the department of Laboratory Medicine and Pathology. I was going to be working in the Canadian Blood Services building for the next six weeks studying blood.

My supervisor, Mitali Banerjee, made sure my intimidation faded with a new understanding. Although I knew a general overview of blood components and its functions I soon realized that there are so many more aspects of blood to cover. Did you know that blood cells can circulate in your body for up to 120 days but when in vitro, outside the body, they can only survive for less then 42 days? When considering the need of patients for donor blood, this is too little time.

With Mitali Banerjee's assistance, I was going to test whether Ascorbic acid (Vitamin C) would prevent damage done to the blood cells when in vitro. In an attempt to reach a conclusion I learned to use the many types of equipment in the lab including a spectrometer, coulter counter, centrifuge and incubator. Some of the simplest things in the lab truly fascinated me like the magnetic stir rod which, when placed on a machine, would rotate inside the beaker at speeds past 40rpm.

I was gaining experience in research lab but also receiving a lesson in communication. For example, in July, most of the lab members attended a conference in Japan to present some of their own findings. Many of their studies had been picked and prodded by very experienced researchers from around the world but they returned with input which they could then apply to their studies. As I progressed further into my own research I began to realize that there are so many factors involved, mistakes that might make the entire experiment a flop and details which, if missed, could unravel all my evidence. Communication allowed me to talk with other members of the lab, find out their opinions, ensure I was covering all the bases and perhaps improve my own work.

During my work experience I also had great opportunities to meet new people. Not only did I meet fellow WISEST students from in and around Edmonton, but also people who inspired us to achieve. In particular our professional development day networking seminar which let us meet women who were active and succeeding in a non-traditional career. From these people I learned about their inspiration, journey, choices, regrets and successes. It was apparent that in order to become successful, one must have a passion for what they are doing.

In Dr. Acker's lab we were required to keep an up-to-date notebook of our activities and results. Throughout my discoveries, studies and experiments slowly the blank pages were filled with my very own research. Looking back at those pages I can truly say that I have learned. This program has given me the tools to succeed not only in high school science, but also my future studies.

## shibani balasubramanian supervisor: Dr. Eleni Stroulia / Computing Science

**Sponsor:** Dr. Eleni Stroulia, Dept. Computing Science



"There are many boys and girls just like me who want to go into non-traditional careers."

#### "Research Makes Sense"

Engineering became my passion when I was introduced to physics and computer programming. I had and have always aspired to go into Engineering and this dream became a reality through the WISEST program, when I worked as a Student Researcher in Computing Sciences. The project that I worked on is a part of a bigger project associated with Civil Engineering as well as Architecture. The main goal of my project is to enable occupational therapy notes on objects conformed to the building structures in a virtual 3D world, which is Project Wonderland, in this case. The overall plan is to create a language that specifies rules to be applied to the IFC (Industry Foundation Classes) files in order to automate problematic aspects in Occupational Therapy such as accessibility.

In this lab, I learnt a lot about programming. I was introduced to JAVA language as well as Xml, which is another programming language similar to JAVA. I also learnt about IFC or Industry Foundation Classes, which are class files that are used within a building or facility management industry sector to describe, exchange, and share information in a neutral data format. BIM Server is the centralized server that supports these files. I learnt how to add, modify or remove a file, as well as how to spot errors in a file when it did not work. With this knowledge, I began to work on creating a file to enable notes on objects by calling the web service. I used Xml and then JAVA on a NetBeans software. As the days were coming to an end, I realized how much I learnt and the importance of my research. This research enables equal opportunities to all people and useful information for the architects on the structure.

The best part of the WISEST program was not only participating in a life-changing research, but also the Monday and Friday sessions

with the other WISEST researchers. This gives an amazing opportunity to share the experience of our labs with one another that broadens the fields that one has never thought of. In one of the sessions, I learnt a lot about the best way to write notes. However, two of the WISEST sessions were the most memorable ones- Role Models and Off-Campus Tour. The role models truly inspired me to not hesitate to go into a career that is male dominant. Scanimetrics, the Off-Campus Tour, was truly an eye opener, as I am interested in the environmental aspect of Electrical Engineering- something, that never appealed me. Of course, the Science Olympics was the greatest as I contributed in making an "egg-break free" package! Getting free gifts made the program all the more enjoyable and fun.

Being involved in a summer research program where girls and boys are allowed to participate in projects that are male or female dominant, respectively, is very inspiring. This program has pushed me to never give up my dream due to fright. It has taught me teamwork skills, given me an opportunity to learn programming but most importantly, it has taught me to believe in myself and that I am not alone. There are many boys and girls just like me who want to go into non-traditional careers. I have already taken the first steps to a long journey that waits ahead thanks to the WISEST team with their awe-inspiring sessions and for giving me an opportunity to be a part of the team.

### stephanie bohaichuk supervisor: Dr. John Spence / Renewable Resources

Sponsor: Alberta Advanced Education and Technology



It seems strange to think that WISEST is nearly over, since I really enjoy working in my lab, especially with the people in it. Working in Dr. Spence's Entomology Lab in Renewable Resources gave me the opportunity to learn much and experience a lab that included field work and was not quite the traditional image of a lab. As well, the WISEST sessions were very useful; the whole experience is something I will remember well.

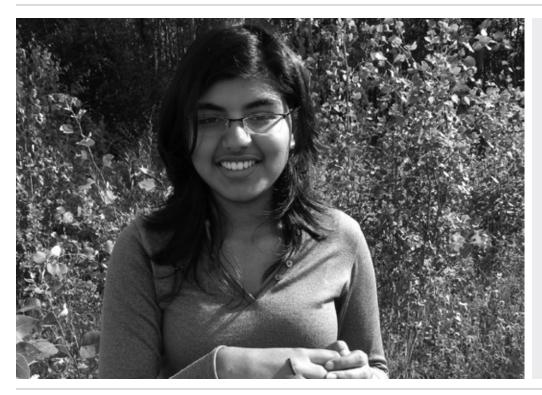
My main project dealt with two species of water striders. We collected fifth instars (nymphs in the last stage, almost adults) from the "experiment pond" at George Lake. After they molted, we paired them up in little tubs of water in three different temperature treatments. Each tub had a foam strip in it for females to lay eggs on, and we had to check these daily to record the date to first egg, as well as other information. From this data it can be inferred what the effects of climate change might be on a pond ecosystem, the "threshold temperature" (when it becomes too cold to lay eggs) for water striders, and how many "degree-days" it would take to lay eggs. It was very interesting to be able to work with living creatures. It was an excellent opportunity to be able to work independently sometimes, even with data analysis. While looking at the data I learned some statistical tests and what makes data significant, as well as the fact that not all data in science is nice and straightforward. But even if the data seems insignificant, there can be other ways to look at it and hypothesize why it did not turn out as expected.

I not only got the chance to work on a number of different tasks, including field work (a new experience for me), but also to work on and see a variety of projects going on simultaneously in the lab. By sorting through EMEND samples for different types of beetles, ants, and spiders, I realized that some work, including identifying and finding insects, can take a long time. I also learned so many new orders of insects and families of beetles, some of which are very entertaining to pronounce. It was fun to go to my supervisors with something and have them instantly tell me the species name. Though when something is not known, dichotomous keys are extensively used and sometimes beetles one millimeter long have to be dissected. I greatly improved my use of the microscope and my ability to manipulate the sample under it. It was really good to be able to see multiple projects on diversity, snails, mountain pine beetles, spiders, and other beetles. It gave me an excellent overview of the department and made me finally notice insects and their importance.

WISEST tours were really useful; in particular, I enjoyed the tour of Scanimetrics, which helped me learn about careers in engineering and where that can take me. The networking sessions made me realize that I can talk to people in various careers to help me choose one. Having to do a research poster enabled me to see what would go into a paper, and also got me to read research papers while actually understanding them.

Overall, this program was a great experience, and I had a lot of fun. Thank you so much to all the fun people in my lab, especially Sonya, Charlene, and Stéphane. Thank you to Emma, my fellow worker, friend, and source of great fun (scary faces in the cold room). I am grateful to WISEST and my sponsor for providing this opportunity.

### **SUPIAJA TENGAN Supervisor:** Dr. Jens Roland / Meanook Biological Research Station **Sponsor:** Human Resources and Skills Development Canada - Canada Summer Jobs



"It far surpasses any book knowledge and will be cherished forever."

I was apprehensive about going away from home to the Meanook Research Station, but also extremely exited to be starting a learning curve with two new friends, Alanna Howell and Nikita Robinson. For a girl who has spent most of her life in urban centres, the thought of staying at a small research station south of Athabasca was a bit intimidating; but after spending six amazing weeks there I miss it! The people at Meanook were welcoming, and treated us as unique individuals there to do independent research.

There was always a bounty of things to do at Meanook. Everyone was willing to teach us and answer questions about their projects. My main task was doing field research on Forest tent caterpillars with Jen Waller and her field assistant, Cliff. A huge part of my job was to help them feed and sort the caterpillars and parasitoids. During the six weeks, I went on two camping trips with Jen and Cliff, which was an adventure on its own. It was my first time camping and I couldn't have picked two nicer people to go with. I learned invaluable skills on those trips such as starting a fire, setting up a tent and using a GPS system.

Days were often long and tiring as we would stop every 15 minutes to search for stocked and native caterpillars. Unfortunately, this field season was fairly dull for Forest tent caterpillars as the outbreak suddenly died and we rarely recaptured stocked caterpillars and had difficulty finding native ones. There was frustration throughout the Roland lab, but Jen always stayed optimistic and we found some interesting data. The most interesting part of studying Forest tent caterpillars was the interdependency within the caterpillars' ecosystem. It was interesting to note their ability to completely defoliate masses of Aspen trees, which led to an ALPAC experiment that involved observing the patterns of caterpillar survival on different hybrid Aspens which I helped Jen with. I was captivated by the mathematical aspect of caterpillar study which involved statistics; the focus of my Principal Investigator, Jens Roland.

I really wanted to know how far caterpillars are capable of traveling, which may help better understand the population trend. Jen told me that though there was a lot of data regarding the movement of moths (gathered using pheromone traps) there was no data as to how far the larva are capable of moving. This is where my project was born. I just wanted to run caterpillar races for the fun of it, but when it came down to actually carrying out the experiment, after considering all the factors such as exhaustion, tying up and dying the caterpillars for monitoring purposes and the effect of the presence of leaves I decided to make this my official project. Though there was frustration when the caterpillars failed to cooperate (which was often the case) I enjoyed the project and gathered interesting data.

I am amazed when I look back at how much knowledge I gained at Meanook; not only about Forest tent caterpillars, but also about several other topics that would be discussed with the other researchers such as the environment or post secondary education in general. It far surpasses any book knowledge and will be cherished forever.

I would like to thank all the researchers at Meanook for making my stay so memorable. I would also like to thank Brandon, the station manager, and Esther, the assistant manager, for their encouragement and kindness, Patje, the cook, for her amazing food and making the stay feel like home and the best cookies I have ever had and most importantly Jen and Cliff for welcoming me into their research. The one thing that I have taken from this experience that is unique to WISEST is a newfound appreciation for the hard work and dedication that is put into scientific research

## taylor seal supervisor: Dr. John Vederas / Chemistry

Sponsor: Epsilon Chemicals



It was sitting in a friend's basement, scrolling through channels to pass the time, that I got the call. I glanced down, ready to plead with my mom for just an hour more, when I noticed an unfamiliar number on the phone. When I answered I found out I'd been accepted into the WISEST program, and I couldn't help the excitement. Despite the fact that I'd gotten my application in just under the wire, actually having to phone the post office to beg for them to stay open an extra ten minutes to mail it in time, I was one of the lucky 60 students to get accepted. I jotted down the info: Chemistry Department, John Vederas, isolating antimicrobial substances produced by bacteria. Although at the time I had no idea what my project was, I couldn't wait to start what would come to be the best summer job I could ever imagine.

I remember the first day, wandering up into ETLC, undoubtedly resembling a deer in the headlights as I ambled into orientation. I couldn't help but notice everyone else with the same unnerving look, wondering what we'd be in store for over the next six weeks. After introductions and presentations, we were sent off on our own to meet our supervisors and research teams. I was given a tour of the lab, an overview of the project, and met the many people that I'd be sharing a lab with over the coming weeks.

I couldn't have been more delighted with my lab placement in the chemistry department. The project I worked on was growing up bacteria that produced and released a peptide to kill other bacteria, you can think of it as a sort of chemical warfare. We were working on developing a process to purify the compound, which we successfully achieved. The goal was to produce enough of our sample to be able to compare a synthetic version of the substance to it in hopes to confirm its stereochemistry, or the spatial arrangement of the atoms within the molecule. Looking into the future, there is potential for development of an antibiotic because of the knowledge gained from the study of our compound, unique in the way that other bacterial strains do not develop a resistance to it.

Working in the lab was such a unique experience; I don't know many other 16 year olds that can boast having worked with dangerous chemicals on their summer vacation, or knowing not only what matrix assisted laser desorption ionization mass spectrometry is, but can tell you how it works. I've gotten an inside look into what a real job in research entails. Not only that, but I've gotten opportunities to meet mentors from all aspects of science and engineering. They've taught me about all the different career paths available to me in the future, and how they've reached those spots themselves. Not only have I met individuals already in science, but WISEST has given me the opportunity to make friends with other students that share the same interests and love for science as I do.

I can't even begin to emphasize how incredible this experience was or how lucky I was to have been accepted into such an amazing program. Thank you to everyone who has helped me this summer; my research team for guiding me and helping me throughout the project, my sponsor for providing financial support for the research, and everyone involved in WISEST for such an extraordinary opportunity. The WISEST experience has provided me with the knowledge, inspiration, and courage I need to follow my dreams, no matter where they may take me.

### ying ling supervisor: Dr. Rhonda Royschuk / Pediatrics Sponsor: Faculty of Medicine & Dentistry



"...I felt it was so beneficial hearing about the different facets of their career paths."

A cluster-adjusted Wilcoxon signed-rank test? A chi-square distribution? Despite my love for mathematics, I have never come across these terms before this unique, educational, and inspiring summer. High school statistics would never be able to teach me the things I have learned at my research job through the WISEST summer research program. While working in the Rosychuk Biostatistics Laboratory, I got to apply my math skills in a field that interested me greatly: pediatrics. My principle investigator, Dr. Rhonda Rosychuk, along with Dr. Mahmoud Torabi and Lu Cheng, helped me ease into my new job, and teach me a number of invaluable things.

Dr. Rosychuk's ongoing project is researching the epidemiology of presentations of respiratory illnesses to the emergency department (ED) using provincial, administrative databases. She hopes that by researching the epidemiology of presentations to the ED, she will be able to provide in-depth knowledge to be used for further applications. I was assigned to look at presentations to the ED for the disease croup. Croup is a disease that causes inflammation of the upper respiratory system: the larynx and the trachea, and is most common in young children (3 years or younger). In the beginning, the child experiences the usual cold symptoms, but as the inflammation worsens, the child may experience a loud, barking cough. Sometimes, the upper respiratory tract can get so swollen that it becomes difficult for the child to breathe. If this occurs, the child may require a visit to the emergency department (ED). From there, the child may receive prolonged treatment in the ED, he/she might get discharged, or he/she could be admitted into various hospital facilities for further treatment.

Specifically, I looked at the ED presentations for croup that resulted in admission to the hospital in infants aged 2 years and under. The

aim of this investigation was to examine the differences in the admitted presentations among the three regions of Alberta: Edmonton, Calgary and Non-Major Urban. I looked at three different things to compare: the demographics (age, sex, and socio-economic proxy) of the individuals, the frequency of repeat visits per individual, and the duration of the time spent in the ED prior to hospital admission.

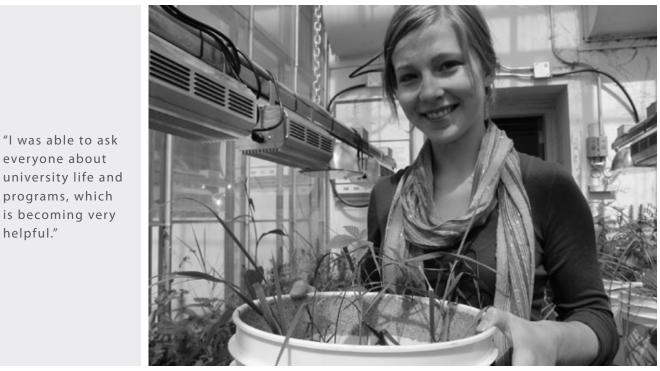
Because of the substantial amount of data I was working with, I had to quickly learn how to use a program called S-Plus. Using the S-Plus programming language, I was able to create commands to perform tasks on the data. These tasks ranged from executing different tests on the data to creating graphs in order to visually represent the findings. Two statistical analyses that I used were the chi-square test and the Wilcoxon signed-rank test. The p-value generated from these tests show us if there is enough evidence to support a correlation between the regions. The results showed that while the Edmonton and Calgary admissions were pretty similar, there was quite a bit of difference when comparing the two cities with the Non-Major Urban region.

I applied for the WISEST summer research program for one reason: to learn. WISEST has given me an opportunity to gain experience in the research field in a way that most other high school students will never get to experience. It has allowed me to meet many great people that I will continue to communicate with and grow from. Also, I feel that now I have a better understanding of how university life will go, and of just how many career options are out there for me.

I would like to express my endless gratitude to WISEST and my sponsor, the Faculty of Medicine and Dentistry, for selecting and supporting me and allowing me to be a part of this unforgettable summer. It will be an experience that I will continue to cherish and gain from in the years to come.

### ZOEY ZAPISOCKI Supervisor: Dr. Erin Bayne / Biological Sciences

Sponsor: Alberta Summer Temporary Employment Program (STEP)



The WISEST Summer Research Program has been a fantastic experience I will never forget. The two projects associated with my research were about songbird parent behaviors, and the spread of invasive plant species throughout the Boreal forest.

helpful."

For the first two weeks, I worked in the lab viewing videos of songbird nests. The purpose of this was to record the behavior of the parents when tending to and guarding their young. When a specific event would take place in the video (for example, a parent arriving with food), the event and the time it occurred were recorded in a data table. It was interesting to see that birds are guite active, rather than just constantly in the nest as I had previously thought. This was all part of a larger project that my supervisor, Jeff is working on. It involves the effects of linear features on the behavior of songbirds in the Boreal forest. Even though I only played a small part, I am grateful for the opportunity to be included in Jeff's research.

The majority of the program was spent doing field work in the Slave Lake and Lac la Biche areas. There, we looked at the spread of invasive plant species in the Boreal forest. We hiked around various campgrounds and well pads, sampling 10 x 10m plots. In addition to identifying which species were growing there, we also took forest canopy readings with a densiometer, took pictures of ground vegetation with the cover board, and marked each plot on a GPS. From the data we collected, I was able to look at the plots which were located in the edge of the forest, and 50m into the interior of the forest. I wanted to see if the amount and area covered by invasive plants in the plots were related to the distance from the road. The results showed that there was a greater amount of invasive plants in forest edges, rather than in the interior. There was also a greater area covered by the invasive plants in the forest edges. This makes

sense because vehicles travel roads from all over, bringing invasive species with them. They then spread throughout the ditch and into the forest.

The days were very long and tiring. But they were definitely worth it. They were much more than just regular days at work. I camped with my research team for sixteen days, which gave me so many more opportunities to not only learn about plants, but so many other important things.

For me, the WISEST Program was more about the "who" rather than the "what". My supervisors, Erin and Jeff are kind, intelligent, and extremely hardworking. I am glad I had the opportunity to participate in their research and ask them the numerous questions I had. Heather and Mike, assistants who came on the field work trips, were really fun to hang out with and also helped me on my knowledge of plants. I was able to ask everyone about university life and programs, which is becoming very helpful. Meeting other students my age was awesome. Even though it is hard to speak with every one of the WISEST students, I got to know a few really well.

Overall, the WISEST Program has given me an amazing experience. A main reason I applied for this program back in April 2009 was to get some kind of career insight. I did get that. But I got so much more. Meeting new people and experiencing new things was what my WISEST 2009 experience was all about.

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