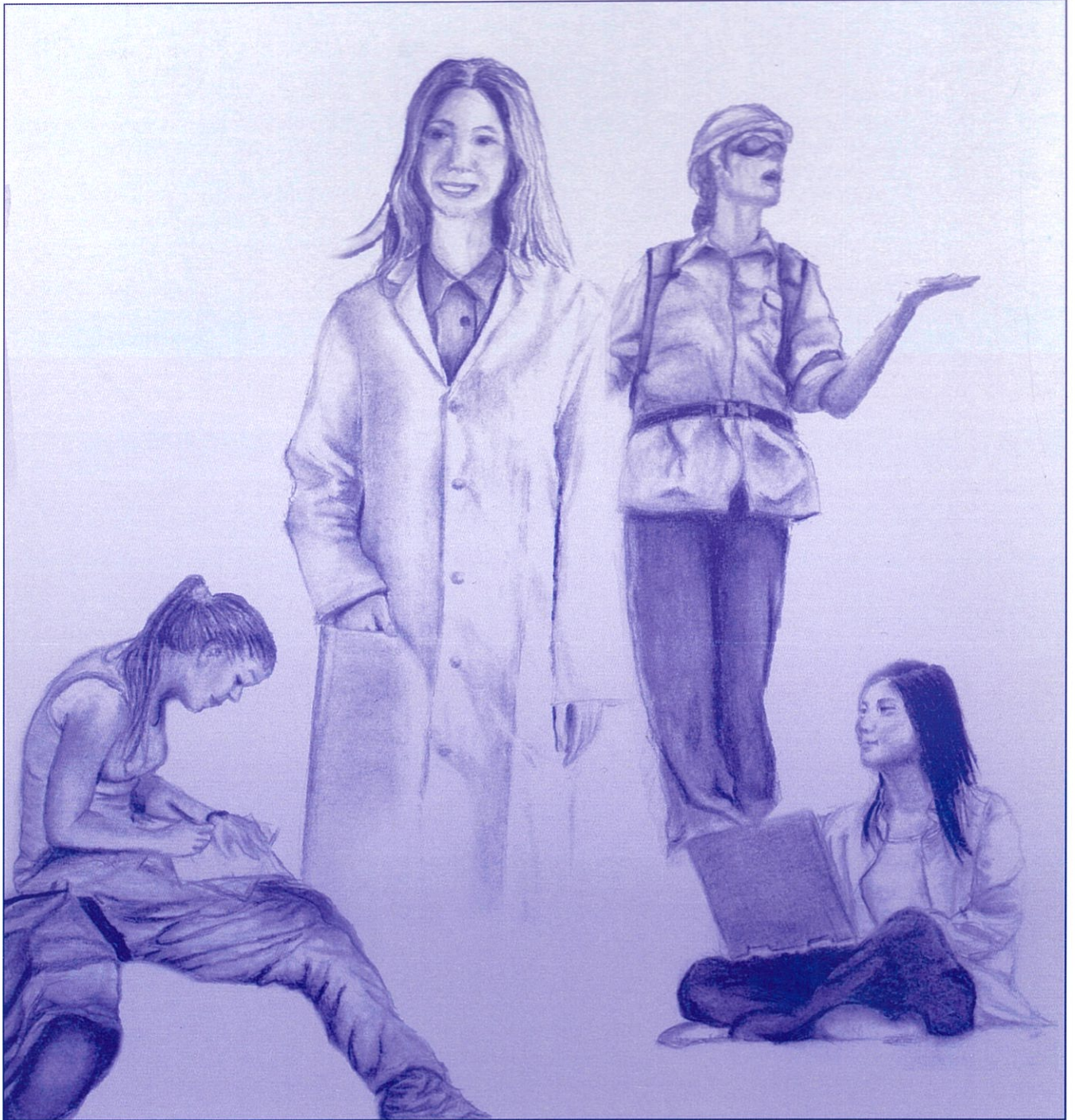


WISSEST

women in scholarship, engineering, science & technology



summer research program 2008



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.

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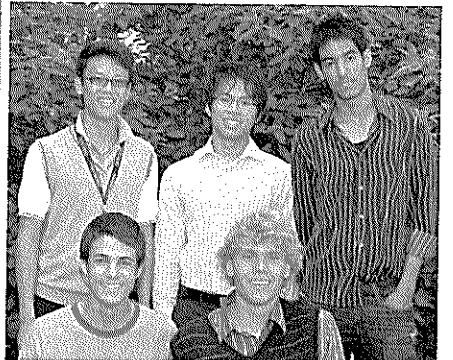
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WISSEST

summer research program 2008



student report book

students from the 2008 WISEST summer research program



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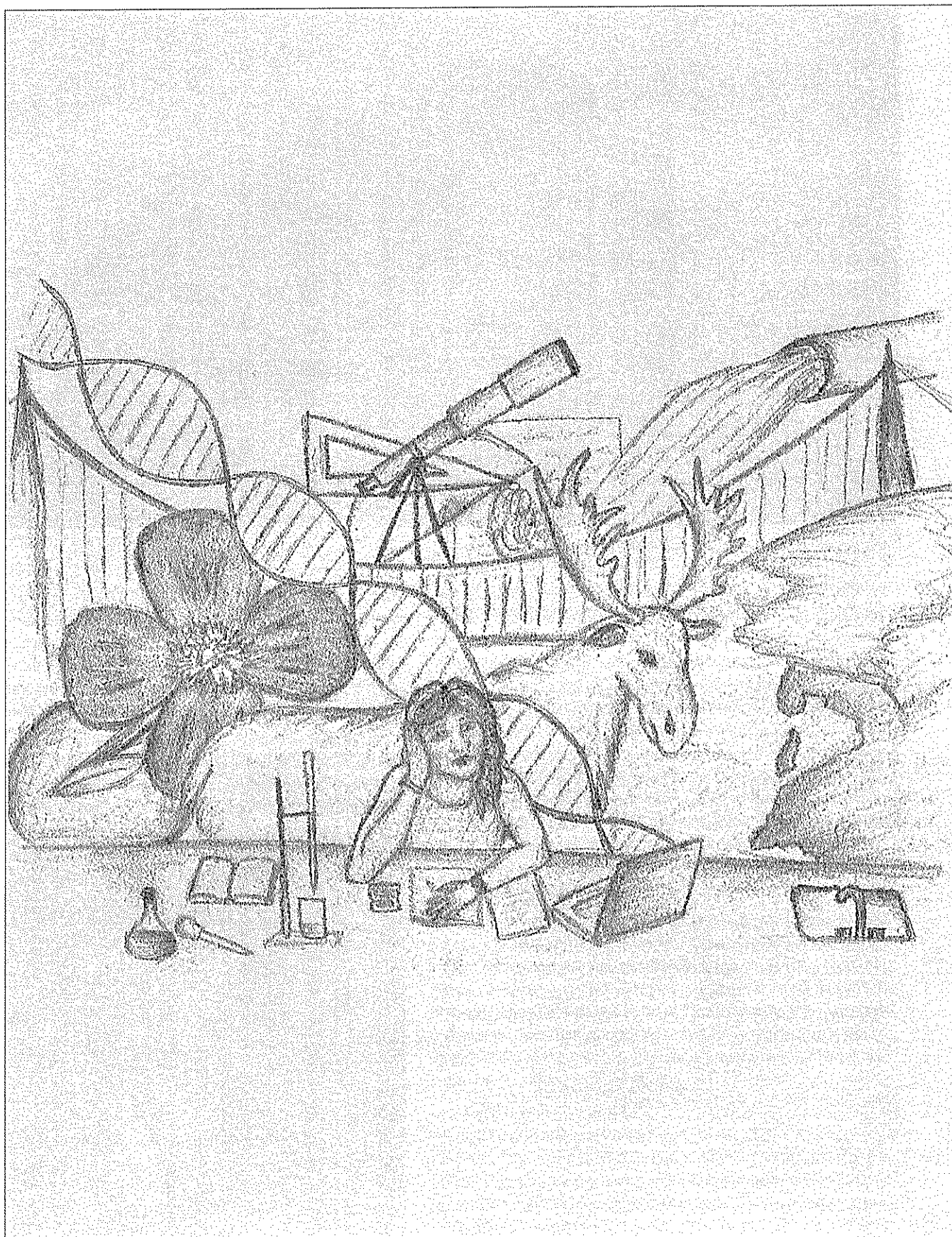
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ISEST summer research program



the annual wisest summer research program

by: Grace Ennis (WISEST Coordinator) and Gail J. Powley, P.Eng (WISEST Vice-Chair)



left to right: Gail Powley, Jennifer Lee, Taban Rizvi and Grace Ennis

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

One of the first major initiatives was the WISEST Summer Research Program, a valuable six-week research experience at the University of Alberta for high school students who are making decisions about their future fields of study and career paths. Students (both young women and men) who have completed grade 11 spend six weeks working as a member of a research group within disciplines less traditional to their gender. For young women, these areas include engineering, science, and technology, and for young men, the areas of nursing, nutrition and human ecology.

The WISEST students have written personal reflections about the experiences they had in the Program and in the research laboratories under the supervision of their scientist mentors and fellow research team members. They 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 formal weekly activities gave the students even more information about non-traditional areas of study. The student reports 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.

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. As Partners and Contributors, their sponsorship 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 extraordinary summer

by: Jennifer Lee and Taban Rizvi



left to right: Jennifer Lee and Taban Rizvi

WISEST 2008 will be a summer filled with memories for both of us.

What started as an ordinary summer turned out to be a summer of EXTRAORDINARY experiences. This was of course due to the 61 students who made our lives interesting and exciting. We loved meeting each and everyone one of you and thoroughly enjoyed watching you make parachutes out of paper to save your egg from ultimate doom of 3rd floor CAB, laughing your way through Mamma Mia and Pitch n' Putt or doing artistic interpretations of the two of us!! On a more serious note, it was great to see you learn from all the role models who participated in the Small Group Discussions or University 101, or learn



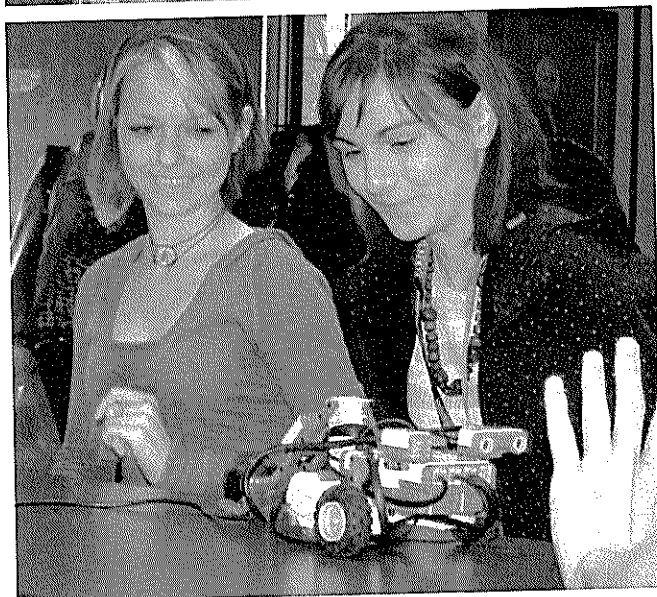
about research during our On Campus Tour, or even make your own robots or video games during "Many Faces of IT".

Throughout the summer, it was wonderful to have you drop by the office to share with us stories about your projects and labs or just to share some coffee and timbits. Some of you were a bit shy at the beginning or a bit unsure of your placement, but by the end of the program many of you told us about your joy and surprise in finding out something you did not even know existed. You discovered the many possible directions you could go in, and we heard some of you express surprise at how multidisciplinary each field is!! Over the course of the 6 weeks, it was fantastic watching the personal growth and success of each of our 61 WISEST students.

One of our favourite memories was LAB VISITS (sounds dry but it was SO not!!). Both of us got to see you in action and found out more about your projects. It was thrilling to see what you were working on and share in your excitement as we watched your face light up while you described everything you had accomplished. At the Celebration of Research, we stood filled with amazement and pride at the knowledgeable and professional people you had all become! (In addition, it is our opinion that by the end of the six weeks, you knew more than both of us combined in your subject area.)

We wish you the very best in everything life throws your way, and we hope that this summer has inspired you to find a career that you are passionate about, and drives you every day to keep on learning. May this experience have been beneficial for you and hopefully WISEST acted as a stepping stone into your futures, whatever that may be. Please stay in touch with us if you can, and thank you for giving us such an incredible summer!!

wisest 2008 partners and contributors



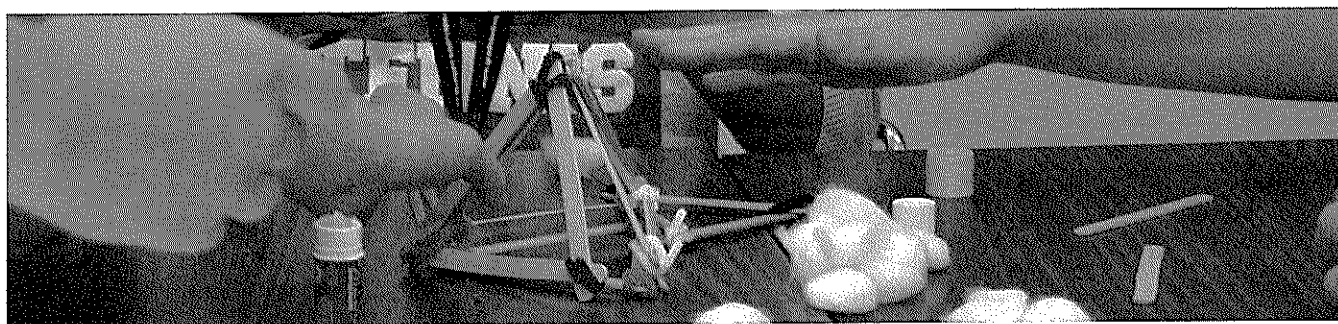
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- Alberta Advanced Education and Technology
- Alberta Heritage Foundation for Medical Research
- Alberta Employment, Immigration and Industry (STEP)
- Alberta Ingenuity Fund
- Alberta Education
- Alberta Environment
- Alberta Research Council
- Alberta Women's Science Network (AWSN)
- Allard Foundation
- Canadian Information Processing Society
- Canadian National Railways
- Capital Health, Edmonton Area
- Dow Chemical Canada Inc., Western Canada Division
- 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, Circle of Research Excellence
- Merck Frosst Canada Ltd.
- NSERC PromoScience
- Process Solutions Canada
- Suncor Energy Foundation
- Syncrude Canada Ltd.
- University of Alberta
- Faculty of Agricultural, Life and Environmental Sciences
- Dr Eleni Stroulia, Dept. Computing Sciences
- Faculty of Engineering
- Faculty of Medicine and Dentistry
- Faculty of Nursing
- Faculty of Science
- Centre for Math, Science, Technology Education
- Department of Civil and Environmental Engineering
- Weyerhaeuser

Contributors

- New Paradigm Engineering Ltd.
- Inland Cement
- Esther Ondrack

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.

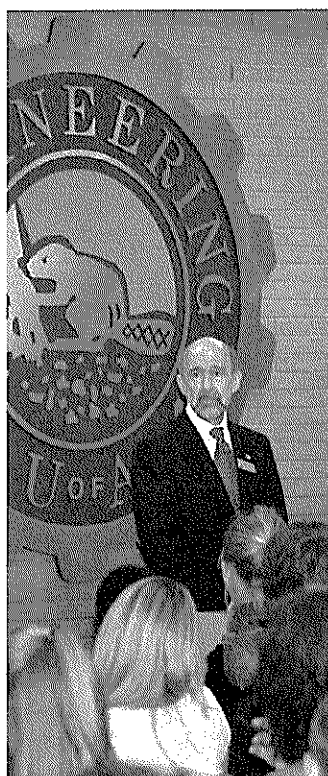
Official charitable tax receipts are issued to **Partners** and **Contributors** by the University of Alberta.

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



☐ Yes, we would like to become a Partner/Contributor of the 2009 WISEST Summer Research Program.

1. TERM:

- ☐ three years ☐ two years ☐ one year

2. LEVEL:

- ☐ **PARTNER:** WISEST Student Researcher position(s) at \$3000/position

If so, how many student researchers? _____ \$3000/student = \$ _____

- ☐ Cheque Enclosed ☐ Please invoice us

- ☐ **CONTRIBUTOR:** We wish to donate \$ _____ to: _____

- ☐ General support of activities and events in the WISEST Summer Research Program
☐ The Margaret-Ann Armour Endowment Fund for Rural Students
☐ Cheque Enclosed ☐ Please invoice us

3. CONTACT INFORMATION:

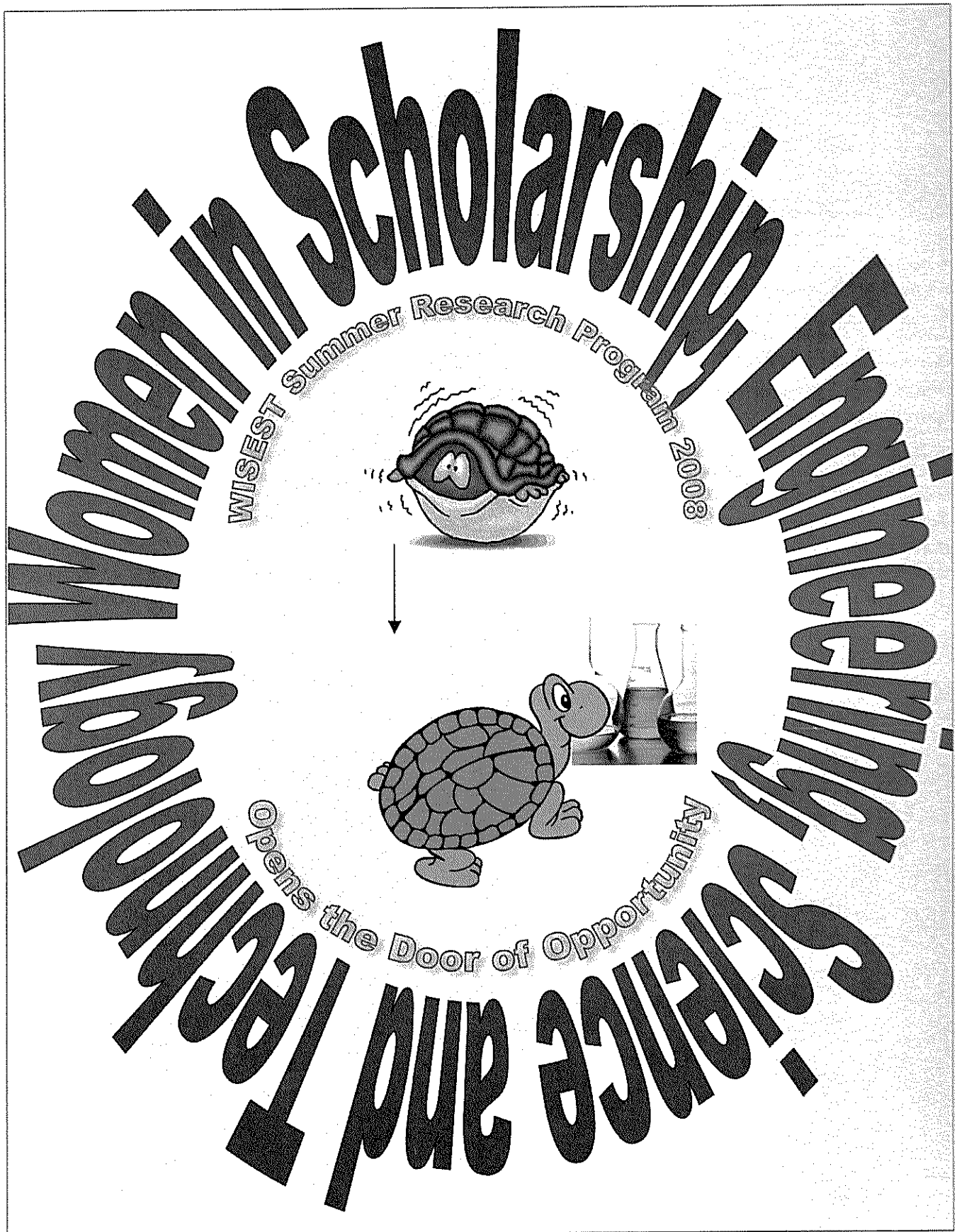
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Contact Person: _____

Address: _____

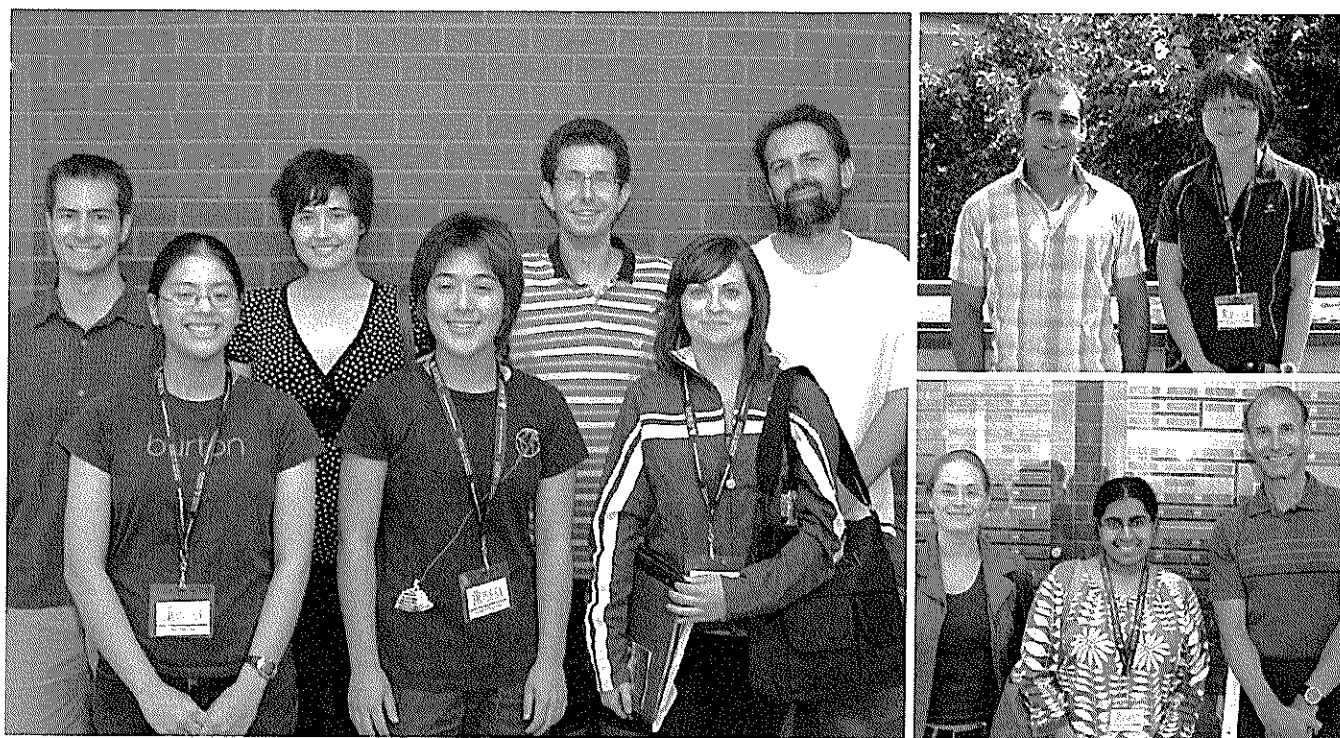
Phone: _____ Fax: _____ Email: _____

student events & activities



orientation to the wisest summer research program

by: Nancy Manchak

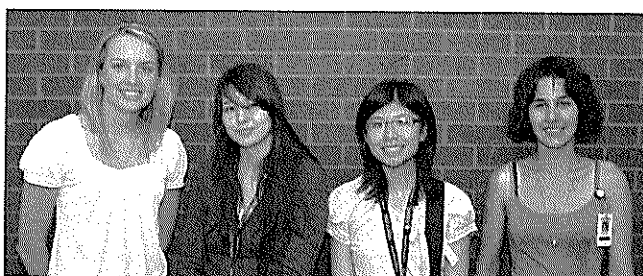


On orientation day, July 3 2008, I had the privilege of meeting sixty one other students with a passion for science and knowledge. Walking in the ETLC Solarium we were greeted by Grace, Taban and Jennifer. It was not long before a quick game was played where we were all moving around the room asking each other questions such as, "Are you a vegetarian? Is your birthday in November? Do you like to cook?" Afterwards, the fear and nervousness that we had all felt to some degree was put to rest as we enjoyed a breakfast buffet and picked up free goodies from the different university departments. It was while hearing introductions from Grace Ennis and Gail Powley that I realized what a truly special program WISEST was and the impact that would it would have on my future goals. All of the female role models for the program were so welcoming to us students and the overall atmosphere was one of excitement and vision. Everyone in the room had been selected to attend WISEST based on their academic performance, teacher recommendations and overall aptitude to achieve positive results from the six week term. It was with this knowledge that I came to the understanding that among this group of talented young men and women were the leaders of tomorrow in areas of science, engineering and technology.

Background information and expectations were explained to us before we split into two groups to play a dance themed name game. It did not take long for everyone to start laughing as we combined crazy dance moves with remembering thirty names. After a campus tour to ensure that everyone knew their way around campus enough to avoid getting lost, we were provided with a lasagna lunch. It was not long before the room was filled with conversation as new friendships were made between students who realized they had so much in common with each other.

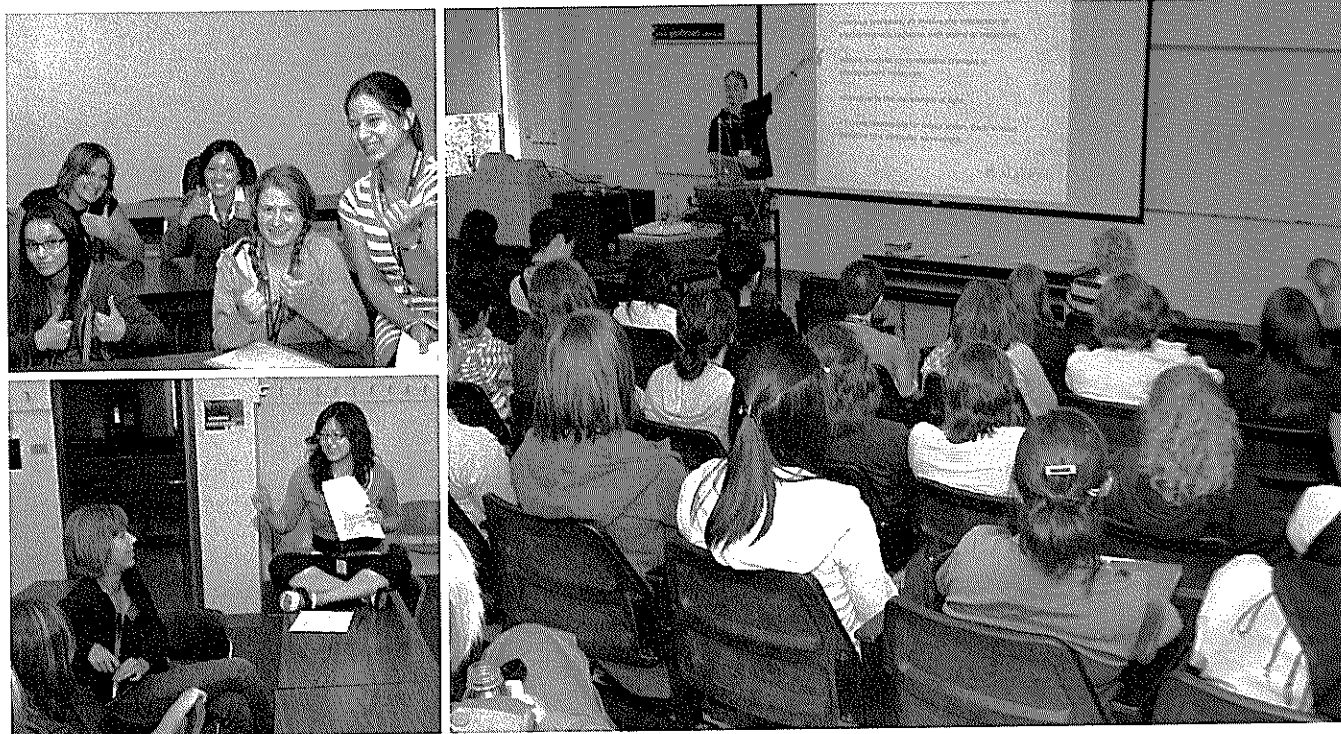
During the afternoon portion of orientation safety training was provided to guarantee all WISEST students were well prepared for work in a laboratory setting. We learned proper procedure for bio-hazardous and chemical materials from Daniel Dragon and Nasrin Dhanani. Later in the day we had the privilege of listening to Order of Canada recipient Dr. Margaret Ann Amour describe her experiences with science and how it had impacted her life. Listening to Dr. Amour you could not help but be amazed at all she had accomplished during a time when there were few women in the scientific fields. Throughout the day we heard about activities and events that would keep all of us busy throughout the six weeks. At orientation, six weeks seemed like it would last forever but as I write this I am already amazed at how time has flown by.

It was near the end of the afternoon that we were able to meet with our supervisors. All of the students waited as one by one groups of one, two, or even four students were introduced to their research teams. It was evident that the supervisors were just as keen about the research projects that lay ahead as the students themselves. After a full day of meeting new people and learning about the WISEST program, I left orientation knowing that this was only the beginning of an amazing opportunity.



university 101: science 100 seminar

by: Andrew Perri



This was my favourite Monday session because we were able to learn from people who had gone through the scary feat of university. I also enjoyed it because the idea of it was to openly discuss any concerns about university and our career paths for the future. All of the WISEST students were split into groups of four to six and each group had a role model to tell them about their experiences in university and the sciences. It was very helpful and opened my eyes to the fact that university is a great opportunity and it would be a shame to waste it locked in your room, studying for exams.

My role model was very enthusiastic and entertaining. He told us about his personal experiences and shared his insights on the

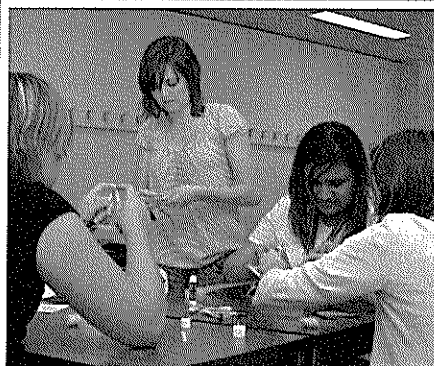
university lifestyle. His advice helped me to understand university a bit more by giving us the main idea of it all, and then discussing our questions and concerns. Here is what I got out of it: University is different for everyone so there is no mathematical equation that we can use to solve the secrets on how to succeed. I learnt about balance and how it's useless to spend the majority of your time studying or the majority of your time goofing off, you'll miss the whole experience if you do that. "When you study, study, and when you have fun, have fun. Don't combine the two or both of them will not be fully experienced." We are bound to fail and failure is definitely not a bad thing, if you really understand how it works you'll look at it in the right way. One of the things our role model kept on repeating was, Don't be hard on yourself, if you don't forgive yourself, the amount of stress and anxiety you will have will keep getting worse. You don't need to get the results you want, it's good to shoot for them, but in the end, if you take it easy on yourself, but still make an effort to figure out what's not working out for you, you will grow from it. I believe this not only applies to succeeding in university but also succeeding in life. Overall, the discussion taught me that university is a mini world where you actually learn more about yourself and life than the material you're taught in your classes.

I really enjoyed the Monday sessions because they each exposed me to the university and the sciences at the university. You'd be surprised how many little things you can learn just by taking a tour through a lab. We were able to choose some of our tours and we were constantly surrounded by mentors and people with insight to share from their experiences. I felt very welcomed at the U of A (mostly because everyone loves WISEST students).



science olympics

by: Natasha Workun



It is the competition of every nerd's dreams, the WISEST science Olympics. With the summer Olympics currently underway in Beijing what better way to break the ice with a room full of nerds than to hold the science Olympics. The science Olympics were one of the Monday afternoon seminars held by the wonderful student coordinators. We were split up into eight teams of five so the competition was fierce; everyone wanted to prove that they had what it takes to be the ultimate science nerd. There were only three events so it was go big or go home.

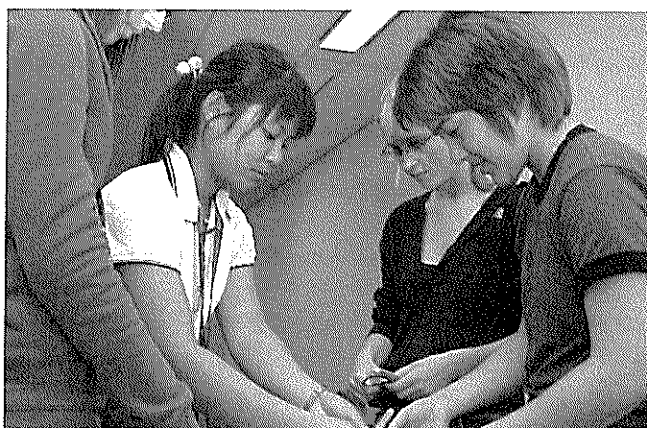
First up was the spelling bee to see who could come up with the most science words in fifteen minutes, the only catch... all the words had to be spelt using the periodic table of elements. Points were awarded for words over six letters long, the longest word, and a science or technology word. You had to come up with a team name, theme, and title of position for everyone on your team. Well you might think coming up with random words from the periodic table is easy I personally challenge you to try it again and stick to a theme that is six or more letters long and is also spelt from the periodic table. It is hard than you think.

Therefore, with fierce competition, next up was science charades, again we had fifteen minutes to guess as many science related words as we could. Well we might be the elite science nerds some of us like me for example cannot act out the simplest words to save our lives, acting out things like phagocytosis, decomposition and symmetry are not very easy, but it is a good thing that we all knew our stuff and was able to keep guessing once we got close.

So with smiles on our faces it was time for the last event the "Egg Drop of Doom." We had forty-five minutes to come up a structure that would prevent an egg from breaking when dropped from the first floor to the basement of the CAB building. Only given one meter of masking tape, a handful of each pipe cleaners, straws, popsicle sticks, a meter of

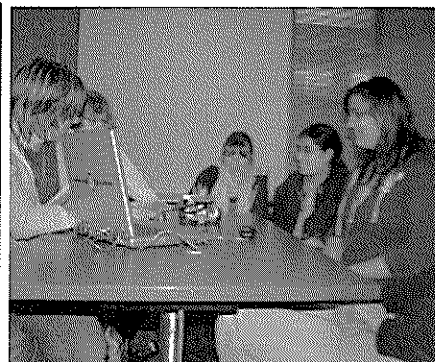
string, and a large sheet of paper we set to work. Knowing that the triangle is the strongest structure most groups decide to go with a similar pyramid type structure suspended by a parachute. That is all expect for one group who decide a circular structure using the paper for padding was best. With ego's running high, it was time to see who really the best engineers of us all were. Drop number one, from the first floor, all the groups made it through expect the group with the parachute, one down six to go. Drop two, second floor, everyone made it out safely so it was time to go to the next floor and last floor with the winner taking all. Drop three from the third and finally floor, only four of the eggs break and it is a three ways tie for first as we ran out of floors.

With team two picking up the gold metal and teams seven and one picking up silver and bronze respectively, I am sure to say that fun was had by all whether you won or lost. Thank you to Jen and Taban for putting this event together and to all the other volunteers that helped along the way.



the many faces of IT

by: Tyana Rudolfson



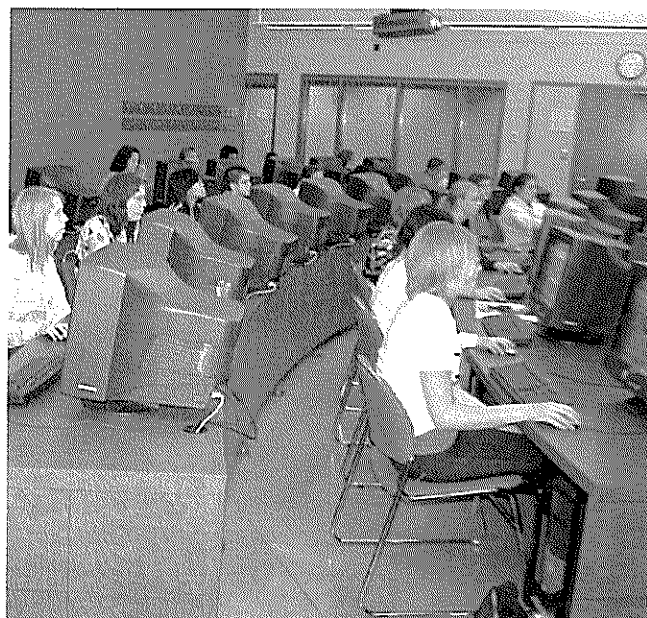
For our second Monday seminar, everyone gathered in a room inside the Computer Sciences building. We sat down to face a woman in front of two large projection screens. Wendy Dupree, with a Bachelor in Sciences from the University of Alberta, had come to teach us all about her experiences working for IBM. Having specialized in Software Design during her university career, she was quite familiar with many aspects of technology. For the next while, we learned about the many faces of women in technology. Showing us the variety of positions in the company, we all were surprised with the variety of personalities in what would typically be considered a very consistent environment. Wendy shared with us all the issues women have to face in such a field. To our astonishment, we discovered that just because IBM works primarily with the research and development of new technology, the diversity of the technology being discovered and the number personalities associated with those discoveries were infinite. I know we all left that discussion with a new appreciation for all the areas in technology that can women can explore.

After the IT presentation, we were split into two groups. Half of us were led into a room where we were placed in front of LEGO catapult robots. In this demonstration, we were taught how to use a program on the computer to ultimately make the robot throw a ball. By the end, we could make the robot move forward and backward, and throw a ball when it was placed in its hand, all with the click of a mouse. We could even make it perform several movements in sequence with each other. Needless to say, anyone who loved anything to do with robotics went absolutely nuts!

The other half of us were led into a separate room where we were taught how to create our own ping-pong game on the computer.

We could even personalize our game, creating our own background and such. Of course, it may sound easy, but creating a computer game from scratch for the first time is not walk in the park for many people. For this reason, we were happy to keep it simple for the time being.

After the session, our heads were buzzing with so many new experiences and ideas, we had nearly driven ourselves to the point of exhaustion. That was alright, though; it was well worth the effort. After all, how many people get the opportunity to do everything we did in one short session? I would be willing to say not many.



on campus research tours

by: Jillaine Proudfoot

When the sign-up sheets for the On Campus tours were circulating, I was having problems deciding what to sign up for, they all sounded so interesting! In the end, I decided to join the group of Biomedical Engineering, and I was glad I did! On July 28th, me along with the 4 others in my group, met Dr. Jei Chen who would be giving us our tour.

Dr. Chen is an associate professor at the University with the Biomedical Engineering and the Electrical and Computer Engineering Departments. The first place we went to on our tour was NINT. There, Dr. Chen gave us a tour of his company's lab, which working on a variety of biomedical projects. He also introduced us to his students working for him that summer who he was going to teach how to become million or billionaires! (Preferably the second one, one of the students commented!)

Dr. Chen then told us about some of his previous projects he had worked on, and we were fascinated! The one that we really all found very interesting was a machine that can take any type of blood, and remove all the antigens on it, so that it can be used universally on any patient! He then told us about a system he developed that you can set up to your satellite radio. When you hear a song you like on the radio, you press a button, and it downloads on your i-pod. He also said he was in the process of inventing a nose that could smell dangerous toxins.

After our tour of NINT, we went to the Electrical Engineering building. There we went outside a lab, and saw people working in Bunny suits! He explained to us what some of the projects they were working on there, and how very precise everything had to be. We were amazed at the capabilities technology had in helping people, and were thankful to Dr. Chen for showing us around.

Once all the tours were done, I heard all about the other student's tours, and they found them to be great experiences as well. Some of the other places that were toured were chemical and materials engineering, the diabetes center, computing sciences, iCORE, chemistry, and nutrition. In the materials engineering tour other students found it intriguing to see a braiding machine that was used for blood catheters, and other equipment for orthodontics. In the experimental glass-blowing tour, one student found the fact that they were able to stretch quartz to make fibre optics very interesting. She found the glass-blowing exhilarating, and loved the souvenir she got at the end! In the Computing science tour they said that they learned how to mathematically solve problems on the computer.

Overall, I thought I learned the most out of any Monday afternoon seminar from the On Campus Tour. It was excellent to experience other labs outside of the field I had been placed and was a very eye opening experience for everyone in Wisest!

dinner and a movie: mamma mia

by: Nini Brar

When I first heard about WISEST, it seemed like a program with lots of crazy studying and no fun. The name of the program does for sure suggest the impression of that kind, but it was only some seconds after stepping into the bubble of WISEST, that I and all my friends realised the fun of being involved in this program. Day after day, the stress increased but more important than that, the fun filled activities for the involvement in the society started and never ended throughout the program.

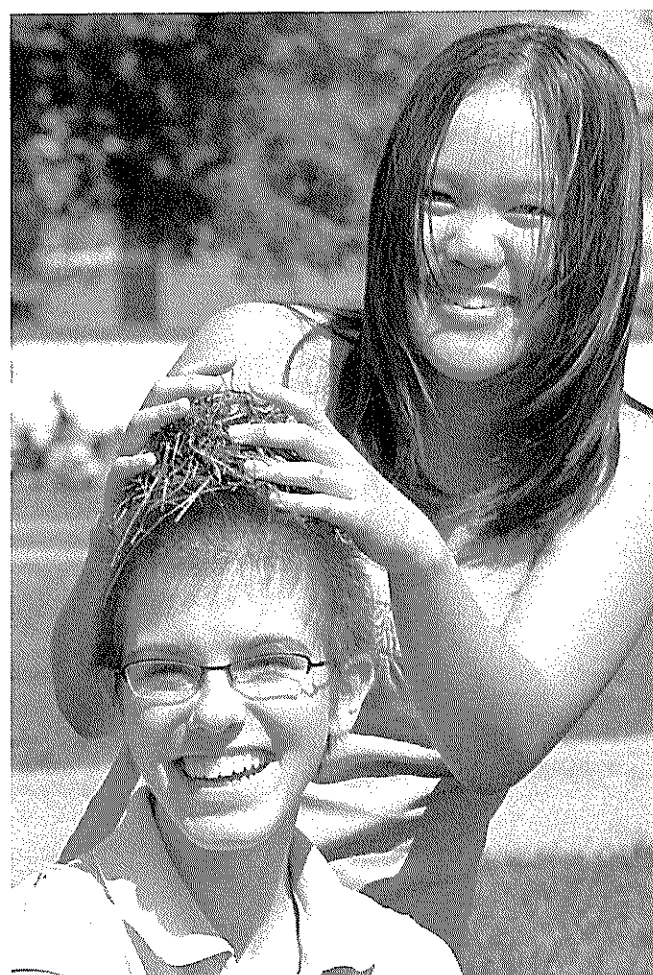
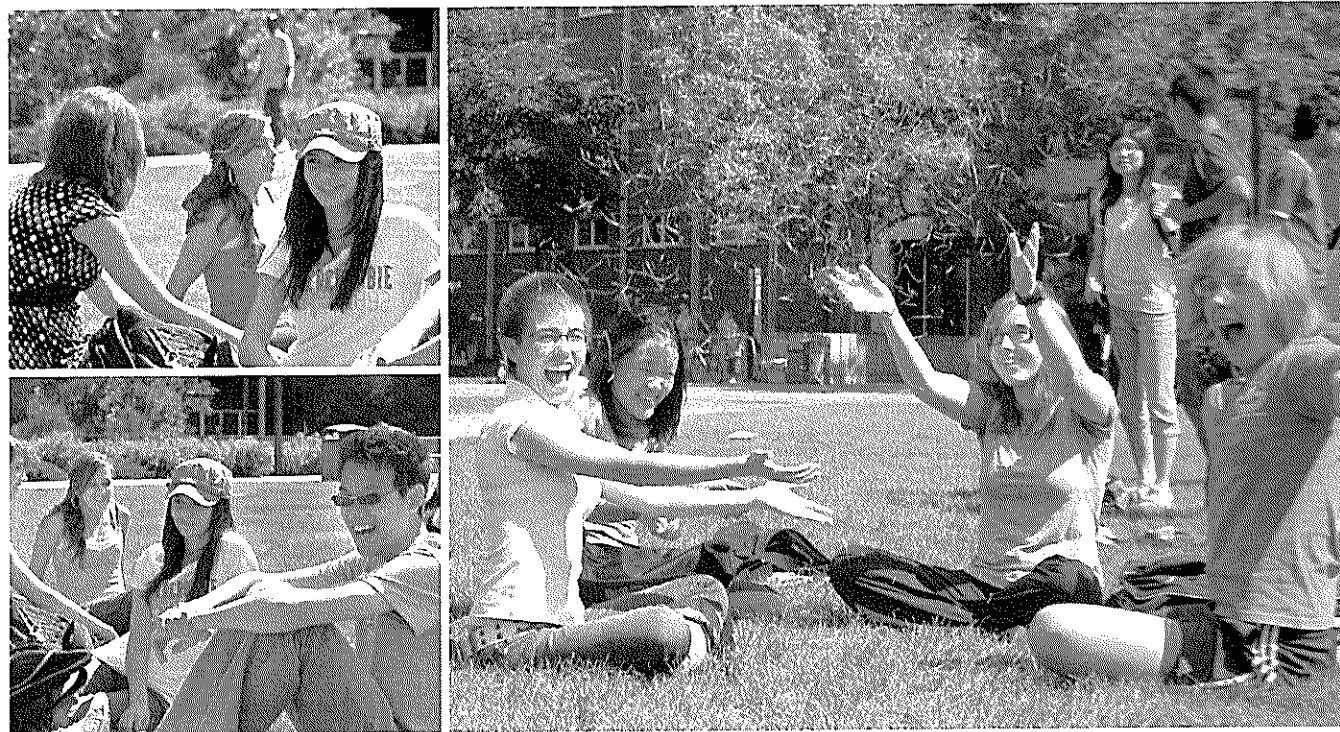
Midst all the research work in the lab and the office, there was an evening to spend with WISEST friends. It was on July the 18th that the WISEST students and the coordinators headed off to the West Edmonton Mall. The fun started on the very first minute of the trip. There was chatting all over the room and the fact how much everyone knew each other in 15 days was just mind blowing. This was possible only due to the efforts of the coordinators of the WISEST program by organising different activities. The students who chose to participate in the evening were lead by Jennifer and Taban and we took the bus to the West Edmonton Mall. The level of excitement was just increasing every single second. By the time we got there, everyone was having fun and was excited for the movie. Everyone just loved the idea for a Dinner before going to the movie. We again got a chance to sit with all the friends, chat and eat dinner. This added on more to the friendship of our WISEST group. After we

were all done, we headed to the new theatre at the mall itself. I was so excited for the movie MAMMA MIA because it seemed a cute movie from the trailers and pictures. The movie started and I personally liked the setting of the movie. It was set in Greece and such a pretty setting. It was a movie with a combination of comedy, romance, and suspense. The songs by "ABBA" were just addicting. It was a perfect movie for watching with friends all together in a group.

The movie was finally done and we were all happy because we had fun but sad as well because we had to leave the company of our friends. But the fun activities in the lab as well as outside the lab never ended and went on. By the end of this report I would like to give a short message to all my friends who seek to be the future WISEST students. I would like to say that WISEST is a perfect program and the best summer job you can ever get. Being involved in this program, you get a chance to gain hands on experience in the university labs in the different Faculties with all the students with similar interests. You get a chance to meet professors, grad students who assist you on the right track for the decision making for the post- secondary studies. On top of that, you enjoy your summer in the summer mode with all the different fun filled activities. I feel highly privileged to be a part of this program and will encourage you all to be a part of the WISEST as well.

fabulous freeby friday lunches

by: Cara Oakley



Rain or shine every Friday lunch hour was truly fabulous. Meeting at the Timmy's in CAB, and hanging out in QUAD was a weekly tradition. Luckily on all but one Fabulous Freebie Friday (FFF) the sun was shining; and on that day when the sun didn't the shining personalities of the WISEST students made up for it.

The reason Friday is in the title is obvious, it happened on Friday, and just as obvious should be why Fabulous is as well. FFF was a highlight of the week, and something to look forward too despite all the other cool things happening on campus.

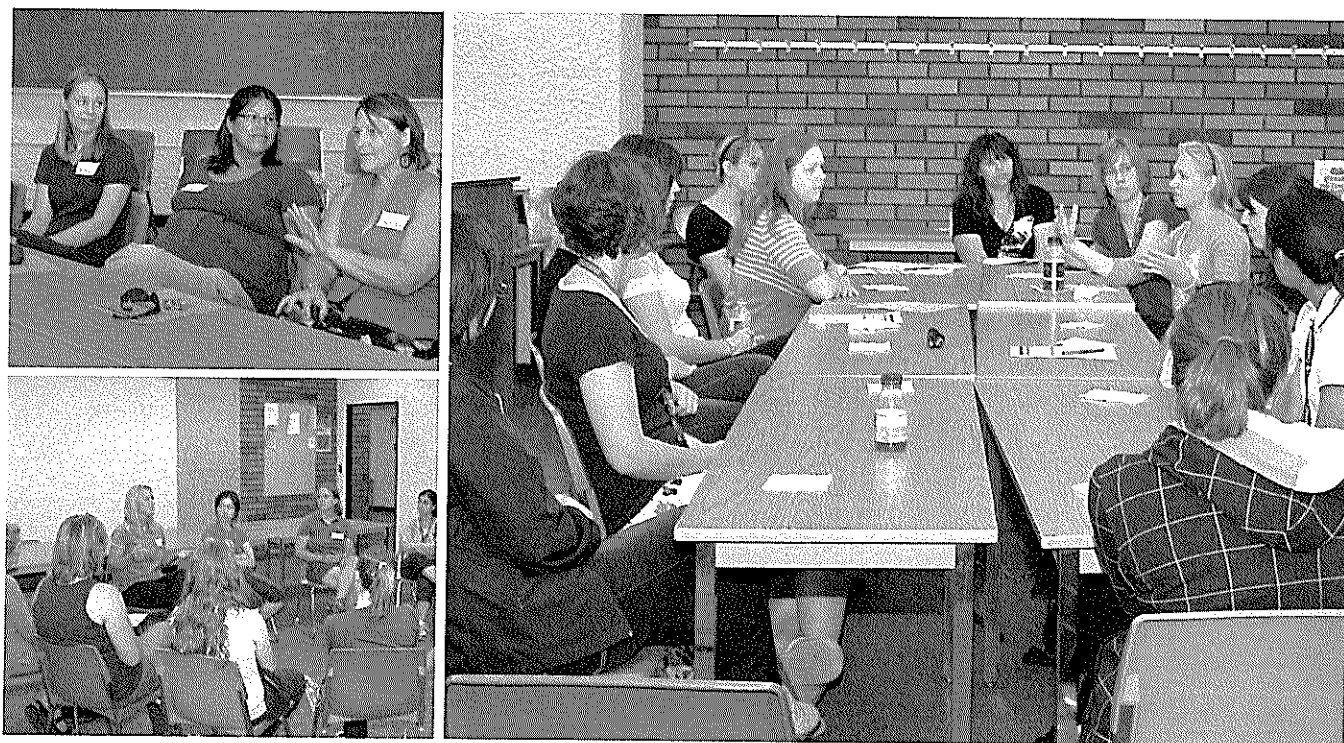
Sharing stories on our research, our co-workers, and our weekend plans Fridays were critical to getting to know each other. Finding familiar faces to sit with, laughing at the discoverE(sp?) camp counselors dressed from The Wizard of Oz, and dragging each other out to play Frisbee or throw a football around we got to see more than just the working aspect of our new friends. And speaking of new friends there were two whom were there every day of the journey, Jen and Taban. I don't know if it was that they fit in with us, or we fit in to their university style, but I have never met a coordinator that was as much a friend as mentor. FFF could not have happened without their organization skills, and would not be the same without their presence.

We squinted and complained about the sun (in contrast to some of our badly lit labs), missing our busses, and being plain tired; yet it did not darken our moods for we all glowed with the experience of Campus life that WISEST offered.

Therefore, every Friday lunch, with the freebie draw, the funny conversations, great friends, and sunshine was really...Fabulous.

small group discussions

by: Monika Viktorova



In addition to exposing the participants with hands-on experiences in science and research, WISEST has also provided insights into university life and what the future holds for those who choose to study science through its weekly seminars. One of the sessions that impressed me and broadened my perspective the most was Small Group Discussions. It was an extraordinary opportunity to meet, talk with, and get advice from women who had followed their dreams and pursued a career in science or engineering despite the fact that these fields are dominated by men. Our group of more than sixty WISEST students was split up into smaller groups of 6 or 7 girls and boys and paired with a moderator and an equal number of "role models". The role models were women who would share their unique and diverse experiences in their careers in science and engineering and how they overcame the barriers associated with the imbalanced gender ratios in those fields.

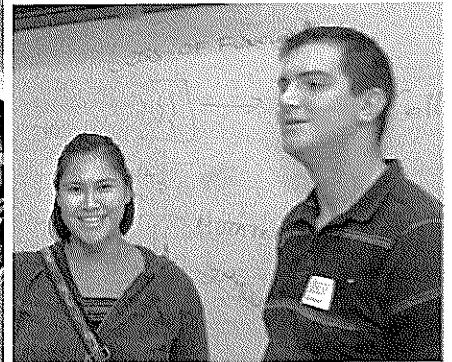
At first, it was intimidating to be surrounded by such a successful group. When the moderator asked each role model to introduce herself, I was impressed by their accomplishments. My particular group included a project manager from IBM, an engineer from ATCO gas, a consultant who recently finished her undergraduate degree, a mathematical biologist, and the executive director of Alberta Women's Science Network who had only twenty minutes earlier presented the Minerva Award. As the moderator, a Human Resources Generalist from Haliburton, started introducing various scenarios of common dilemmas faced by an undergraduate student, however, the conversational flow picked up speed and everyone seemed to feel more comfortable and willing to share.

Every role model had a unique set of experiences that included both the challenges faced in their careers and the successes of overcoming those challenges. They generously shared their stories about why they made the decisions to study in science or engineering with us. When each role model explained how her career path had evolved, I found myself reassured by the fact that some of them had been just as divided about what they had wanted to study as I am presently. The IBM project manager explained that she had wanted to become a librarian before she became interested in engineering, an experience that all the WISEST students can relate to since we are still choosing what to study ourselves. All the role models shared similar changes of mind in their degrees careers, which they explained had always been beneficial for them. Another important piece of advice that they gave us was to be confident in our knowledge but at the same time to be unafraid of asking questions. They stressed that asking questions of people with careers in science and engineering is an important way to broaden our perspective and would allow us to make our decisions more easily.

Small Group Discussions is a very valuable session because it not only allows students to meet successful women in science and engineering but it also creates a personal atmosphere where the students can ask for advice and the role models can share their experiences. What I liked most about the session was that it reinforced the fact that the challenges of choosing a career path in science and engineering need not be faced alone because there will always be people you can look to for advice and inspiration.

aboriginal perspectives

by: Priyanka Vergis



In science there are many ways to look at one problem. This influenced by our culture and ethnic background. In Canada, we are very blessed to have the opportunity to look at these problems in many different ways as we are a multicultural nation. However, we seem to forget a culture that took the resources around them and made the best out of it. They are our Aboriginal Peoples.

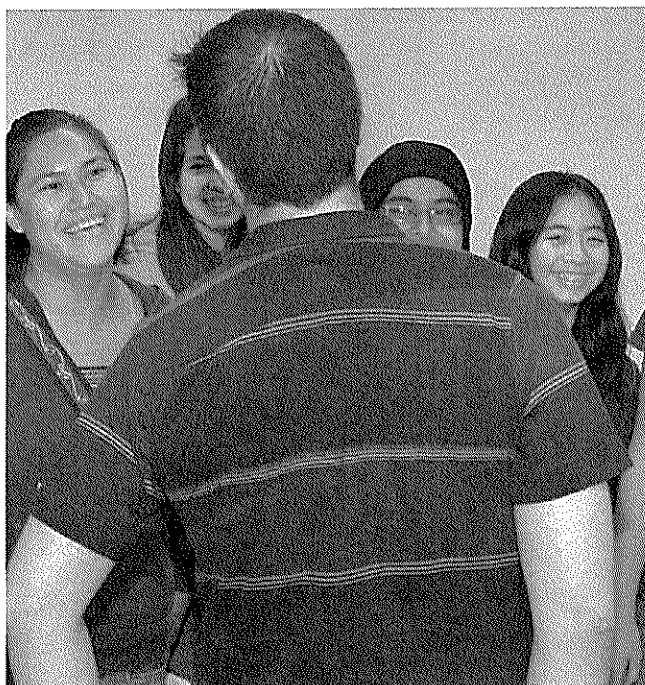
With so much advancement in our society, industries need space to develop their products and many times they take and use the land

and resources of the Aboriginal people. But what happens when we use their resources for our scientific purposes? Do they have any say? Are they reimbursed for their land? These are all questions we asked and thought about during our group discussions with many of the Aboriginal peoples that came and talked to us today.

It was interesting to learn that many times industries and sometimes the government will use their land without sitting down with the community to discuss what resources will be needed and how they will be replaced if any of it is used. It is important for industries and scientists alike to sit down with the community and discuss these issues with them. Their culture is very important, and offending them would be a disgrace.

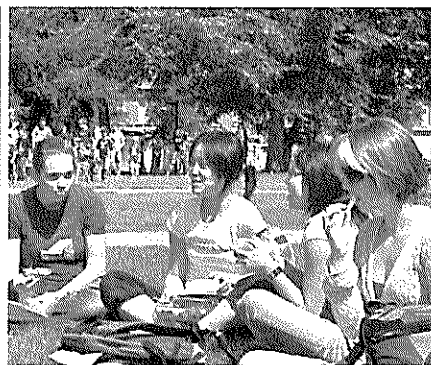
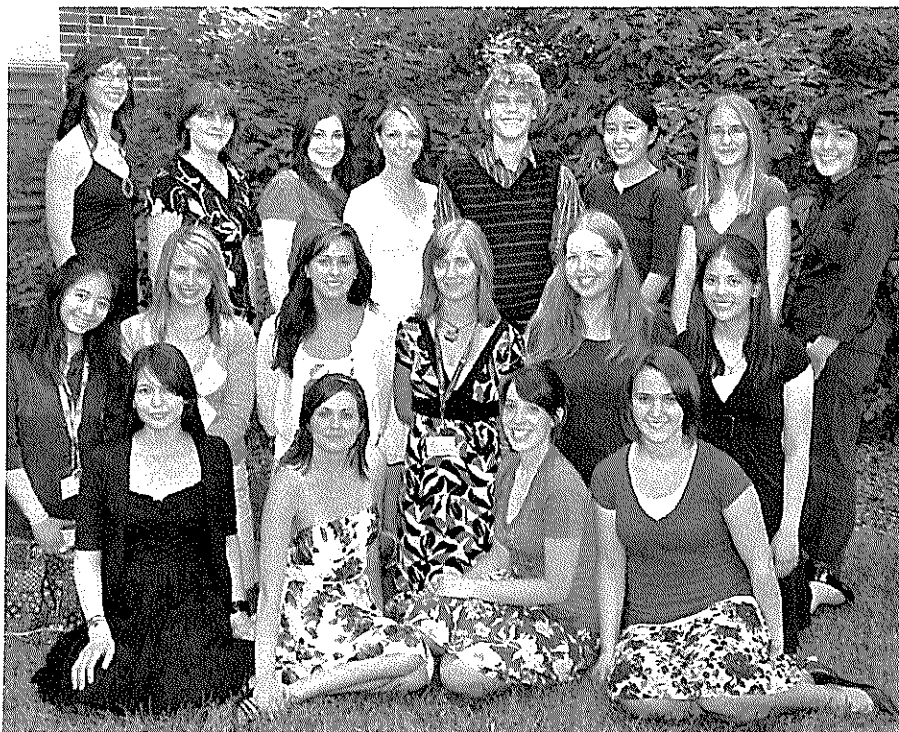
The Aboriginal people, many times are in such a state of poverty that the only resources they get are the ones around them. For them their land is very important. If you live up north in Iqaluit and the Northwest Territories, they only get one shipping of supplies a month. I think it is important that they get reimbursed for their land that are giving.

Claire Clark, our guest speaker for the day, discussed her troubles that she faced during her time. Alcoholism was a large factor that gave her the determination to go out in the world and get an education that would better her future. She was 16 years old when she moved out of her reserve and took her litter sister along with her. The one thing I understood from her struggles were that if you are determined and you see a goal that you want to achieve before you, then that's all that matters. You have to push yourself, no can do that for you. It is also important to have a support group whenever the going gets tough and help you along the way. Life is not easy, but it is what we make of it that counts!



the rez report

by: Alex Lush



The WISEST Summer Research Program is meant to bring young men and women to the University of Alberta in order to introduce them to non-traditional roles in science and engineering. Many participants are from Edmonton or the surrounding areas, but for those from farther away that had no relatives or friends to stay with, there was St. John's Institute. Almost all of us arrived the night before (except for those who encountered slight difficulties trying to drive through the mountains) to move in and get acquainted with Stephanie (our amazing Resident Advisor) and the other people we would be living with for the majority of our summer.

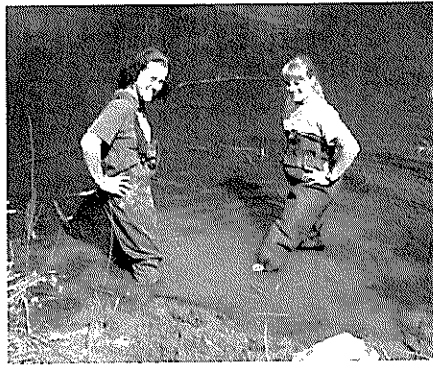
Before gathering for our tour of campus (so we would be able to find our way to orientation in the morning), most of our time was spent unpacking our things and trying to feel at home. We were all somewhat shy and nervous about meeting all these new people that we would be spending most of our time outside of the lab with, but once we did our first icebreaker we could already see that we had absolutely nothing to worry about. After the first week, we were having so much fun living without our parents and with each other that we simply could not understand how people could bear to participate in WISEST without living in residence. I mean, why would you want to work all day if you didn't have an awesome group of people to go home to? We learned about each other's work, where we were from, what types of sports/activities we liked to do, and where we wanted to pursue our post-secondary studies. Living with people from rural Alberta, British Columbia, Ontario, and the US helped get different perspectives on the sciences and also let some people in on other things they might want to study in university.

From exploring Whyte Ave. to holding enormous sleepovers, there was hardly room for a dull moment living at St. John's. We crowded into the TV room to watch the season finale of people's favourite shows, and also around each other's laptops to watch some YouTube. Half the people seemed to leave on the weekend to go visit home, but those of us who stayed behind kept busy playing poker, pool, ping pong and foosball downstairs. During our free time at work, some of us would make up plans for the week and weekends, which included things like a scavenger hunt, hide and go seek in the dark, random drama games, monopoly Sundays, weekly trips to West Ed, Body Worlds, the Taste of Edmonton, and the Heritage Festival. Meal times were full of people all attempting to eat at the same crowded table, while trying to figure out what mystery meat the "boneless BBQ ribs" were composed of. Many a night we were also entertained by the Ukrainian Osvita students, who were practicing their cultural dances. While our many planned activities kept us occupied, there were times when we just wanted to curl up on some mattresses and watch movies. Other times our room-mates (or hall-mates) would announce that their (or their room-mate or hall-mates) birthday was only a couple of days away. Of course, we could not let this announcement go unnoticed, so everybody joined in to plan a streamer, balloon and even tree-decorated-cake filled birthday that they would never forget.

As the program comes to a close and we all start to pack up our things and prepare to leave, reality sets in. The people that we have spent our summer with will all be leaving and going their separate ways. It is sad to see everyone go and to say goodbye, but hopefully this will be the beginning of the even greater friendships yet to come.

meanook: a special place

by: Alyssa Larson



Cree for "a good camping place", Meanook brings images of lurking bears, a lonely log cabin, fascinating field work, and wonderfully dirtied clothes to mind. Upon stepping out of the car and into the station, however, I discovered that, thankfully, only half of those were right.

Life at Meanook is drastically different from that of in a city. Sky scrapers are replaced by towering birches, parking lots with lilt-ing daisy fields, and the confusion of rush hour by clean, fresh silence. The lab at Meanook is unlike any other—a subject may be found inching its way under a leaf, swimming at the bottom of a pond, or, in the case of swallows, dive-bombing you as you walk in a field. Cinder block walls, in the meantime, have been banished for the shivering aspens that ring the station's fields. In truth, perhaps the only thing that resembles the traditional lab found at a university are the people.

Biologists seem to run through Meanook like a current. While living at the station, immersed in the daily life of these scientists, fellow researchers become coworkers, friends, and finally, mentors. To be on the lip of science, and to help fill an unexplored void with knowledge is an exhilarating experience. I had not imagined that I, a grade 11 student, would be working in such a place, to the backdrop of nature.

The words "research station" on the sign at the turnoff to Meanook sounds novel and even alien enough to invite the curiosity of a passerby every few weeks. However, days at Meanook are spent soaked in a casual and familiar atmosphere, as the researchers never fail to include us students in any activity. The list of memories I'm taking home run like Kodak moments—there were mud fights, game board nights, sultry

afternoons spent in the cool waters of Narrow Lake, and one effort at singing around the nightly campfire. So, in short, the Cree were right in marking Meanook a special place. However, more than just a "good camping place", it became the home of first experiences, great memories, and a heck of a lot of fun.



life at meanook biological research station

by: Alyssa Larson, Lisa Lorenz and Jasmine Mah



This summer has been amazing! Although we all had our apprehensions heading in, it became obvious very quickly that our WISEST experience was going to be much more than we ever expected it to be. From the beginning we felt right at home at Meanook. It would be impossible not to! The station serves as a temporary home to a great bunch of people. Between ABMI, the Americans, the peat guys, the fish people, the caterpillar people, and various other researchers it's always easy to find someone with a fun idea. A huge thank you should go to the other people working just to keep the station on its feet — Brandon, the station manager, his assistant Allison, the facilities manager Warren and of course our amazing cook Patje were constantly rushing back and forth trying to solve all the problems of the world. Most of the time they succeeded...without them there wouldn't be a Meanook at all!

The three of us were given the opportunity to participate in many different projects, and we learned a lot from them. Because so many sides of science are studied at Meanook, we got a good sampling of many aspects of research. However, it was more than just the researching that set Meanook apart. Living where you work is a unique experience...how many times have you had breakfast with your boss? Explaining life at Meanook is like trying to explain a Gravity Assisted Death Sphere...you really have to experience it first hand!

research in action tour: Isotechnika

by: Sundas Komal Mohsin

On Tuesday July 5th, half of the WISEST students and their Student Councilor, Jennifer, got on the bus and departed for Isotechnika Inc. When we arrived there, we were greeted by a couple of members of the company, including the Chief Operating Officer, Dr. Launa Asplet, and then introduced to what exactly Isotechnika is. We found out that Isotechnika Inc. is an international biopharmaceutical company headquartered in Edmonton. The company focuses on the discovery and development of novel immunosuppressive therapeutics that are designed to offer advantages over other current treatments.

A tour of the many labs in the company followed the introduction. Our group was divided into two and paired up with one of the two lab technicians. We learned that before a new manufactured drug can be tested on humans, it has to undertake pre-clinical (in-vitro and animal studies to insure safe use in the human testing phase) and laboratory research where the results from this stage must be approved by regulatory agencies. There are many Phases in this process as the information from the previous phase is used to further improve the results of the following Phase. In the first Phase, a small group of healthy human volunteers, mostly university students, as they are both healthy and could do with the extra cash, are examined to see how the drug and human body will interact and to study if any side effects result from the dosage. This particular process can take several weeks to months because the drug is gradually increased in dosage to examine if any side effects still appear.

After Phase 1 is complete, the drug, again, goes through extensive testing for even more efficiency and competence. Regularly, as many as several hundred patients may be involved during this stage. Most of the time, this Phase is further sub-divided into smaller Phases such as Phases 2a and 2b. Dosage rate and dose response are given emphasis in the first sub-phase, while in Phase 2b, the drug is tested on patients who have the medical illness and its performance is then

compared with an approved drug for that illness that is already being sold. The drug must be approved to go on to Phase 3, where it is then tested, yet again, on an even larger group of patients, about a several hundred to a several thousand, over a period of a couple of years. Throughout these years, data regarding the efficacy, benefits, and possible side effects of the drug is collected. Sometimes, a Phase 3b may be introduced to test the drug through a different yet even more recent method. After the completion of Phase 3, the company is able to request the approval of the drug. In the post-marketing Phase, further drug testing may occur to test the drug's competency with other drugs already on the market.

Isotechnika's most recent development, Voclosporin, is a next generation calcineurin inhibitor, which recently completed a Phase 2b North American trial for the prevention of kidney rejection following transplantation. An extension to the Phase 2b trial and a combined Phase 3 European/Canadian trial for the treatment of moderate to severe psoriasis are ongoing. Their partner, Lux Biosciences, is currently conducting three separate Phase 2/3 pivotal trials investigating voclosporin (referred to as LX211 by Lux) for the treatment of uveitis. Atrium Medical Corporation, another one of their partners, recently received approval from the Belgian Competent Authority to investigate voclosporin as the drug utilized in the CINATRA™ Drug Coated Coronary Stent system.

After the tour, some of the staff explained their academic backgrounds and interests in science when they were in high school over a snack. This was an amazing experience for us as we got a thorough knowledge about the extensive and intense research involved in putting a drug on the shelf. Also we learned that Isotechnika provides opportunities for kids like us to learn more about this process through different activities, such as summer internships. Overall, this was an awesome experience and we all got a lot out of it!!

potluck picnic & pitch n' putt

by: Anna King

A few of us WISEST folk gathered in Quad one Thursday afternoon for a delightful pot-luck supper. The table was filled with an abundance of food, starting with humus and pita, all the way to Nancy's scrumptious chocolate puffed wheat "pile". I think the best aspect of this high class meal was the lack of utensils. I remember drinking canned peaches out of cups and eating macaroni salad with my fingers. Just another one of those WISEST experiences.

Then we made our way to the golf course at Kinsmen Park. We had a slight detour thanks to Taban and her wonderful directions but we finally got there. When we were lined up to retrieve our clubs from the front desk I did not quite understand why they were giving me two, but I went along with it anyways. One of the girls that one club was a driver and the other was a putter then told me. I had never used a driver before, so I was a little unsure about the game to come. As we all stepped out on to the golf course and took our first swing at the ball, we realized, this could take awhile. We struggled to find some kind of engineering or scientific technique that would help us along the way, but there was none to be found. Positive attitude, enthusiasm, and an optimistic out look were the only things

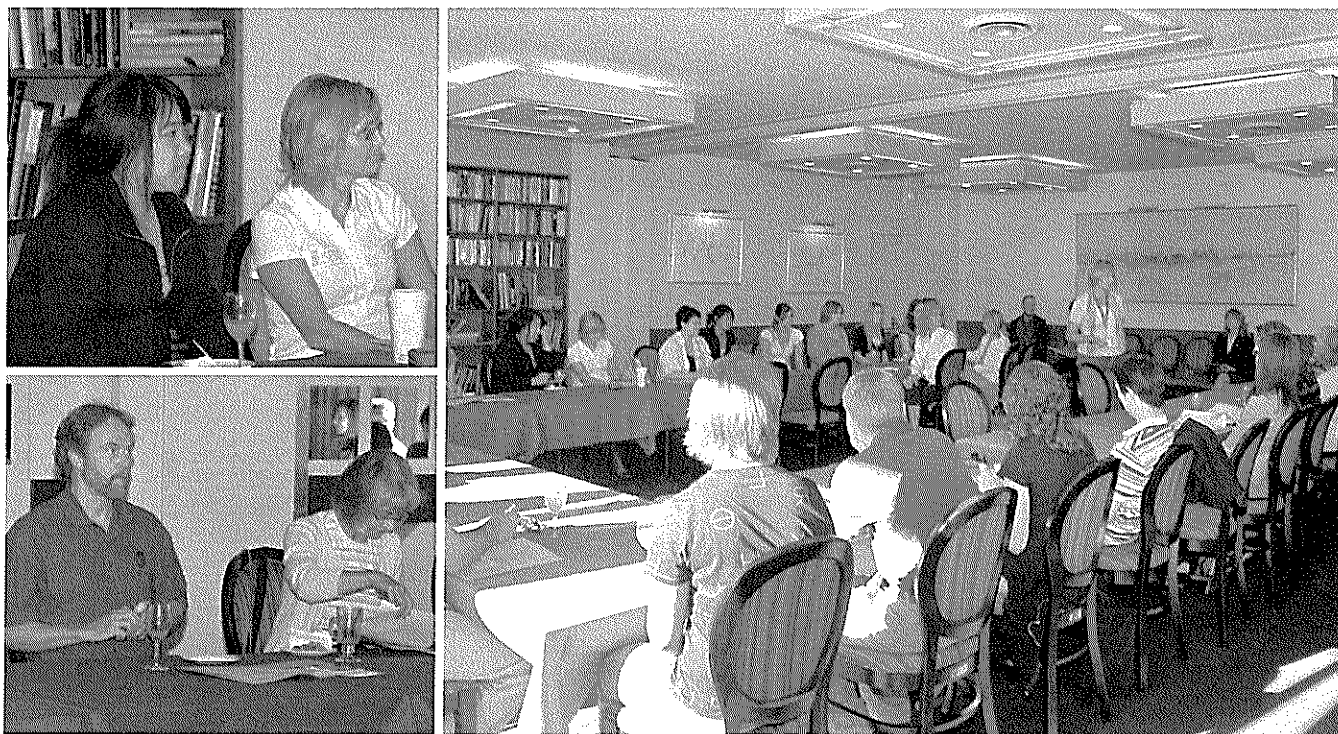
that could rescue us. We might have also used the flag pole as an extra player just to keep the game moving.

As I look back and remember concentrating on the flag and my follow through pointing directly into the bush. The golf game quickly turned into a game of hide-and-go-seek. I have to say those golf balls are really good at picking their hiding spots. I think the golf balls also had an unfair advantage because they could use their camouflage to blend in with those darn mushrooms. I would like to say that I saw some improvement by the end of the game but I am not quite sure where the improvement was to be found. I think this is why no one really wanted to keep score. If we were keeping track I think we would have calculated at least 30 over par, but that's pretty good for 9 holes on a 3 par golf course if you ask me. I think there is a pretty good chance that I will see many of you in the pro golf tournaments on TV in the near future.

Overall, the pitch and putt was a great success. It was a wonderful afternoon filled with laughter and excitement. I really enjoyed taking time away from the lab and spending time with the other WISEST students. The golf course was aesthetically pleasing, the fellow golfers were entertaining, and the memories are priceless.

wisest teachers' day

by: Christina Law



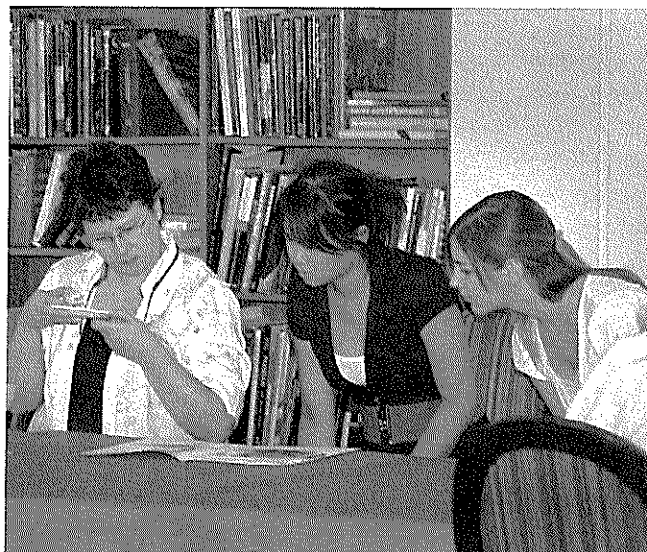
WISEST Teacher's Day gave high school math and science teachers a chance to come to the University of Alberta campus and learn about current topics in Science, Engineering and Technology. They then took their experiences back to the classroom to include in their curriculum. The day started with coffee and tea and a welcome from Mrs. Gail Powley, the WISEST Vice Chair, and Mrs. Grace Ennis, the WISEST Coordinator.

The teachers were greeted by students from their high-schools and taken on a tour of the labs the students had been working in, giving them a first-hand look at the students' research work. The teachers were directed to an interactive session where they learned more about the Faculty of Science's new Science 100 program for first-year University of Alberta students. Dr. David Lawrie, Sessional Science 100 Coordinator, led the teachers through several interactive and interdisciplinary science demonstrations that the teachers could use in their classrooms. Some even involved balloons!

Immediately following lunch in the Faculty Club, the session "First Nations, Metis and Inuit Perspectives in Science, Engineering, and Technology" featured several keynote speakers. The presentation focussed on important issues in science from a traditional perspective and had the goal of helping teachers incorporate inclusion into the science curriculum. Ms. Rheanna Sand, PhD Candidate in the Department of Biological Sciences, spoke to her personal experiences as an aboriginal person in the science world and made a number of recommendations to support future students of aboriginal descent in their pursuit and interest in sciences. Rheanna had recently been awarded the NSERC Aboriginal Youth Achievement Award in Academics. Ms. Caroline Nixon, Ms. Debbie Mineault, and Ms. Jennifer Dolecki, representatives from Alberta Education, Curriculum Branch,

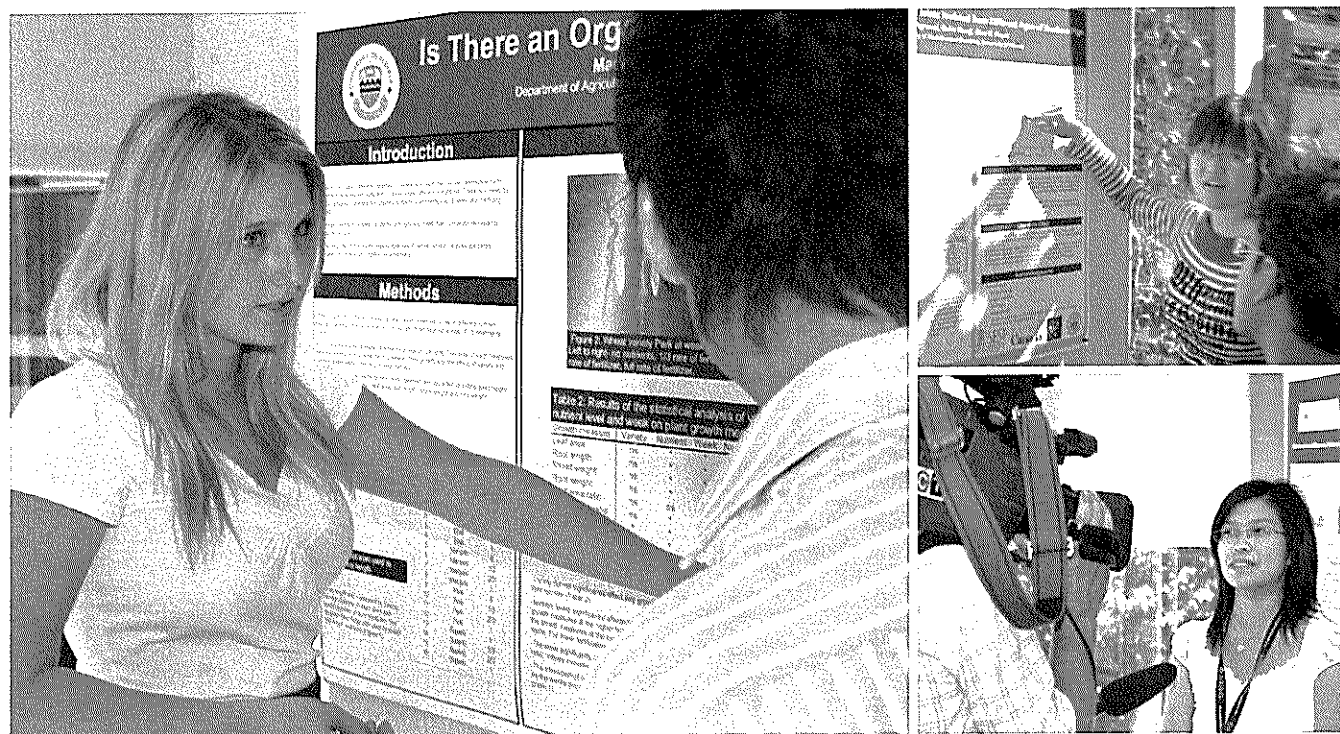
gave a presentation on First Nations, Metis and Inuit Perspectives in the Science/Math Curriculum.

Teachers then chose a research lab tour that gave them a behind-the-scenes look at the latest research in areas that match with different aspects of high school curricula. Tours included: 1) Immunology and Transplantation Lab where research work related to diabetes is being conducted, 2) The Alberta Ingenuity Lab Center for Oil Sands Innovation where Dr. Frank Jenkins, Director of CMASTE hosted the teachers, and 3) Dr. Rik Tykewinski's research lab in the Dept. Chemistry where he spoke to the teachers of the synthesis, characterization and study of compounds containing multiple carbon-carbon triple bonds and their novel applications.



research team thank you

by: Nancy Manchak



Hello everyone. For the past six weeks, I have had the wonderful opportunity to work in a research lab as a part of WISEST. There are many people in need of thanking, including our sponsors, coordinators, teachers, research teams... the list goes on, but today, I would like to especially thank our research teams. Although without any of the other people I have mentioned, WISEST would not exist, it is the research team with which the students spend the most time.

To the principal investigators, supervisors, and other researchers, thank you. You take a leap of faith when you accept a high school student into your lab for a month and a half. And once we arrive, you invest hours of your day teaching and mentoring, answering countless questions all in hopes of guiding us towards understanding and improving our research. You were encouraging when we struggled, forgiving when we made mistakes, and sincerely proud of our accomplishments when we succeeded. You allowed for the potential within each of us to come forward. Where our current knowledge of the research topics left off, you completed with what seemed like a huge database of information that we could access at anytime.

Although we are much younger, greener, and less adept at what we do, you have all shown tremendous patience with our development. I for one would not have understood a single thing I was being told had I not been told repeatedly in a variety of combinations of words, permutations of sentences, and hours of demonstration. IN spite of all the work required to mold us into good researchers and scientists, you still welcome us and include us in the lab just like any other university student. In my case, I have experienced high tea at Rutherford House with 'the girls' as well as pointing out my favorite restaurant, Chianti's, for a friend's birthday lunch. It is these events that make the difference in the overall lab experience be-

cause, as we all know, it's not all work and no play. I know students this year who have worked in the middle of the night, others who have slept over in another city and even one who acquired a chick that hatched in her lap. There must be countless other stories about the labs that I have not heard but each will be just as unique and memorable as the other. I can only thank the many people involved to provide opportunities for us to see and experience things first hand rather than simply talking about them.

Thank you for sharing your passion for what you do. This passion is contagious, and I wouldn't be surprised if quite a few of us continue with courses that allow us to explore fields similar to what we have done. I know I definitely will! You brought life and purpose to us this summer, and I am proud to have worked alongside great researchers. I am amazed to be my own primary source when all I've ever known is "research" from the library. So thank you, research teams, for bringing us closer to the unknown.

As well, I would like to thank the University of Alberta for letting us use the amazing equipment and facilities. It was quite funny when I was first asked if I knew how to use a pipette. At the University, we use micro pipettes where you calibrate, press a button and release to get the measurement of liquid you need. In high school, you use a bulb. Enough said.

Thank you to everyone who supports WISEST and allows women and men to take on what they've never taken on before. I think I speak for all the WISEST students when I say that this was amazing. So on behalf of all my peers, thank you.

celebration of research

by: Catherine Lee



The celebration of research was the perfect end to the WISEST program. The event took place on August 15th 2008, in the solarium of the Engineering Teaching and Learning Complex (ETLC). Though everyone was sad to leave, we did have the opportunity to learn what all of our friends had been doing over the summer.

The day started out bright and early at eight in the morning, with the putting up of posters. Though somewhat chaotic, Taban and Jenn were able to calm everyone down and start off with the day's announcements. I for one was very happy that we received some practise time before we had to face all the research teams, who would be arriving at ten thirty. Group by group, we visited other students research posters. We took turns both presenting and listening to the presentations, and as a result, we could see that the WISEST program had covered many different research labs for its students. These projects ranged from constructing a 3D hand, to finding an efficient relationship between tire size and practicality. However, the most important part of this little practise session was the chance for us to get over our nerves and into the proper presentation style. By the time our research teams arrived we were all ready to go.

At the beginning of the day, I was not sure why Taban and Jenn insisted that we needed to have two presentation times, that is until I saw how many people attended that first session. It isn't until you see everybody in a room together that you realize 61 WISEST students and most of their research team, means hundreds of people. But, the celebration was well planned, as it did not feel too clustered as supervisors, principal investigators, and others milled around the room, listening to presentations. This eventually settled down with speeches and a thank you made by Gail Powley, the Vice Chair of WISEST, and Nancy Manchuk, a WISEST student. Based on the ex-

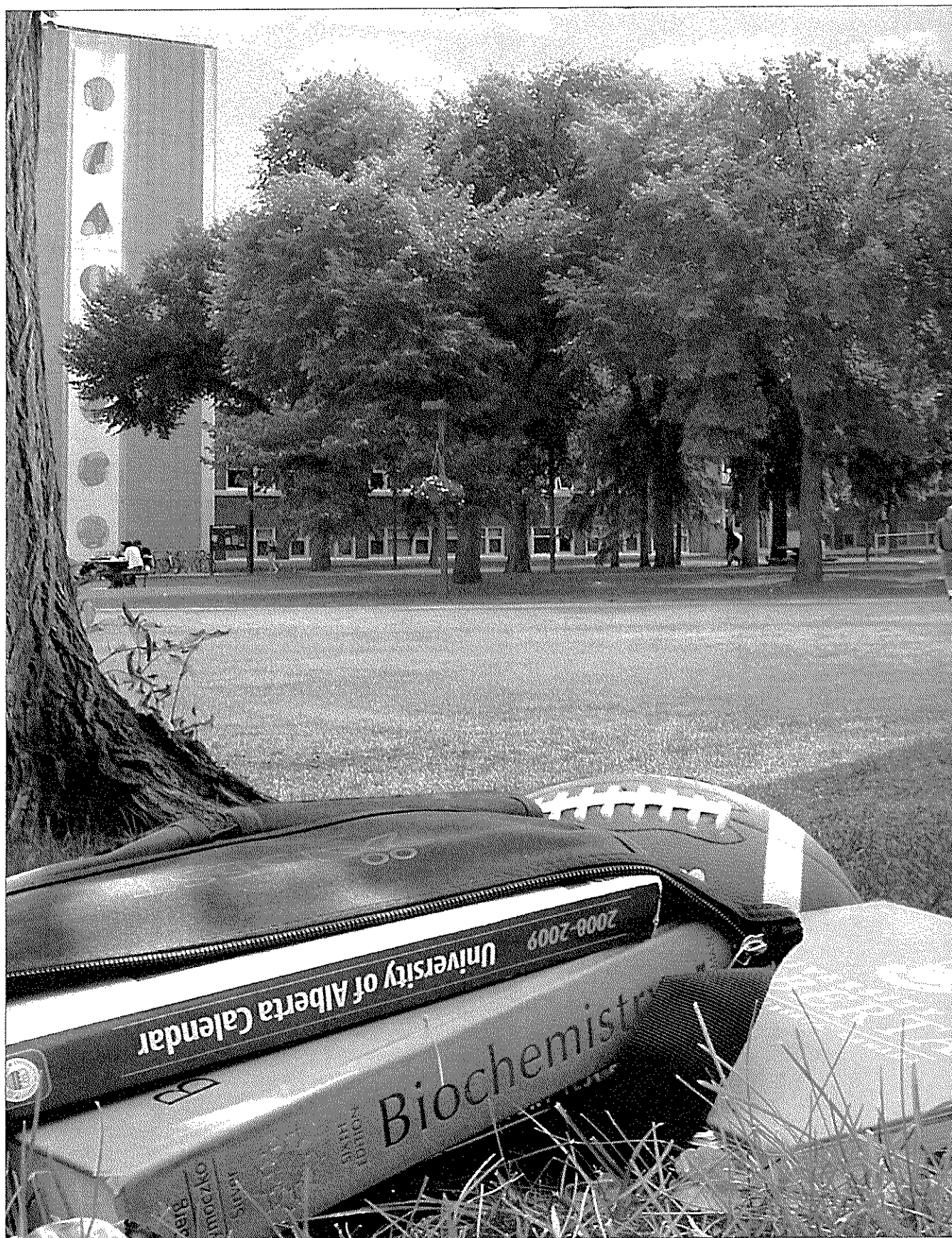
citement felt in the room, you could tell that the research teams were very proud of their WISEST students and their accomplishments. This was very important as it made the WISEST students feel as if they were part of the research team even to the end. However, the research teams eventually left, for their respective labs, and the WISEST students prepared themselves for tors of their lab to both families and sponsors.

During the tour time, I was able to show one my friends what I did in psychology, and she showed me what she did medicine and pathology. It was quite interesting to learn what happens in other labs, and I was grateful for the opportunity. But, we were almost out of time, so we hurried back to ETLC and got ready to present.

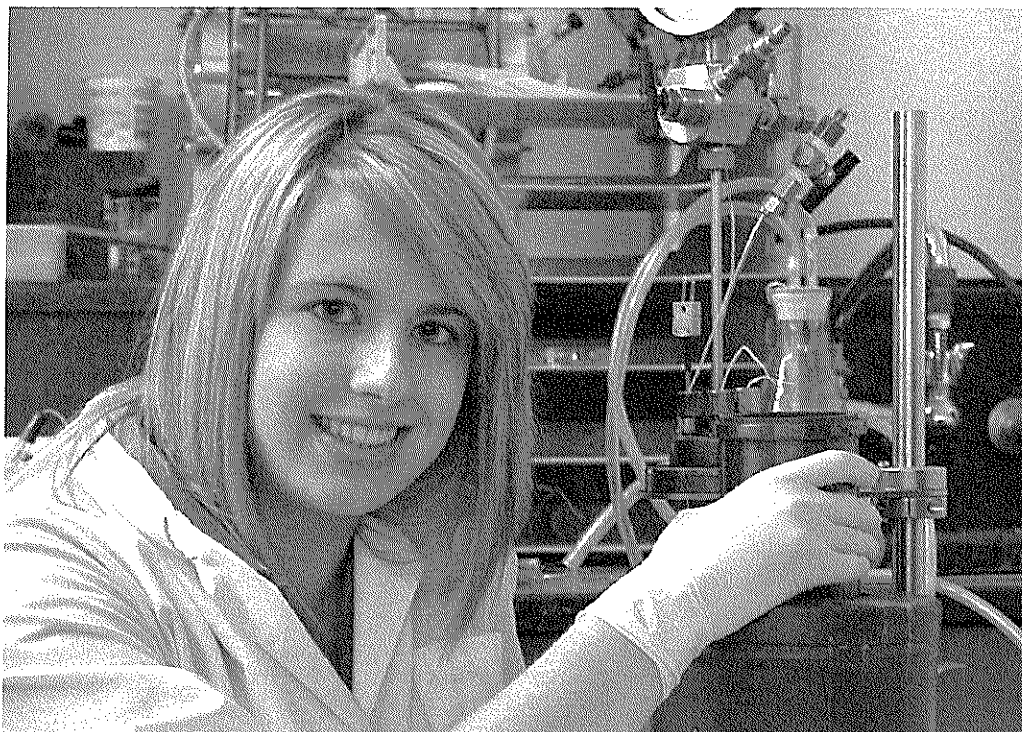
The rush of excitement started to come back as families began to trickle in, and by four o'clock, the room was full once again, perhaps even busier than it had been in the morning. Gail Powley greeted our guests and family members, while Monika Victorova thanked our families for giving us the support that we needed. But, once the speeches finished, we found ourselves presenting our research, yet another time. Seeing my family amidst the crowd, gave me a confidence boost, knowing that this had been one of the best summers of my life, and I was unlikely to forget the experience that I gained not only from working with other researchers, but learning more about different fields in science, and what it feels like to be a university student.

Thanks to Taban and Jenn, I learned many new things, and got the chance to meet new people who I promised to stay in touch with. Despite a sorrowful goodbye to all the out of town students, I left ETLC feeling very happy in what I accomplished this summer, and I believe that all 61 other WISEST students had the exact same feeling.

student reports



alex lush Supervisor: Dr. Jingli Luo / Chemical and Materials Engineering
Sponsor: Syncrude Canada Ltd.



"...in my mind this was and is still the perfect opportunity to discover what exactly you want to do once you leave high school."

From the moment I attended the presentation about WISEST from a past-participant, I was sold. I anxiously checked the computer for the application packages to come out to make sure that I would get my application in on time and have a chance to participate in such an amazing program. Most of my friends were looking forward to a summer full of shopping and tanning and thought I was crazy to want to go work at the University all summer, but in my mind this was and is still the perfect opportunity to discover what exactly you want to do once you leave high school. WISEST would also give me the opportunity to meet other young people who had similar interests as myself and make some life long friends living in residence.

When my phone rang in May, I thought it was just another telemarketer calling. But when I read the caller ID and saw "WISEST", my heart rate went through the roof. I actually got in! I immediately answered and proceeded to find out that I had been placed in the department of Chemical and Materials Engineering in one of Dr. Jingli Luo's research teams. I would be working in the corrosion lab with my supervisor, Lianpeng Tian, and would be working on a project that looked specifically at the stress corrosion cracking (SCC) of the pipes in the steam generators of nuclear reactors. My mother was practically as excited as I was, seeing as she herself was a materials engineer. Having no idea what exactly I had gotten myself into, I eagerly packed up my things and set off to residence right at the beginning of July.

One of the first things that struck my mind when I began working in the corrosion lab was that there were way more types of corrosion than I had originally thought. There is uniform corrosion, pitting corrosion, galvanic corrosion, and microbial corrosion, along with many others. Being more inclined to physics and biology, being thrown

right into advanced chemistry was quite a shock. Luckily, there were two other WISEST girls in the same lab as me, and we quickly bonded. All three of us didn't have much of an idea what exactly we would be doing over the next 6 weeks, but we certainly found out. As we all had different supervisors, we all had slightly different projects. One of the girls was working on the erosion-corrosion of pipeline steel, while the other was testing the effect of different surface conditions on the corrosion potential of metals used for implants. I got to assist in slow strain rate tests to discover the susceptibility of alloy 800 to lead-induced stress corrosion cracking in different solutions that mimicked the environment of a steam generator in a nuclear reactor. I learned how to use the Kelvin Probe, a machine used to test the work function (the energy needed to move an electron from just below to just above the surface) of metals and helped with running high temperature tests in autoclaves.

Not only did the WISEST Summer Research program give me insight into the world of laboratories and research, it also gave me more information into life at university and what to expect. Living full time with other WISEST students at St. John's gave me time to really get to know them and compare goals and aspirations for the future. Together we compared programs and universities to broaden our minds and the variety of options we had before us. This experience has made me much more comfortable with leaving for university in just one more year, as leaping into the unknown is always a hard thing for me to do. Overall, WISEST has made me even more excited about the future, as I am more aware of the choices I can make and the paths I can take towards an exciting career in engineering.

alix krahn

Supervisor: Dr. Robert Donahue / Civil and Environmental Engineering

Sponsors: Human Resources and Skills Development Canada - Canada Summer Jobs / Suncor Energy Foundation

"The experience I have gained here will no doubt help me through the rest of high school and university, and anything I decide to do later."



Working in a research lab for six weeks during the summer? Sounds fun! Fortunately, that has been what I have been doing: research in a lab in geochemistry.

I have wanted to be an engineer for a very long time, and when I heard about the WISEST summer research program, it seemed perfect for me. I would get to spend the summer working in a lab and learning about engineering and science and making friends with others doing the same. I applied, and was elated when I received the phone call saying that I was accepted.

I couldn't wait until the first day, and when it arrived, I felt a mix of excitement and nervousness. I didn't know anyone there, but everyone soon met each other and our student coordinators. At the end of the day, we met our research teams and saw our labs for the first time. At first, it seemed overwhelming. Everything was unfamiliar (and much more accurate than the labs in high school. Eek!), but I was eager to start.

My project was one small part of the research going on in my lab, most of it researching mature fine tailings from the oil sands, and what can be done about them to make them more useful and less damaging.

My project focused on cation exchange capacity and sedimentation properties of kaolinite and bentonite (a type of clay). First I measured out different mixtures of kaolinite and bentonite. I then added sodium acetate, mixed and separated, poured it off, and repeated with ammonium acetate. We then measured the cation concentrations in the ammonium acetate. This tells us how many cations exchange off of the surface of the clay, and how bentonite affects this.

We also did sedimentation tests on the mixtures of kaolinite and bentonite. This involved mixing together sand, clay and water and then watching how it settles – if the clay and sand segregate or

stay mixed, and how fast the interface between the solids (clay and sand) and the water dropped. We worked towards having the different combinations of kaolinite and bentonite non-segregating by increasing the amount of solids in the mixtures.

The six weeks I have been here have gone by so fast, it doesn't seem that I am done. Working in a research lab over the summer has been a dream come true for me. This has shown me how rewarding working in a research lab is – you have to work through problems in your research, and work for days to complete one small experiment before you can get your results back. It has also shown me just how much glassware you go through!

I love science, and particularly engineering, so being able to work towards finding something new out was really exciting, and to be able to do it as a mere grade eleven student was remarkable. I felt that I was able to do something worthwhile over my summer, and learned a lot in the process. The experience I have gained here will no doubt help me through the rest of high school and university, and anything I decide to do later. Although some people may think that six weeks working full time doing research is wasting your summer, I can tell you that it is anything but. This program was unforgettable.

alyssa larson

Supervisor: Dr. William Tonn / Biological Sciences

Sponsor: The Allard Foundation



"Learning about research is only fully possible by experiencing it first hand — and I was lucky, because I was able to experience more than just one aspect of research while I was at Meanook."

Before coming to WISEST, the only answer I had for people that asked me what I was doing this summer was "Researching toads." Sometimes I would add "...in Athabasca." Actually, I got quite a bit of sympathy for it — personally I thought it sounded fun, but obviously not everyone shared that sentiment. It took less than a week for me to come to the realization that this summer I would be doing a whole lot more than just weighing and measuring amphibians.

My "real" research project actually focused on solar energy. The main purpose of the project was to determine the feasibility of solar energy in Alberta. Using solar radiation data downloaded from a meteorological station, I calculated the number of kWh that could be produced annually from an inexpensive home solar panel. I also found the amount of energy required to power three sizes of homes. From this information, I calculated the number of solar panels that would be required and their total cost. The cost to power a small home, using 5000 kWh a year, worked out to be just under \$14 000 — not including installation, maintenance, and battery costs. Assuming the factory warranty of 25 years, this works out to \$0.11 per kWh — almost what the usual electricity costs now. Of course, the cost of conventional fossil fuel energy production is only going to rise. Solar panel technology has become considerably more affordable than it was in the days when it was only used by NASA. Overall, solar electricity in northern Alberta is no more cost effective than conventional production as of now. However, it also has a number of benefits — it adds significant value to homes, and the greatest payback is of course that it doesn't pollute. Plus, everyone thinks you're cool for going green!

All of my research was conducted at Meanook Biological Research Station. This great little place is also where I ate, slept, and relaxed

(or whatever it was I did in my free time). I worked on many more projects than just my own — scientific and otherwise — and now, I can add saving bats, fixing trailers, weighing fish ovaries, washing boats, catching frogs, driving standards, hunting farmer eggs and sorting bugs to the list of things I've accomplished in life. I met some remarkable people during my stay at the station — between ABMI, The Americans and The Peat Guys (maybe they had other names?), Warren, Patje, Allison and Brandon there was always someone with a fun idea. Of course, I must include my friends and fellow WISEST students Lisa Lorenz and Jasmine Mah in the story. Jasmine, hurry up and get your shoes on! Lisa, be quiet! (Just joking, guys...put that pond mud down.) When we weren't working, we laughed over lots of movies and a couple of campfires, and had a blast. Frankly, we had fun while we were working, too.

At the end of WISEST I can safely say it far exceeded all of my expectations. Learning about research is only fully possible by experiencing it first hand — and I was lucky, because I was able to experience more than just one aspect of research while I was at Meanook. WISEST is an amazing program!!! Now, when I'm asked what I did this summer, I will laugh and say "Researched toads," and I hope people will realize there was far more to it than that!

"This gave me the opportunity to see what laboratory research and experimentation was actually like and how intricate the work is, unlike the labs completed at school with pre-expected results."



I have wanted to be a WISEST student for the past 5 years, after having attended the CHOICES Science Conference For Grade 6 Girls. Since that fateful day, everything I did involving science was in the hopes of preparing me for the opportunity to become a WISEST student research intern.

The day I got the phone call regarding my acceptance I was ecstatic, realizing that all my hard work and studying had not been in vain. I promptly began researching about the University of Alberta and the field that I had been placed in, Agriculture, Food and Nutritional Sciences. After becoming more knowledgeable about the area, I was somewhat disappointed that my experience wouldn't be health related, as that was the subject I had wished to be exposed to. I was interested in learning about laboratory work however, and so gladly embraced the opportunity and decided that this internship could expand my horizon and that agriculture could possibly be my new found passion.

At the orientation, I anxiously anticipated the introduction to my laboratory supervisor Dr. Victor Manolii and my other lab co-workers, even the free items and food could not calm my excited nerves. At the end of the day I was finally introduced to my supervisor and given a quick tour of the plant pathology lab that I would now call work for the next six weeks. I was also told about my project studying clubroot, a mysteriously difficult pathogen affecting canola crop production. It was all quite overwhelming and I was unsure about how I would ever manage to remember everything I was told and the names of all of the people I had met.

The next few days were quite boring for me, as I engaged in a long study period, reading many reports and articles about clubroot and methods that had been taken in attempts to eradicate it. The subject was interesting but the reports contained long scientific words that

I didn't understand, forcing me to ask many questions to my supportive co-workers. Shortly after my study session, I started taking part in various lab experiments, as well as began my own experiment, testing the difference of pathotypes of clubroot from Alberta and from British Columbia. The most exciting part about my experiment was that I was involved in every aspect of it, from the growing of seedlings, to the inoculation, to rating their infection at the end of the six weeks of growth. This gave me the opportunity to see what laboratory research and experimentation was actually like and how intricate the work is, unlike the labs completed at school with pre-expected results. Through my lab I was also privileged to experience working on the field, visiting CDC North and rating plants infected with clubroot. This allowed me to learn even more about the variety of tasks you can have while working in one single lab.

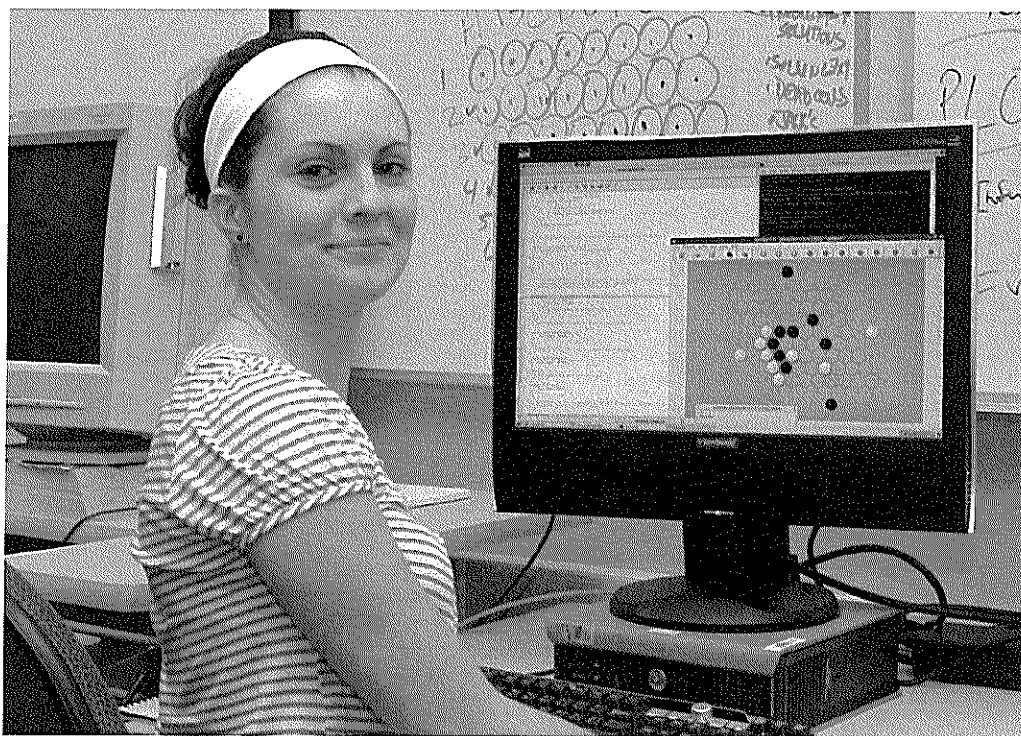
WISEST's out-of-the-lab activities were also a great way to learn and make friends. Attending Monday afternoon seminars introduced me to a variety of other careers related to science as well as let me learn about other peoples' experiences and struggles within the science world. Fab Freebie Friday lunches were a great way to spend an hour every week socializing with other WISEST students and learning about their labs and experiences.

In the end, my experience with WISEST was truly remarkable. A summer that would have otherwise been quite dull and unproductive became the perfect opportunity for me to learn and grow as a person. Of course, making a little cash did not hurt either.

andrea buchfink

Supervisor: Dr. Ryan Hayward / Computing Sciences

Sponsor: Dr. Eleni Stroulia



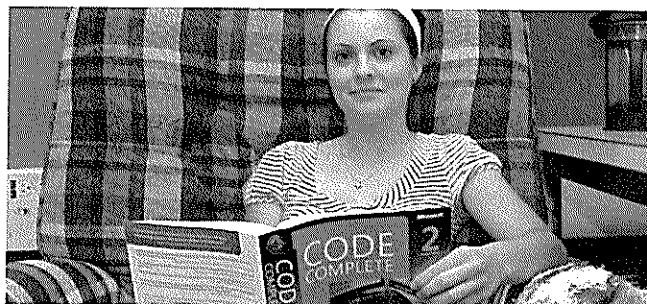
"My favourite part of the job was the problem solving questions we had to solve. Not only did my job challenge my mind, but I felt excellent when I was able to solve a problem."

I had been counting down the days to learn the fate of my 2008 summer. Once I finally received that phone call I was ecstatic, I learned that I had been accepted into the WISEST research program. There was no doubt in my mind as to whether or not I would accept this unbelievable opportunity. From the starting I knew this summer job would be amazing, now almost a month and a half later I can still say my mind has not changed. This experience was all that I wanted and more. Not only was I able to learn about the University of Alberta and research, but I was able to make great memories that will certainly last a lifetime.

I was placed in the Algorithmics lab, in the Computing Science Department, with Philip Henderson as my supervisor. My job involved a board game named Hex, which is a strategic game between two players where the goal is to connect sides. The game is best described as a mix between the games Go, Chess, and Connect Four. The first day of my job was extremely nerve-racking; I could tell that I had a lot of learning to do. The main reason for this is that my job involved programming, which is an area I had absolutely no experience in. After the first week of my new job I doubted if I had made the right decision to come to Edmonton. It seemed that I was too far behind in this area to be able to catch up with the other people I would work with. After I learned more about programming I began to enjoy it more, however I definitely can't say that it came easy to me. My favourite part of the job was the problem solving questions we had to solve. Not only did my job challenge my mind, but I felt excellent when I was able to solve a problem. I also really enjoyed learning about Hex and was shocked by all the strategy behind it. There were a lot of discouraging moments, but during these were the times I learned most from.

The biggest change that I had to overcome during this job was being far away from my family. However, living in residence has made this transition a lot easier, it's one of reasons my summer has been such a great experience. I never would have thought that I could make such great friendships in a matter of weeks. Not only was I able to make friends, but I was also able to see and do a lot more things than what I would have been able to do if I stayed at home. For example, on one of the first days in Edmonton we went to Shakespeare in the park and even though we almost got lost going there, we all had a great time. I was away for many of the weekends, but the first weekend I stayed we went to Capital Ex. Normally, I am the person who sits off and watches people going on the "scary rides", but this time I was actually on them and had fun! As well, some of the people, including myself, had the great opportunity of going to Body Worlds. Never in a million years could I have seen myself taking part in many of these activities if I hadn't been living in residence.

I am very grateful to those who have given me this admirable opportunity; I know that without them I wouldn't have been able to learn so much. I had an amazing summer and would do it all over again if I was allowed to. I encourage others to join WISEST, you won't regret it!



"Life does include endless possibilities, but WISEST screams it out loud. The environment is forgiving and very open, but at the same time challenging."



I had never gone to a summer camp or had a job where I didn't work with family before this summer. I went on a school trip to Ottawa my grade eleven year and I loved everything about it. I loved how it pushed me out of my element and forced me to be the best I could be. I had always been afraid of going to a summer camp or joining a new team because I hated to be out of my element, but then I discovered how amazing it truly is to put yourself out there.

My Biology 20 teacher told me about WISEST and I was one out of four people who showed up to the meeting at my school. I had shown a great interest in biology and was enthusiastic about learning and I think that's why I was accepted.

First of all WISEST helped me grow in many ways. I became more independent, more courageous, more positive, more open, more confident, and I gained the strength to withstand anxiety and just let life happen. It has now helped me see that in moments where you have the choice to act in fear or in courage, choosing courage is the most rewarding. It was nice to have a community that encouraged who I am, I felt more free to express my love for learning and my love for the situations I was put in. I also learnt a lot about the University lifestyle and how it is to live an "adult's" schedule. This whole experience gave me a great amount of exposure to so many things that I'll probably still be looking back and learning new things about it years from now.

The environment is forgiving and very open, but at the same time challenging. Although the program requires responsibility, it also teaches responsibility and if you really need it, they'll surely take care of you. As one of five males out of 61 students in WISEST I can tell you that I did not feel out of place and I was not treated differently. So for any guys who would like to join up, but are apprehen-

sive because of their gender, this research program's goal is to put each student in a non traditional role. The sense of community and togetherness is not fueled by gender, it's fueled by the common outgoing attitude that everyone has and their interest in science.

My research project entailed many interesting things and from what I hear from other WISEST students, the program wasn't anything like they imagined. Some students were put into labs with other WISEST students, but most of us were on our own. From my experience, my supervisor was laid back and easy to work with. He wasn't serious all the time which helped me come out of my shell and be comfortable in my work environment which I think is very important. From what I hear research includes lots of time and work, but little compensation. This is very important if you're trying to get your PhD, raise kids and have a life. If anything, this experience has turned me away from doing research as a career, but that was my goal in the beginning, to find out what was or wasn't for me.

If when you look at life, you see opportunity and endless possibilities, then this is perfect for you, because everyday the students are given something new to figure out, a new philosophical thought, a new study in your lab, a new question, a new situation, a new custom, a new fact about yourself. Life does include endless possibilities, but WISEST screams it out loud. Whether the situation is enjoyable or not, it's your choice to let it affect you in a good way, and in my opinion, it would be difficult to be affected in a bad way by the WISEST summer program.



"If you are going into the WISEST program I guarantee that you will have way too much fun for one summer, I know I did!"

I was introduced to the WISEST program by the career counselor at my school. When she was talking to our class about this program I seemed to be the only one interested and I wondered why. I went on a limb and thought I may as well apply and hope for the best. I applied with no expectation of getting in but as soon as I got a call from a friendly voice, I realized I would be spending my summer in Edmonton; working at the U of A. Soon I started asking questions like, what was it going to be like? Who was I going to meet? How was I going to spend all summer away from my family? At first, I thought it might be like going to school for the summer, but I soon realized I was totally wrong. I have to say that WISEST exceeded my expectations and made my summer into an experience that I will treasure forever. I think WISEST was the best way to get familiar with the surroundings of Edmonton, learn exciting ways to apply my high school education in real situations, have a great time making new friends, and attending the fantastic festivals of Edmonton.

Residence was such a wonderful place and I encourage anybody from outside of Edmonton who is enrolled in WISEST to stay at St. John's Institute for the summer. It is such a great atmosphere to get to know the fellow WISEST students. I found that there was always something going on such as Shakespeare in the Park, Street Performers, Capital Ex, Body Worlds, and the occasional stroll down Whyte Avenue. I am so glad I had the opportunity to stay at residence and make so many close friends that I hope to stay in touch with in the years to come.

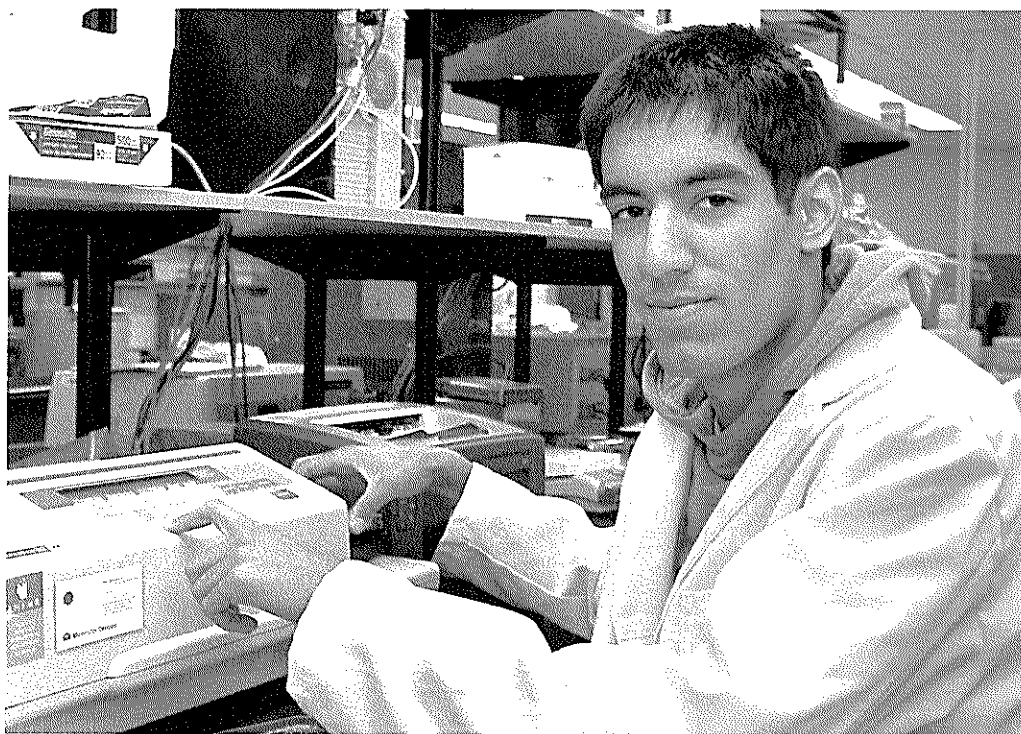
Working in a biochemistry lab all summer has been filled with excitement and at points, confusion. I felt sorry for my supervisor at first, because she had to explain almost everything that we were doing. I didn't have any background on DNA or dealing with other phenomena involving genetics. One of the highlights in the lab was

getting to play with dry ice. The best combination is with soap water and a scoop of dry ice. This makes a huge tower of bubbles that sometimes has the tendency to flow over the sink! Another great encounter was with liquid nitrogen, which boils at -196 degrees Celsius, that makes it extremely fun to freeze grapes with for the sole purpose of smashing them on the ground.

Let's be honest, all the talk about PCR, digestion, ligation, and purification of DNA was a little overwhelming. But, now I feel like I have accomplished something when I can say that I actually understand a little about the purification of DNA, and detailed process taken. This summer my research was focused on purifying a protein called pre-carnocyclin A. This is a linear protein, which is the precursor to the circular protein carnocyclin A, which is known to be active against food spoilage pathogens. Specifically, our goals were to clone the gene for pre-carnocyclin A as a fusion protein, to over express and purify the fusion protein. Then cleave the fusion protein and purify pre-carnocyclin A. Subsequent studies will then examine the 3D structure of both pre-carnocyclin A and carnocyclin A. These studies will help us understand how this protein becomes circular, and to compare the activity between the two structures.

I would recommend any grade 11 student to take full advantage of this extraordinary opportunity and apply for the WISEST program. You meet so many new people, learn fascinating things about the world of science, and find out what university life is really like. If you are going into the WISEST program I guarantee that you will have way too much fun for one summer, I know I did!

"Partaking in the WISEST program was an invaluable experience that has changed my views of research, as well as opening my eyes to a myriad of prospective career paths."



When I initially applied for the summer position I was apprehensive at first because I knew the focal point of the program would be women and I was unsure of how the few men in the program were going to be dealt with. From the outset of the program, beginning with the orientation, it was obvious that many of my thoughts were true as there was a paltry five males, including myself, in the ETL. Undoubtedly many of the seminars we had, such as Faces of IT and small group discussions, were focused solely on women in positions of prominence in the scientific community. However by noting this it is extremely important for future applicants, specifically males from my perspective, to see this program for what it is: an excellent opportunity for grade 11 students regardless of their gender.

The Monday afternoon seminars were very informative, my favorite being the tour of Isotechnika, a publicly traded pharmaceutical company placing research emphasis on developing immunosuppressive drugs.

When applying to WISEST my desire was to be placed in the Faculty of Agriculture, Food and Nutrition Sciences rather than the Faculty of Nursing, which is predominantly what males are usually placed in. My wishes were fulfilled and I was placed with Dr. Jianping Wu's research team studying the functionality properties of egg proteins. Specifically, my project was to investigate the antioxidant properties of the second most abundant egg-white protein, ovotransferrin, and in particular the properties of its peptides.

Through the first couple of days my supervisor, Shengwen Shen, introduced me to the lab and we went through a variety of assays so I could develop a proficiency in pipetting as well as become accustomed to various other techniques we would be using throughout the duration of the program. From then on we began work on my

project. First we digested the protein with the enzyme thermolysin in order to produce a hydrolysate and the enzyme was then deactivated by lowering the pH of the mixture. This mixture was then taken to a centrifuge in order to compound all of the insolubles that were a product of the digestion. The resulting solution was then put through ultra-filtration with a membrane having a cut-off of 3000 Da and subsequently fractionated into different peptide mixtures using Fast Protein Liquid Chromatography. The fractions that came out were freeze-dried and used for the assays that would determine their antioxidant properties.

We initially planned to do many different assays but because of time constraints we chose to focus on the Oxygen Radical Absorbance Capacity-Fluorescein assay which determined the ability of the sample to block the oxygen radical mediated oxidation of fluorescein until all of the antioxidant activity in the sample was exhausted. The area under the fluorescence decay curve, given to us by the microplate fluorometer software, was used to quantify the total oxygen radical activity in each sample. The data from the program was then extracted and put into excel for analysis, which proved to be quite a lengthy process.

Partaking in the WISEST program was an invaluable experience that has changed my views of research, as well as opening my eyes to a myriad of prospective career paths. The hands on lab experience will stick with me throughout the remainder of my education and eventually my career, while giving me a head-start on many students who have little or no previous lab experience to aid them in university. I recommend the program to anybody who has an eagerness to learn and experience new things.



"To be able to try out research before attending university was a once in a life time opportunity that I will always be happy I took."

When my teacher first told me about WISEST I remember being so excited. Hearing about a grade 11 student like me could work during the summer doing research for a university. I would be doing research in things that really fascinated me and meet people with the same goals as myself. I knew right away that I could not let this opportunity pass and I am glad I didn't. WISEST has been ever thing that I ever could have imagined and more.

I was privileged to work in a Lab with Dr. Monika Keelan, who is a professor in the Dept. of Laboratory Sciences and Pathology. My direct supervisor was Megan Burlet, who taught me so much not only in our research but in university life as well. Megan's enthusiasm for science and research inspired me and opened my eyes even more to the world of science.

I choose to work in the Dept. of Laboratory Sciences and Pathology because I was always interested diseases, bacterial resistance and why they occurred. Being able to do research in this field was so fascinating to me and I loved every minute of it. To be more specific my project was on a bacterium called *Helicobacter pylori*. Our research lab obtained 142 isolates of this bacterium to do testing on. All of these strains of the *H. pylori* bacteria were from a village called Aklavik. Aklavik is in the North West Territories and has a population of about four hundred people. *Helicobacter pylori* is a bacteria that cause ulcers, gastritis and gastric cancer and is known to be the only bacteria that is linked to a cancer. It affects people all over the world. In Alberta for example people affected by this bacteria are 15% of our population. However our research team took special interest in this village because of their overwhelming problem with stomach cancer. People normally would get cancer in later stages of their life such as in their fifties but in Aklavik people as young as 20

would obtain stomach cancer. Aklaviks population was decreasing tremendously and their problem needed to be solved. Finding the connection that over 75% of Aklaviks population had been infected with *Helicobacter pylori*, Dr. Keelan's lab knew where to begin. The normal treatment for *H. pylori* is usually 2 antibiotic drugs and a protein pump but over the years *H. pylori* as started to increase in resistance to the 2 antibiotics causing another problem. My part in this important project was to find the prevalence of antimicrobial resistance in *H. pylori* isolates from Aklavik. Basically meaning that I had to find out how resistant these 142 isolates from Aklavik were to 7 different antibiotic drugs to know which ones are more effective and how much.

I have learned and grown so much from this opportunity the WISEST program gave me. This program really opened my eyes to what kind of things I might want to do with my life. To be able to try out research before attending university was a once in a life time opportunity that I will always be happy I took. I would recommend anybody to apply for this program it was such an extraordinary experience and if I could I would do it again. I will never forget this amazing experience thanks to everyone involved in this program.



"I never thought welding would interest me, or the molecular structure of steel for that matter."



When I signed up for WISEST I didn't know where I was going. In life that is. I knew I wanted to go to university; but that's it. Sciences, engineering, arts? Not a clue. And then I saw WISEST. Now there was a chance to see what campus life was like. What I really wanted. And boy did I get a good look at campus. Taking the LRT every morning, finding the best coffee places, reading in sunny quad over lunch. And yet sadly I didn't find what I wanted to do with my life; because everything WISEST showed me sparked my interest. Okay, so I wasn't inspired into applying for the Faculty of Arts. But I got to see nutrition labs, and pharmaceutical companies, speak to someone with a masters degree in demography, and meet some of the most amazing people I will ever work with in materials engineering.

I was placed with Joel Pepin, a graduate student working towards his masters in Materials engineering; and learned many things from him, including that coffee is a necessity for coherent thought. And so much more. I never thought welding would interest me, or the molecular structure of steel for that matter. But from learning to use Rhino (a form of AutoCAD), to grinding, polishing and etching samples, to coming up with spur of the moment solutions to problems nobody would have ever thought of. I learned so much, and had fun at the same time.

What was the actual project? Finding the right variables to produce an ideal weld. So from voltage, to current, travel speed to polarity, I saw it all this summer. Some jobs seemed simple, and some how took the most time (grinding), and others somewhat scary, but I loved doing (cutting on the disc saw). All that plus hours doing visual analysis, working on excel, creating a graph for every possible combination of variables, and many hours peering into a microscope made for a very busy summer.

I have to admit I was fearful of university, not only did I not know where I was going, I was afraid to leave behind my social network. To be paying for an education, managing my own time, having classes with hundreds of students, and not having people to fall back on and ask for help struck terror in my heart. But I learned about that too. University isn't big and scary. Okay not THAT big and scary. Joel introduced me and my work partner Erin (going into first year engineering) to his friends. Only one of which he knew from high school. Turns out all those hundreds of kids in your classes are potential new friends. They became the coffee group. And the daily tradition of Timmy's and jokes I sometimes needed explained, is going to be one of the top memories of this summer.

But this wasn't all fun and games; despite how when looking back it seems I was always having fun. This was a job. Get there at nine and work till five; a responsibility. And that poster? That was a big responsibility. You think you understand everything till you have to put it into words. But with much help from Joel and Erin, I pulled through.

This summer has been so much fun, one I will truly never forget, people, jobs, places; all that I will never forget.





"Though somewhat complicated at times, I really enjoyed the experience of being able to explore something new."

My first visit to the Sturdy lab definitely petrified me. (However, now that I think about it, I'm not surprised, as the lab was situated on about four different levels of the psychology wing in the biological sciences building.) My supervisor quickly assured me that I would not have to run around the building, and that I in fact was very lucky because the lab recently moved, and I did not have to help in the long and complicated process. So after the brief tour and introduction, I was allowed to leave and prepare myself for the chickadee training the next day...

The next day, I learned that chickadee training included reaching into the bird's cage and making desperate attempts to grab it, with my bare hand. But, I managed to make my way through the session with the new knowledge that yes, birds do bite. On returning to the lab, my supervisor, Michele Moscicki, informed me that most of my work would involve using computer programs to examine chickadee notes. Michele told me about how the Sturdy lab was going through different species of birds, and studying their calls. These calls were made up of separate notes, that when combined, were used as communication between the birds. As each species of chickadees had different note types, we needed to go through as many calls as possible and find a way to distinguish them from each other. Examining their calls was very interesting because chickadees (which are songbirds), are one of the seven groups that are able to learn their calls in a manner analogous to humans. But, communication is very important to the chickadee, as it uses other birds' calls to determine the presence of survival needs such as food or mates.

Using various programs, such as Syrinx and SIGNAL to analyze the bioacoustical aspects of the calls, I was able to determine five distinct categories, in which one could identify the notes. The five

categories were A notes, B notes, C notes, D notes and Dh notes. Determining these different categories was often difficult, but it was also fun at the same time. It was exciting to be able to obtain new information about boreal chickadees. After I determined the categories, I also had to measure each section of the note, ranging from things such as the ascending duration, to the start frequency of the note. Though somewhat complicated at times, I really enjoyed the experience of being able to explore something new.

All in all, my lab provided a very comfortable environment to work in. Not only were Michele and Dr. Sturdy helpful, but so were the other undergraduate students in the lab. These people were very helpful in not only showing me the way of the computer programs, but also in helping me feel like I was part of the research team, and not some silly high school student who was there to mess the whole project up. The lab was very respectful, and I really enjoyed working with them this summer.

The WISEST program coordinators, Taban and Jennifer also helped to make my summer and unforgettable experience. They always planned fun-filled activities for the Monday afternoon seminars and the Friday freebie lunches. Without them, I wouldn't have been able to find time to meet other WISEST students, or even get to know them better. This program taught me many things that I would never have learned just sitting in a classroom at school. I would definitely recommend this for other students interested in science, or engineering!

"...this experience has showed me there is so much more to science than just what we learn in school."



WISEST was the most wonderful experience I have ever had. At first it was overwhelming, so many new people to meet, and new techniques to learn. I am normally very shy, and since I didn't know anyone I thought it would be really hard to get to know anyone, but since everyone seemed alone and shy, all the activities made it easy to talk to anyone about their projects or anything. I feel a lot more confident from this experience. It went by so fast, I wanted it to keep going for a few more weeks but I do miss sleeping in. I will never forget this amazing experience.

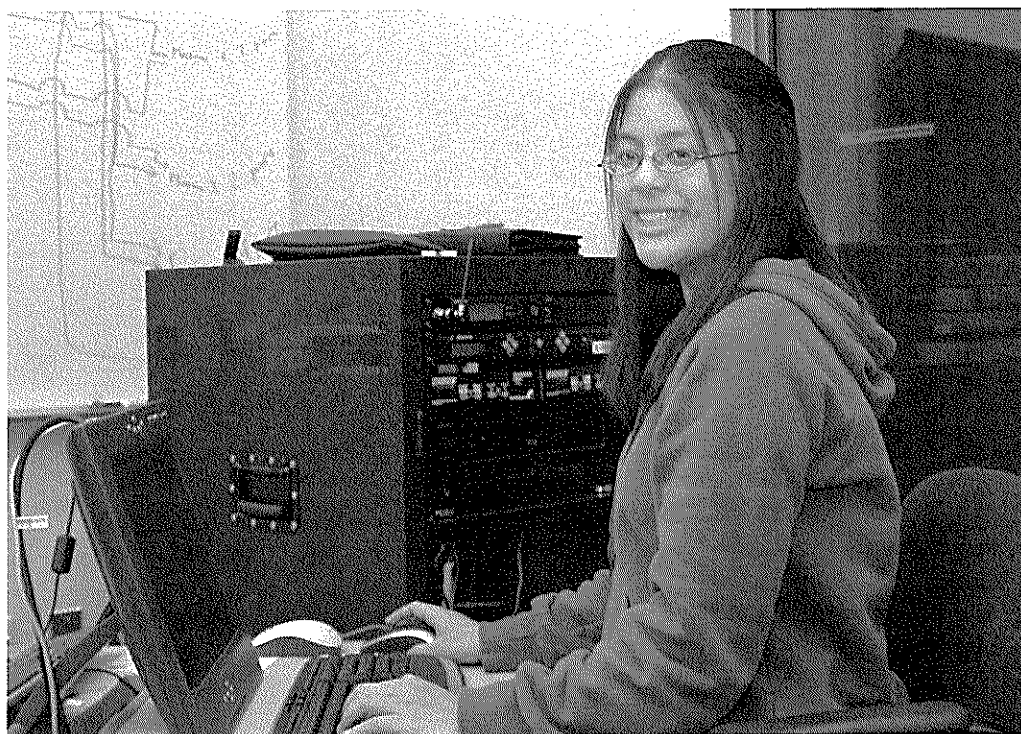
During the first few days, I got lost quite a few times. Since I was in the hospital lab and the clinical sciences building, it was a bit easier until we had Monday afternoon seminars then I got lost on the way over. I now know my way around most of campus which will truly help me when I get to university since I plan to attend the U of A when I complete high school.

During the program, I got to meet some amazing people. Dr. Fiona Bamforth, my principal investigator, was always in and out of the lab, had meetings everyday but still always found time to help out or answer any questions that I had. It was an honour to work so closely with her and see what she does everyday. Nour Moussa, the grad student I was working with in the mornings, made it really fun, she made sure I understood everything and that I had the best experience I could. Gisele Cramer, my supervisor in the afternoons, made the work interesting while looking at a different form lab work. The student coordinators, Jennifer and Taban were always there to talk and made life on campus fun and interesting, giving me a chance to get to know everyone and become good friends with some of them. I would like to stay friends with them and hopefully see some of in a couple of years when we go to university together.

This project let me experience lab work like I never would have imagined it before. I was working with 5000 year old human DNA from Siberia. So as not to contaminate it, we had to wear a full body white outfit with a mask, goggles and double gloves. It was amazing to work with something so rare and important for understanding the past. My research was trying to find the origin of the bones from the analysis of the mitochondrial DNA. It was so different from what I was expecting. When I heard my project would be with ancient DNA, I never thought I would be working directly with 5000 year old bones. I'm still uncertain of where my education and career will take me, but this experience has showed me there is so much more to science than just what we learn in school.

WISEST was the best summer job I could have ever dreamed of having. I am so glad I applied and took the chance of a lifetime. It was packed with fun and learning and I wouldn't change it for the world. It was tiring and a lot of work but it was worth it. WISEST was the one of the best experiences I've ever had and I will always cherish it.





"...I was able to learn very much about the research that is done with computers and how they can be applied to many situations."

I can still remember the excitement that I felt while I walked back to residence after the first day of the WISEST Summer Research Program, filled with anticipation for what I would be facing in the next six weeks. I was extremely ecstatic about having the opportunity to work in a research lab at the University of Alberta during this time. From the night of that phone call, I couldn't wait for school to finally finish, as I knew that this summer, I would be constantly learning about the different fields of science and engineering and the research that can be done in them. Usually, my summers consist of wasting it away by sleeping in until noon every day and mulling over what to do in my excessive amount of free time. I was certain that this summer would be one of the most exciting ones that I've ever had.

I was given the opportunity to work in Dr. Eleni Stroulia's software engineering research lab in the department of Computing Science with my supervisor, Brendan Tansey. My project was to design an interface for a graphical visualization of the internal structure of a wiki. Although wikis are becoming an extremely popular method of communicating information because of their collaborative nature, navigation becomes increasingly difficult as more content is added. Displaying the internal structure of the wiki in a visual manner such as a concept map would allow one to see its relationships and navigate through the wild easier. Additionally, it would provide a more comfortable environment for those who find the usual text-based interface of a wiki hard to follow. The interface was created in a program known as Flex Builder using MXML, a markup language based on XML. Being someone who had nearly no previous coding experience, I was required to be able to learn the language and work with it in a short period of time. I would not have been able to do that without the help of my supervisor, Brendan, who was extremely patient, kind, helpful, and willing to answer the countless questions that I had about my project.

In the end, despite my lack of knowledge about the coding, I had an extraordinarily fun experience where I was able to learn very much about the research that is done with computers and how they can be applied to many situations.

In addition to my experience at work, I had the opportunity to stay in a residence with 17 other WISEST students and two HYRS students. Living at St. John's Institute for six weeks has been one of the most fantastic experiences of my life. I met so many amazing people that had similar interests as I did, and we would always have random discussions about every topic imaginable. There was something to do all the time, with the many festivals that Edmonton had, such as Shakespeare in the Park or Capital Ex, and if there wasn't, we would just have a movie night or walk down Whyte Ave. I have grown so close to my friends who have stayed here at residence with me during my time here, and I believe that these friendships will stay with me for a very long time to come.

In conclusion, my WISEST experience has been incredible. I have been able to meet so many inspiring and passionate people who were eager to share their stories and encourage me, learn about what it is like to work in a research lab, and discover what I could do with my interests. It has also helped me to realize that university is not as frightening as I had perceived it to be, and that there is always someone who is willing to help you if you need it. I am very glad that I was able to participate in this program this year, as it was an amazing and opportunistic experience. This has been one of my most exciting, memorable, and interesting summers that I've ever had.

"It allowed me to gain a first hand experience about some of the things that go on in engineering."



For my WISEST Summer Research Project, I was placed in the department of Chemical and Materials Engineering. I worked with Kasra Nikooyeh, a PhD student on observing the interactions of heavy oil fractions in solvent systems, in this case toluene and n-decane. Using an Paar DMA5000 oscillating tube densimeter, I obtained density measurements at 20, 50 and 80 degrees Celsius. This value was then used in a calculation to determine the specific partial molar volume. Molar volume is the volume a substance takes up per mole, and partial molar volume is the change in volume per mole of substance added to a solution. When these two values are compared, we can determine what kind of interaction is taking place between the molecules of the solute and the solvent. For example, if the partial molar volume is less than the molar volume, meaning that the volume increase is less than the total volume added, then we can determine that there is an attractive force between the molecules, resulting in a higher density, and lower volume than expected in an ideal solution. Whereas if the partial molar volume is greater than the molar volume, we can conclude that there is a repulsive force between the molecules, which is why the change in volume would actually be larger than the volume of solute added to the solution. However, because we are using heavy oil fractions, (Maya and Athabasca Asphaltenes, Athabasca bitumen, Athabasca bitumen vacuum bottoms and Athabasca maltenes) we cannot calculate their partial molar volumes because mole fractions and molar volumes of the heavy oil fractions are not definitive. This is why we use the density measurements to calculate the specific partial molar volumes, which is in volume per unit mass rather than per mole.

For this lab, I made solutions of each heavy oil fraction at infinite dilution, and took the density measurements at the different temperatures. These solutions ranged in concentration between 100 to

1000 ppm. The importance of infinite dilution is to ensure that the molecules of the solute do not aggregate. This allows us to obtain results strictly involving the interaction between the solute and solvent, preventing the solute molecules from interacting with each other. By plotting these values on a graph, the slope, y-intercept, and inverse density values, could be used to determine the specific partial molar volume. Based on our results, we were able to conclude that there is an attraction between the toluene molecules and the different solutes used. However, the results for the n-decane were inconclusive. The n-decane solutions were difficult to deal with because the solute would remain as a solid in the solution, and so frequent agitation was required to maintain the solid particles suspended within the solvent.

Studying the interactions of heavy oil fractions in solvent systems is important because it allows us to learn more about the properties of the different heavy oils. By knowing more about these properties, better methods of transportation and extraction of these resources can be developed. Increased efficiency results in decreased costs, making the study of heavy oil fractions beneficial to everyone.

This program was an incredible experience. It allowed me to gain a first hand experience about some of the things that go on in engineering, and furthermore, I was able to take a look at a variety of other fields related to the sciences which was not only interesting and mind opening, but fun and exciting as well.



"The atmosphere in the lab encourages me to learn and try new methods of thought in order to accomplish a certain task at hand."

Science has always been one of the most prominent aspects of my life. It gives me the opportunity to develop my curiosity and ambition which have ultimately been fundamental to my success as an individual. Science has not only shed light on the world around me, but has shaped my perspective in terms of career and life goals. I am very grateful for the gift of knowledge, understanding, and the WISEST program for giving me the opportunity to express my passion and talent for science. My experience in the department of earth and atmospheric sciences gave me an extraordinary insight into a branch of science often overlooked behind the emphasis placed on chemistry, biology, and physics in academics. I was given the chance to work in a lab with an amazing atmosphere for learning and developing personal growth. As the program comes to an end I now reflect on the importance of my research to the domain of geology, as well as the amount of knowledge and maturity I have gained from the WISEST program.

The main focus of my research project was to observe the flocculation of kaolinite in different saline environments and analyze its surface sorption of various elements. Ultimately this would lead us to a better understanding of the sedimentology behind clay deposits and rock formation. In order to show the distinctions in morphology of the clay flakes we blended the clay samples into different ratios of fresh water to salt water. Consequently, we analyzed the topography of the clay under a scanning electron microscope. The scanning electron microscope (SEM) is a type of electron microscope that images the sample surface by scanning it with a high-energy beam of electrons. The electrons interact with the atoms that make up the sample producing signals that contain information about the sample's surface topography, composition and other properties such as electrical conductivity.

The base minerals of the clay were analyzed using X-ray diffraction. X-ray crystallography is the science of determining the arrangement of atoms within a crystal from the manner in which a beam of X-rays is scattered from the electrons within the crystal. The method produces a three-dimensional picture of the density of electrons within the crystal, from which the mean atomic positions and their chemical bonds can be derived. In addition, the elements in the water and the clay were analyzed using an inductively coupled plasma mass spectrometer that is highly sensitive and capable of the determination of a range of metals and several non-metals at concentrations below one part in 1012. Our results were quite fascinating and showed that as the flocculation of the clay increased as the range of salinity also increased. In addition the clay seemed to exhibit various topographies as its environment changed. This could mean geologists have much still to learn about rock deposition and formation. A commitment to serve others has always been on the forefront of my mind. My research project at the WISEST program has not only enabled me to be involved in academics but also incorporate how my research project correlates with various STS issues, believing that there is a need to find alternative solutions to social and environmental issues confronting our society and communities worldwide.

The WISEST program gave me the opportunity to meet new and extraordinary people that share common interests, demonstrate passion towards academics, and are willing to work together to achieve something great. Most importantly this program has been a life changing experience because it celebrates something we all are very passionate and curious about. It celebrates science, it celebrates learning, and it celebrates the potential to do something great with the knowledge that we have or may gain. These are the moments that define who we all are.

"One of the most important lessons I learned was that: in research, there are no guarantees, which makes it all the more exciting."



As I sit in front of my laptop writing this report book reflection, my mind flashes back to a few months ago when I sat in a similar position writing the essay response to my WISEST application. I remember how I held my breath, scarcely daring to hope that I (me!) would be one of the lucky ones chosen to participate in the program. I was exuberant when, not only did I get accepted into WISEST, but my request to get a position in the medical field was granted as well.

This summer, I was privileged to be working in the Department of Laboratory Medicine and Pathology, in the Canadian Blood Services Building in Dr. Jason Acker's lab. Unlike many students, my experience was unique in that I was given my own individual research project, which happens to be on the cryopreservation of dental pulp stem cells (DPSC). The hope in the long run is that these stem cells can be used to repair or replace damaged dental cells/tissues to improve quality of life in patients. In order to keep a steady supply of cells available for research and treatment, an effective protocol for their preservation must be developed, which is the basis of my project. I studied how DPSC respond to different rates of cooling, to determine their freezing characteristics.

It was awesome to be able to work in a professional lab setting and to be trusted with cutting-edge equipment and technology that most definitely isn't available in high school, including a fluorescent microscope, cryomicroscope, centrifuge, liquid nitrogen, etc. I have attained many lab skills in these weeks, including cell culture. During a break from my project, I even got a chance to take advantage of CBS facilities to test my own blood type using reagents. My eyes have truly been opened to the possibilities of science beyond the classroom.

At the beginning of the program, my supervisor described to me the thrill of "discovery" that comes along with being a researcher. Now, I

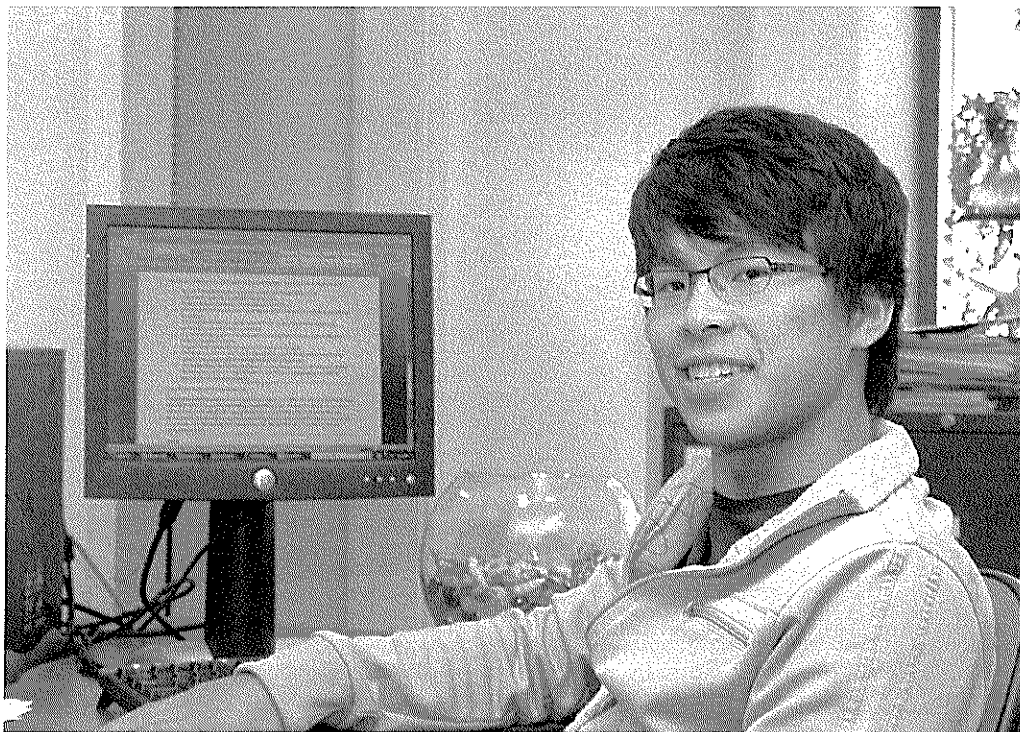
finally understand what that means. After going through the whole process of: doing background readings, designing an experimental question with my supervisor's guidance, writing out my hypothesis and protocols; my research project had become something with personal significance. I found that I couldn't wait to get into the lab and see my experiment take wing and follow through with it, to see if my hypothesis would be verified. One of the most important lessons I learned was that: in research, there are no guarantees, which makes it all the more exciting. Over the weeks, I've had many frustrating failed trials in my experiment, but each setback led to a new learning experience of trouble-shooting and protocol revision. Though repetitions of my experiment in an attempt to perfect it, I became more attached to my research, to the point that every successful trial became a personal victory.

Call me crazy, but I can honestly say I've "fallen in love" with this program and my job this summer. I don't know how I can fall back to the routine of high school life in September after experiencing so much. This summer, I got to see what my dream to work in the medical field looks like, in a tangible form. I learned about university campus life, toured various research labs, and became enlightened about opportunities on the frontier of science I never knew existed.

I would like to end by acknowledging:

- Dr. Acker and his research team (esp. Maria, Ioana, Adele, and Charles)
- my sponsor AHFMR (Alberta Heritage Foundation for Medical Research), and
- everyone involved in WISEST (esp. Grace, Jennifer, Taban, and fellow WISEST students)

Thank-you all for giving me a most valuable experience of a lifetime.



"Forensic psychiatry is an area of research that contains many grey areas for professionals working in the field."

During a University of Alberta open house I came across a booth dedicated to the WISEST summer research program. I quickly forgot about the program and about a month before the application deadline a friend mentioned that he was applying for it so I naturally I decided to as well. As May rolled around, I had begun to consider where I would be working during the summer not really expecting to be accepted into the program as my marks were only slightly above the borderline requirements. The day the student coordinator called me, I was caught off guard and was happily surprised to be hearing from WISEST again. After a brief dilemma of working with sewer robots or in WISEST, I decided the WISEST program would be a better learning opportunity and would probably be in a more secure environment.

On the first day of the program, after meeting for orientations, being a male, the non-traditional profession that I was placed in was nursing. The specific office I was placed in along with three other summer students was a nursing ethics research office. Throughout the first week two other WISEST students and I received a crash course on relational ethics and qualitative research. When it came time to select a project to work on for the remainder of the summer program I choose to create an interactive DVD pertaining to ethical relationships in a forensic psychiatric setting.

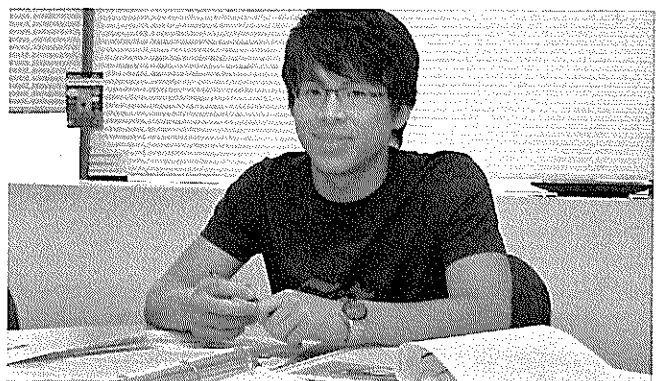
The WISEST program gave me the opportunity to explore the University of Alberta campus; I set foot in eight major libraries, explored Whyte Avenue, and became familiar with many buildings in the University area. This program allowed me to work in a research environment and participate in hands on research. I was able to meet many scholarly individuals.

Monday afternoon seminars were organized by the student coordinators Jennifer and Taban who did an excellent job of setting up a diverse range of informative seminars. From University 101, to IT, small

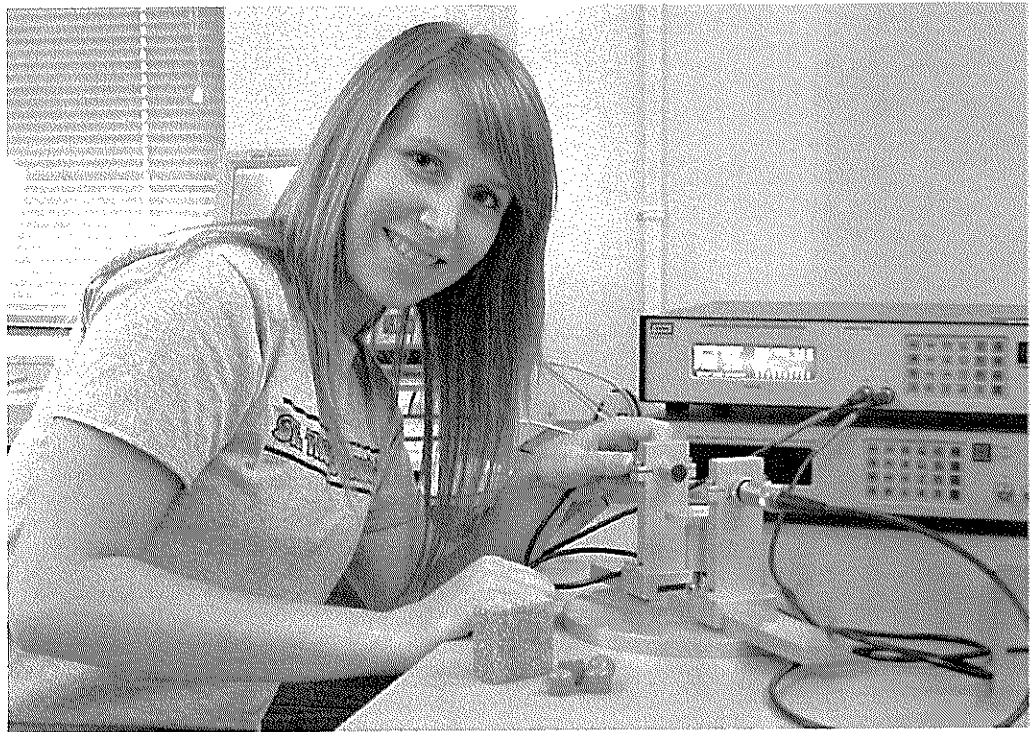
group discussions, and tours each seminar was informative in its own way. Fab Freebie Friday lunches were an opportunity to socialize with many other WISEST students and discuss research projects.

Forensic psychiatry is an area of research that contains many grey areas for professionals working in the field. Among these professionals, there are psychiatrists, psychologists, nurses, and social workers who may face ethical dilemmas in everyday situations. The research that was performed in this office attempted to describe and identify these conflicts and dilemmas.

I feel that I have learnt a lot from my experiences in the WISEST program and it has truly helped me gain contacts within the nursing field. It has also helped to open my mind to possible career paths. The last six weeks have gone by very quickly and though it was hard work, it was rewarding to see the DVD that I spent over a month of work on come together. I would like to thank Wendy Austin and my supervisor Erika Goble for allowing me to be a part of their research and WISEST for finding sponsorship for this program and selecting me for this position.



"Another huge part of the program is meeting many interesting and unique individuals who also share a love of science."



Hands down, the most exciting phone call I have ever received took place just a couple of months previous to the fun filled and educational summer I have since been enjoying. Still fresh in my memory is the chaotic atmosphere, created by home renovations, which served as the dramatic setting for the phone call I had been waiting for. It was as I sat on a pile of disorderly furniture that I learned of my acceptance into the WISEST program. Obviously, I was very excited! Much of my enthusiasm for the unique summer ahead stemmed from the idea that I would be progressing from a state of disorder to one of direction as the summer unfolded. Also on my mind was the thought of meeting loads of people with similar interests to my own and becoming more familiar with the university campus.

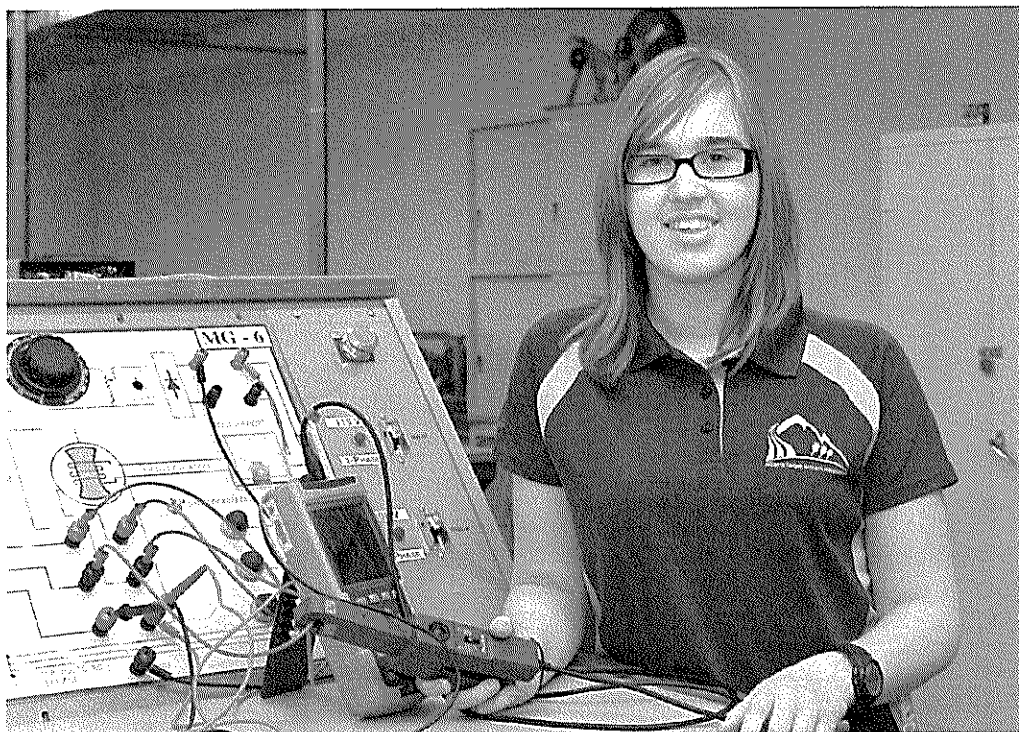
Upon my arrival to the university and the WISEST program, I realized that none of my excitement would go to waste. I found myself surrounded by many friendly people who shared an interest in science and an enthusiasm for the WISEST program. As well, any fears about meeting my supervisor, Dr. Le, and finally seeing where I would be working were quickly proven unfounded. My supervisor and his team were very welcoming and unexpectedly equipped with a witty sense of humor. The fact that I was surrounded by many strong intellectuals soon ceased to be intimidating and became a source of inspiration.

Another source of inspiration was the realization that my project would be a step towards solving real world issues. In this case, the project was aimed at diagnosing osteoporosis using ultrasounds. The project I was assigned involved sending ultrasounds through aluminum foam (made to mimic different types of bone) and analyzing the results. The experiment took place in a tub of water since ultrasounds do not travel well through air. By comparing the ultrasonic waves passing through a sample to a reference wave through water,

the speed of the ultrasounds and attenuation (loss of energy) of the waves were calculated. The resulting data revealed changes in the speed of sound through the different samples as well as changes in the attenuation of the sound waves. These results may help to reveal information about bone density and bone structure. Further studies of the effects of different bone characteristics on ultrasonic waves will hopefully result in the use of relatively cheap, portable, and radiation free ultrasounds as an alternative diagnostic instrument to X-rays.

The slope of my learning curve was not based on the work done in the lab alone. It was constantly made steeper by the Monday afternoon seminars which allowed me to explore other areas of science and research. I thoroughly enjoyed exploring campus, meeting other individuals who pursued interesting science careers and meeting up with the friends I had made through the program. I especially enjoyed the off campus tour to Isotechnika. Being able to see the different environments of some unique research careers was both interesting and intriguing. Because of the numerous aspects of science careers that I have been exposed to, I have been able to put a realistic perspective on my romanticized image of scientists and I can more clearly envision what such a career may encompass.

The benefits of the WISEST program do not stop at a clearer understanding of different careers. Another huge part of the program is meeting many interesting and unique individuals who also share a love of science. Also entwined in this huge web of learning is the chance to discover some resources and programs useful in university and the opportunity to pass on all of the interesting information gathered throughout the course of the program. I can not thank my supervisors, my sponsors, and the WISEST program enough for allowing me to participate in such an enriching experience!



"... my summer was filled with learning in areas that I had not previously considered interesting or as a career.."

In early June I was selected by the WISEST Summer Research Program for placement in the Department of Electrical Engineering. My position was sponsored by the Faculty of Engineering. Within the field of Electrical Engineering, I was assigned to Dr. Wilsun Xu's research team specifically studying the effects that various modern household devices can have on the power quality of the grid as a whole. For this summer, the power lab's key focus was to determine the total harmonic distortion caused by power electronics, and how it affects electrical systems. My co-worker, Sarah Walinga, and I were very fortunate that our direct supervisor, Chris Lerohl, was able to guide us through the complexities of this project.

The first week and a half was spent reading a variety of technical papers and conducting online research to familiarize ourselves with the research topic and the necessary background information to understand it. As a result, my knowledge of waves has been expanded to include the Fourier series and square waves, in addition to increasing my knowledge about various electrical components. Towards the end of the second week, we were investigating the questions that this topic posed, while trying to learn the program and codes inherent in Matlab.

Eventually, we moved on to compact fluorescent light bulbs, as they continue to grow in popularity in today's economically and somewhat environmentally driven society. Compact fluorescent light bulbs are much more than your average incandescent light bulb. In addition to being more efficient and thereby saving money on the monthly electricity bill, these light bulbs pose certain environmental hazards in terms of their disposal as they contain mercury vapours. Similar to other electrical devices, compact fluorescent light bulbs contain bridge rectifiers to convert AC to DC power. However, bridge rectification is a source of harmonics which, in turn, can

cause power distortion leading to loss of efficiency and component damage. Through disassembly and circuit mapping, we were able to determine that a particular manufacturer's bridge rectifier only contained 3 diodes, instead of the standard 4 or 6 diodes needed for full wave rectification. As a result, the tested compact fluorescent light bulbs produced higher rates of distortion and were less efficient as they only utilized half of an AC wave.

Part of my summer also included meeting students in other disciplines and participating in some very interesting lab tours, particularly the nanofab lab. This was a result of the small group discussions, where I made contact with Katie Krause, a graduate student in nanotechnology. This particular tour was most interesting because we were invited to "suit-up" and enter the actual nano-fabrication workcenter. Many thanks to Katie for her time and enthusiasm.

Towards the end of my summer placement, the research team began recording experimental data from testing in laboratory and residential environments. These tests included varying background distortion in electrical systems using both compact fluorescent light bulbs and personal computers (PCs). At this point, the investigation is ongoing.

To some, this research project may not seem too important; however, its importance increases dramatically in critical environments that utilize systems such as life support. These systems (life support) are found on the International Space Station (ISS), in submarines, and also in your local hospitals.

In conclusion, my summer was filled with learning in areas that I had not previously considered interesting or as a career. I would like to take this opportunity to thank my sponsors and my research team for providing me with an interesting summer.

"I was fortunate enough to be placed in a lab that focused on groundbreaking technology."



Writing my application essay for the WISEST program in early April, I was asked how I would like to benefit from this six-week research experience. I remember brainstorming into the night, coming up with the expectations of being exposed to real-life sciences, building character and developing new skills, as well as determining a suitable career path for me to pursue and study in. WISEST did not disappoint! This program has given me experience in research and lab work, an introduction to countless opportunities, as well as support for those interested in pursuing a career in a non-traditional field.

The past six weeks have been exhilarating. I had the privilege of working in the National Institute for Nanotechnology, under the guidance of Dr. Karl Chuang and Dr. Jingli Luo, and the supervision of Dr. Xianzhu Fu. My project included developing a new fuel cell to co generate electric power and ethylene from ethane by developing a new technique to make thin film. I was overwhelmed when I first received my project. I thought to myself, how could they expect me to learn everything and do all this in only six short weeks? My fears slowly disappeared, however, as Dr. Fu explained my project to me with great patience.

We took things one step at a time, and needless to say, I was quite surprised when I was told that I had finished my project. The first step included the synthesis of BCY nanopowder. I began by weighing the correct values of $\text{Ba}(\text{NO}_3)_2$, $\text{Ce}(\text{NO}_3)_3$, $\text{Y}(\text{NO}_3)_3$, and citric acid. Water was then added to the mixture, and the solution was spun and heated. Next, we adjusted the pH level and sol-gel was formed. Sol-gel combustion occurred shortly after, leaving the product of BCY powder. Taking the BCY powder we had made, we moved onto the next step of fabricating BCY electrolyte with platinum electrodes. Using five tons of pressure, we pressed 2g of BCY powder into disks. The disks were then sintered in the furnace for 10

hours. After, the disks were polished until only 0.5mm thick, and a layer of platinum conductive paste was placed on the center of each face of the disks. The final step involved the set-up and testing of the fuel cells, as well as the analyzing and interpretation of the data we collected. We found that approximately 100nm BCY spherical nanoparticles were prepared by the sol-gel combustion method. We also observed that a dense surface of BCY disk was obtained by sintering at a relatively low temperature of 1500OC. The fuel cells with BCY electrolyte displayed high power density, ethane conversion and ethylene selectivity. Things seemed much easier after being broken down into individual steps.

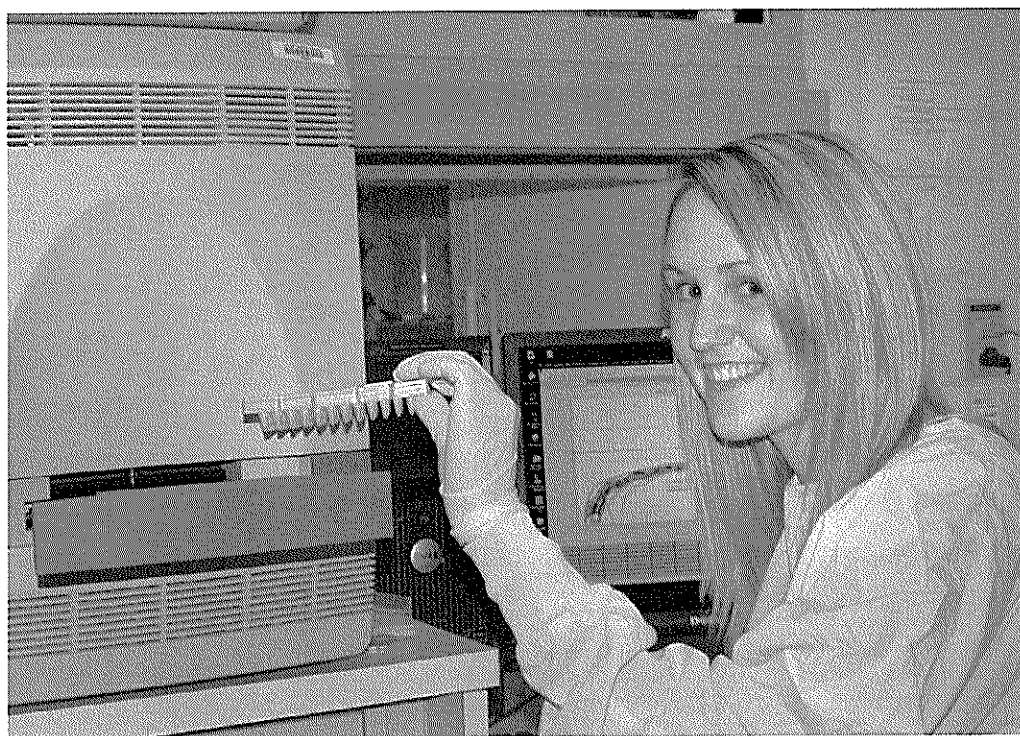
Despite the immense focus WISEST places on academics and research, WISEST also provided students with the opportunity to discover, explore, and gain insight to different careers in the non-traditional field. Through the Monday afternoon seminars, I have been able to learn more about the different types of careers available in sciences, engineering, and technology. I have also been given insight into the lives of others by listening to their experiences in choosing a non-traditional path. These sessions have been inspirational and motivational, helping me greatly in narrowing down my list of possible career paths.

Fuel cells are an important development that will play a major role in society in the near future, and I was fortunate enough to be placed in a lab that focused on such groundbreaking technology. The knowledge I have gained from participating in this program greatly surpasses what I had initially thought I would be capable of absorbing. My participation in the WISEST summer research program 2008 has been amazing. The memories and friends I have made will stay with me for years to come. Thank you to all those who helped in giving me this unforgettable experience.

haley van dalfsen

Supervisor: Dr. Stephanie Yanow / School of Public Health

Sponsor: Elk Island Public Schools Parents Foundation



"My work in the lab taught me more than lab skills, it taught me life lessons."

My first impression of the WISEST Summer Research Program was one of sheer intimidation. I found myself overwhelmed with responsibility that I had never experienced in high school where I found myself being nursed through every act and problem that might arise. In contrast, this program placed me in an environment where I was independent, forced to take responsibility for myself and my actions. As I became more acquainted with the WISEST Program and my project, I began to realize the magnificence of its intimidation. It was the drive that made me make the most of what I had and take advantage of every opportunity that was offered to me.

I was placed in Stephanie Yanow's lab, in the Provincial Laboratory for Public Health, under the supervision of Rochelle Cruz. My project involved validating Real Time PCR as a diagnostic test for *Cryptosporidium* and *Giardia*, two intestinal parasites that infect humans. This was accomplished by comparing Real Time PCR to the traditional diagnostic method of microscopy. Microscopy, which is effective as a diagnostic tool, can be tedious and time consuming especially if there is an outbreak. Due to this, a new diagnostic test like Real Time PCR, which is sensitive and specific, would be greatly beneficial. Through this project I was able to pick up invaluable lab techniques as well as acquire knowledge on numerous topics that I would not have learned otherwise.

My work in the lab taught me more than lab skills, it taught me life lessons. This was far more than I ever expected to gain from working in a lab for six weeks. The people in my research team greatly contributed to these lessons. Stephanie Yanow, Rochelle Cruz, Sandy Shokoples, and Christie Dewar taught me how to laugh and have fun and still manage to get the job done, never shirking your responsibility. My research team shared their knowledge with me on

options for university and what they would do differently or never change. This enabled me to gain a perspective into university that I would never before have had. They were truly an excellent group of people to spend my summer working with, always willing to help me with problems or questions.

Prior to this summer, I found myself getting panicked about university. I had no idea what I wanted to do or where I wanted to go, all I knew was that I loved science in all its forms whether it be math, biology, chemistry, or physics. Based on this I found myself cringing every time I heard the question "So what do you intend to do after high school?" I would stumble over an answer, sounding more like robot on speed than someone who was intelligent, perfectly capable of a coherent response. This all changed after just a six week program. Due to the help of my research team, the Monday afternoon seminars, and the WISEST Student Coordinators, I can now say with confidence that I intend to enter into an Engineering program after high school.

The Student Coordinators, Taban and Jennifer, executed the WISEST Seminars in such a way that I was able to enjoy myself while still learning and acquiring knowledge. These seminars, such as Many Faces of IT and the off campus tour like Isotechnika, enabled me to gain insight into options for university and careers afterward. Taban and Jennifer were extremely helpful, always able to make you laugh. They were a large component in making this summer what it was... amazing. One word. One word to describe a life changing experience. This summer was so much more than I had planned for. I not only learned numerous skills and life lessons, but I also discovered who I was as a person and that is something I will be forever grateful for.

"I was allowed to meet remarkable people that share some of the same goals and passions with me."



When I got the phone call in May telling me that I had been accepted into the WISEST Summer Research Program, I was a tangle of feelings which included thrilled, excited, and kind of nervous. I was thrilled to know that I had completed my application impressively enough to be accepted. Excitement came in bursts at the thought of me working in a research lab with a bunch of scientists around me. And admittedly, I was a little bit nervous thinking that things may not go right if I caused a big nuclear explosion. Now those were only the first few thoughts that crossed my mind when I got the phone call. When my coordinator went on to explain some of the aspects of my project, I realized that indeed there would be no need to worry about nuclear explosions.

My part in the summer research program included working alongside another WISEST student, Jennifer Chow, in the department of Biological Sciences. Our project was a unique one in that there were actually two components of it. During the first three weeks, we worked under the supervision of Jeffrey Ball, a graduate student working on his Ph.D. Our task included watching videos of songbirds and recording behaviour observations. During this period of three weeks, we worked on campus in the biological sciences building. While watching the videos I realized that there wasn't a lot of excitement in recording the time when adult left the nest and when it came back. It didn't take long for the job to become kind of frustrating. But I still remember the first time I saw a predation happening. I was kind of shocked to see that something so eventful was actually happening. I know. What a soft hearted person I am to just sit there and, to my amusement, watch as the life of a baby bird came to end. It was always interesting to see different species of predators coming to claim their prey. Needless to say, by the end of the three weeks I wasn't exactly eager to watch another couple of

those videos, but I was still glad to have gotten to see the eventful life of songbirds. Now it was time to face the lichens.

During the remaining half of the research program, Jennifer and I worked under the supervision of Diane Haughland, who is also working on completing her Ph.D. From her we learned the specifics of our next project: Lichen Identification. During the first week we stayed in the biological sciences building where we were trained to look at different species and genera of Lichen, and we learned how to key out specific characteristics. During the remaining two weeks of the program, we were shifted to the Royal Alberta Museum. Needless to say: way cool! There we continued to work on the identification, but with an added bonus. During our lunch hours we were granted free access to the museum's displays. This was probably the most exciting thing about working there. We also got to meet many other lab technicians that would be assisting in lichen and moss identification.

My overall experience in the research program was unforgettable. Yes, that's right. Not even the birds will be forgotten. In the midst of it all I was allowed to meet remarkable people that share some of the same goals and passions with me. We also got to meet many people in the career that some of us are hoping to pursue in another decade or so. I am so glad that I got to experience this summer because I know that nothing else would have been able to substitute for the amount of knowledge that I gained in the past six weeks.



"I have not only learned the lab experience from them, but also their different perspectives of seeing things."

I have felt very lucky that I have been chosen to be in the WISEST Summer Research Program from July 3rd to August, 15th in the summer of 2008. Throughout the six weeks program, I am working in the Department of Civil and Environmental Engineering, with the principle investigator — Dr. Robert Donahue of the Department of Applied Civil and Environmental Engineering, summer student and supervisor — Ben Burke, analytical chemist — Jela Burkus, and another WISEST student- Alix Krahn. I have spent my six weeks working in the basement of the building of Natural Resources Engineering Facility. We are working on the project about the reclamation of the oil sand wastes. Our goal is to find a way to reclaim the fine tailings, which is the soft by product of oil sands bitumen extraction. We have done some experiments on the CEC (Cation Exchange Capacity), EC (Exchangeable cations), Saturated Pastes, and the Sedimentation Test on different proportions of clay minerals.

On every experiment, we have prepared different proportions of 0%, 1%, 2%, 5%, and 10% bentonite (a kind of clay mineral which has a higher cation exchange capacity) with kaolinite (a kind of clay mineral which has a lower cation exchange capacity). In the CEC and EC experiment, we have found out that the higher the content of bentonite, the higher the cation exchange capacity of the mixture, also the higher percent of the exchangeable cations — calcium and magnesium. In the Sedimentation Test, we have found out that the slurry has a better fines capture with higher proportions of bentonite, the addition of calcium sulphate, and also washed sand. Then we are wondering if by adding clay with high cation exchange capacity could improve the reclamation of the tailings.

Throughout the six weeks, we have used different instruments in the lab. For example, the centrifuge, pH meter, conductivity meter,

shaker, mixer, oven, etc. And our samples are being tested by IC and IC-PMS. At the end of the program, Dr. Donahue and our supervisor — Ben Burke have helped us analyzing data, and teach us about organizing posters. I have not only learned the lab experience from them, but also their different perspectives of seeing things.

During the WISEST Summer Research Program, we also spend our time with other WISEST students throughout different events. For example, during Monday's seminars we get together and listen to different lectures and we discuss with the students from university about the university life; and sometimes we discuss with women who are working in nontraditional field, and discuss about their experience. We also went on campus and off campus tours, that we visit different labs and working places. WISEST students also play games together: we played games on Science Olympics, and we went to Kinsmen Park to play golf. I have really enjoyed the events that the WISEST Summer Research Program has designed for us.

I have really gained a lot from this six weeks program: I have experienced the life of being in the university and doing research, get to know other people's career paths, get to know people who have the same interests as I do, know what science is about, and broaden my horizons. Since I immigrate to Canada two years ago, I find that by participating in the program has really provided me with the opportunity to get to know this society.

"I am indebted to the residents and researchers of Meanook for their warm encouragement, advice, and mischief."



I'll be honest with you. For at least two weeks after I learnt that WISEST students could be sent to the Meanook Biological Research Station, I had pronounced it "meen-nuke", rather than "menuk". Also, images of lurking bears, a lone cabin set among unending, green forests, fascinating field work, and wonderfully dirty clothes at the end of the day, cycled through my head. Those were only half right.

It's true, perhaps, that us three at Meanook did not participate in as many Monday seminars as the rest. However, each day I was lost in the knee-deep fields, towering birches, and mirror ponds of Meanook. The bear I had imagined never appeared, though encounters with the resident beaver, who had a penchant for felling trees across the path, and an unhurried moose grandly chomping pond weeds, had occurred. In fact, during one occasion, instead of researchers striking out into the field, nature came to us. For at least a week, a colony of brown bats had established a roost in our furnace, and was more than determined not to leave.

However, it was the people that made Meanook more than a job. Biologists seem to run through the station like a current, and each one is more than dedicated to their work. Hence, the box of peat moss growing next to the houseplants on the windowsill, the piece of tree fungus on the plate in the leftovers fridge, and the high frequency of Latin words used during dinner time. One of them, Brandon Nichols, the station manager and our supervisor, allowed me and Alyssa Larson to work on the RANA (Researching Amphibian Numbers in Alberta) project.

Worldwide, amphibians are declining at an alarming rate, and the reason for this decline is only dimly known. The RANA project hopes to gain more information on amphibian numbers in Alberta, helping to fill a bank of knowledge from which other scientists may draw from.

To do this, a pond is encircled by a tarp fence. In theory, any amphibian wanting to enter or exit the pond must now hop along the fence instead, falling into the pitfall traps on either side. Each pitfall trap consisted of a plastic bucket sunk into the ground, lined with moist moss and covered loosely by a plastic lid to prevent larger animals from entering. In the event that other animals did fall in, a wooden stick for them to climb out was also included. Each morning was spent checking all forty traps, and recording the length, weight, age, species, and other characteristics of the amphibians found in them.

The memories I'll bring home run like Kodak moments. Most of the researchers generously allowed us to help them with their projects, and many afternoons were spent chasing moths, dodging kamikaze swallows, and catching fathead minnows. There are many to thank: Alyssa Larson, WISEST student, for working with me on the RANA project, and demonstrating how to roast several marshmallows at once (use a rake); Lisa Lorenz, the third WISEST girl, for being a constant companion in our adventures and mud fights; Brandon Nichols, for teaching me the art of the practical joke; and Alison Bil, assistant manager, for showing us all how to take a joke. Also, I am indebted to the residents and researchers of Meanook for their warm encouragement, advice, and mischief.

As with most grade 11ers, I find the path to the future to be rather vague. If anything, I had hoped that working at Meanook would put up some helpful signposts that may point me along the way. Speaking about paths, my favourite path at Meanook twists and cuts into a dense grove of trees. But, once you follow the last curve, it opens up onto a vast field of daisies, rimmed by aspens shivering in the wind. This, perhaps, has been the tallest signpost I've stumbled upon so far, that points to a future in science.



"I would never have thought that I would be someone who would observe birds and identify lichen, but in the end, I realize that I really enjoyed doing it."

When I received my acceptance into WISEST, I had not felt so much happiness for a long time. I had a tough grade eleven year, and getting this opportunity turned my year right side up. I got into the faculty of Biological Sciences. It was not the area that I really wanted to be, but I was just so happy to actually get into the program. For the weeks that I have been working, I have really enjoyed my time.

I had two projects to do. The first project took place in the Biological Science building, and I was watching behavioural habits of birds. I did that for the first three weeks of the WISEST program. My supervisor, Jeff Ball, needed some help getting through videos of birds. I would watch two hours before a predation and record what I had seen. Then I would just observe two hours with no predation at the end. In the last week, I was given a time when there was say three nestlings and another time when say two of the nestlings had gone missing. I was supposed to find where those two nestlings went, whether they fledged or were predated. Sometimes you were given a range of time for over a week. That's 168 hours where the nestlings could have gone missing. Whenever I found out how the chicks went missing, there was a real sense of accomplishment. I would usually spend over eight hours looking for the chicks. From this project, I really learnt to be patient and tolerant. For the first day of trying to find where those nestlings went, I felt like I was going to pull out my hair, but by the second day, I just stayed calm. Also from this experience, I learnt to be more observant. This was really good for my second project.

For my second project, I am working with my other supervisor, Diane Haughland at the Royal Alberta Museum (RAM). My project with her is the identification of lichens. I had so much fun doing this project, and I learnt so much from it. In the first week, Diane trained

Harpreet Aulakh, another WISEST member, and me in identify about fourteen species of lichens and many genera at the university. I was so excited to open my first package of lichen and identify it. We went to the RAM on the second day of working with Diane, and we got a private tour of the museum. There were so many interesting gems and insects in the museum. We did not start working at the RAM until after the first week of working with Diane because the people at the RAM were not ready for us to come in yet. On the first day at the RAM, Harpreet and I were the most experienced people, next to Diane, at identifying lichen.

In addition to identifying lichens, I got to take photos of lichen using a microscope. Sometimes the specimens were so small that it was difficult to take a good picture. If you move the specimen just slightly, it moves out of the camera's view. Also, Harpreet and I had to constantly play with the lighting when trying to take pictures or else we would get shadows in the picture. I was having trouble taking a good picture of one of the specimens, and Harpreet commented, after I had finished taking the picture, that I probably got a white hair from trying to get a good shot of that lichen.

The WISEST program has been such a good experience for me, and I have really enjoyed my time working with the awesome people and trying new things. I would never have thought that I would be someone who would observe birds and identify lichen, but in the end, I realize that I really enjoyed doing it. I have expanded my horizons through this program.

"This research program has been amazing and I will recommend to all of the up and coming grade 11 students."



The WISEST summer research program has been amazing. The summer has been chalked full of learning inside and outside of the lab. Within the lab I have learnt enormous amounts about how ethics works into everyday life and into the healthcare environment. Outside the lab I have been learning from the Monday afternoon seminars. I have been discovering about all of the career options that are outside of the research field as well as all of the possible topics I could approach working in academia. I have not just been learning about the future but preparing for it as well. Living in residence has been awesome in the sense that I have been given a taste of living on my own. This experience has not just been extremely fun but it has prepared me for the future and given me the life skills I needed.

I have been working within Dr. Wendy Austin's lab in the faculty of Nursing. Dr. Wendy Austin is prestigious individual because she is not only a nurse but a psychologist and an ethicist, so accredited she is the Canadian Research Chair on Relational Ethics in Health Care. Because Dr. Austin has taken the time to be a mentor to me she has expanded my view of qualitative research immensely. The research project I am working on specifically within the lab is The Experience and Resolution of Moral Distress within the Pediatric Intensive Care Unit. This project is within its early stages and this has provided me with the ability to work on unique aspects of the project and see it develop over time. When I first came into the lab I learned all about relational ethics and the experience of moral distress. This was essential for me to be able to work on the project I had chosen. Moral distress is the feeling when you are prevented from doing what is right by existential or internal restraints. As well as all of the aspects and consequences of moral distress I learned about all of the core components of Relational Ethics, which was developed within Dr. Wendy Austin's lab, and how they are applied everyday as action

ethics. Then once I had a grasp upon these topics I started working upon my topics by starting to code the transcripts of interviews used for the project. I did this by identifying stories and background information as well as the questions the Interviewer asked and how the participant responded. Identifying the stories these participants told was important because we are using Narrative Inquiry as the methodology of this project. The reason Narrative Inquiry was chosen was because MD(moral distress) is often caused by a single incident and Narrative Inquiry can help identify these incidents and analyze how we can reduce and/or resolve these incidents. Then once I had coded all of the stories to help for the building of typologies I started on helping rewrite some of the stories within the transcripts. This proved to be quite difficult because in Narrative Inquiry I have to be the author of the story but I want the narrator to be the participant as well as the implied author. This means that I want people to think that they wrote this story. Doing this requires the analyzing of their writing style and trying to duplicate it while rewriting their incident as a story. I loved this difficult task; it has me happily frustrated. These were the main two activities I did within the lab but there were still many other smaller things items I did that were required for the research project.

I would like to thank Taban and Jennifer for being amazing Co-ordinators; Erika Goble, Timothy Anderson, Wendy Austin, Theo, and the other WISEST students in my lab for all the help they have given me. This research program has been amazing and I will recommend to all of the up and coming grade 11 students.



"There are very few opportunities for students our age to gain the kind of practical experience that I was exposed to in my lab."

I can't even remember the last time I was as nervous as I was on July 4th, 2008: WISEST Orientation Day. Looking around the room, I could see the few familiar faces of the other students staying in residency whom I had met the night before. But really, I knew no one. I felt like an outsider, an impostor in this room full of what I was sure were sparkling intellectuals. There were a few awkward attempts at conversation, but overall, the room was eerily quiet, considering that it was full of teenagers (mostly girls, no less). I wondered what I had gotten myself into.

But thanks to our student coordinators and some highly amusing icebreakers, we finally got started. Over the course of the day, we all started to relax, and I found that there had been no reason to be nervous at all! Everyone was really friendly, and once we got a little more comfortable around each other, I realized that I fit right in. Although we were all closet nerds, and did have a lot in common, everyone had their own personality, and that kept things interesting. The panic from that morning subsided while we were "oriented", only to return again later in the afternoon when it was time for us to meet our supervisors.

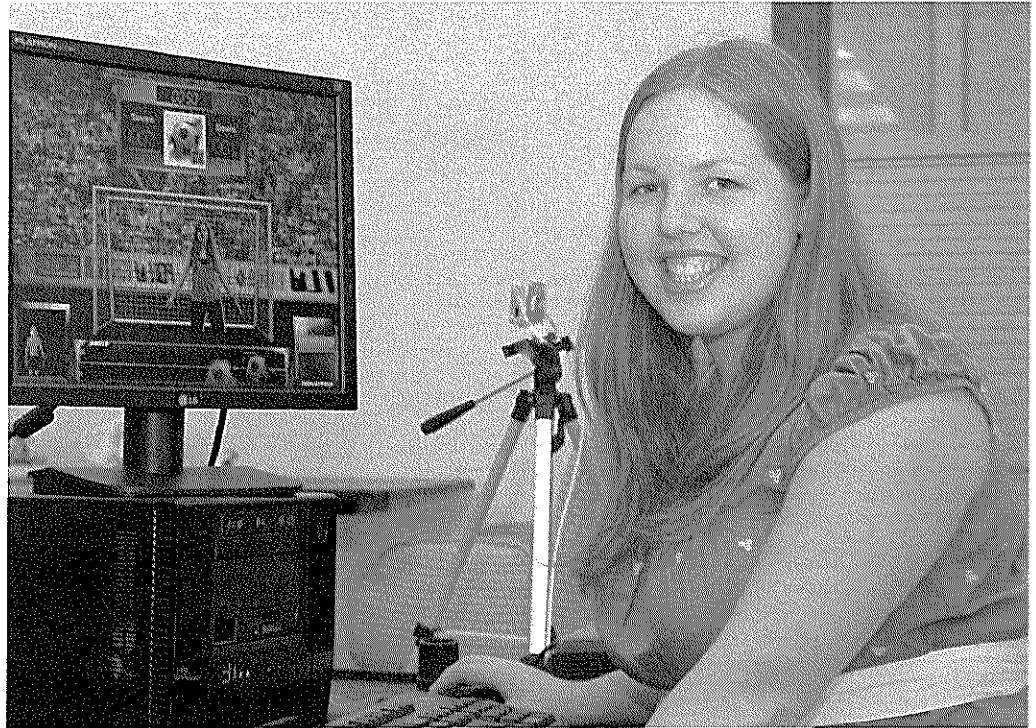
But once again, I realized that my apprehension was completely unnecessary. I had been placed in Dr. Christopher Sturdy's lab in the Department of Psychology, and even from that first day, my direct supervisor Lauren Guillette was friendly and easygoing. She showed me around the lab, and explained what I would be doing in a little more detail. The tour of the lab completely changed my perception of what a research lab was. I had been expecting people in white lab coats and goggles, watching my every move. But everyone was really friendly and laid back (we even got to wear flip flops), and after the first couple days, I was comfortable in my lab, and definitely enjoying it.

My project dealt with the chick-a-dee calls of black-capped chickadees. I had two birds that had undergone an operant discrimination experiment in which they were trained to respond positively to either black-capped or mountain chickadee calls. I had recordings of them before and after their experiment, and analyzed the notes for potential changes in acoustic features (frequencies, durations, etc.). It was a little intimidating at first, but once I got the hang of it, I really enjoyed everything I did on a day to day basis, tasks which spanned from computer work to feeding the birds.

There are very few opportunities for students our age to gain the kind of practical experience that I was exposed to in my lab. I saw all sorts of different research, even within my own lab, as well as outside of it during our weekly Monday afternoon sessions. The sessions were a great way for us to all get together, and to interact with other students. It was nice to get a variety of experiences, so that you saw other types of research outside of your lab as well. My favorite session was the small group discussions. It was really informal, and I loved just being able to talk to these women about their careers and how they got there.

Now that we're nearing the end of the six weeks, I can hardly believe I was ever nervous about coming to WISEST. I gained so much experience and learned so much in my lab, and I made some really good friends along the way. I am so lucky to have been a part of this program, and I had a blast. The memories of this summer definitely go beyond what I ever could have imagined, and I wouldn't change any of it.

"For me, the best part about WISEST was all the different people I met."



I heard about Wisest in grade eleven when a few grade twelve students at our school did a presentation about their experiences they had the summer before. They told us all about working at the University and living at St. John's Institute. I thought that Wisest sounded like a really fun way to spend the summer, so I signed up!

When I got my letter from Wisest describing what I would be doing all summer, I became excited, but also nervous! I was placed in Dr. Edmond Lou's lab at the Glenrose Research tech building. I really had no idea what to expect from my job except for the sentence, "Your project will include setting up, and collecting feedback from PT's and OT's about the IREX and Wii systems, used for virtual rehabilitation therapy." So with that, I started researching my job at home. I found that PT's and OT's were physical and occupational therapists, and also watched a few videos about how the IREX system worked. I thought that the IREX seemed so cool, and couldn't wait to try it!

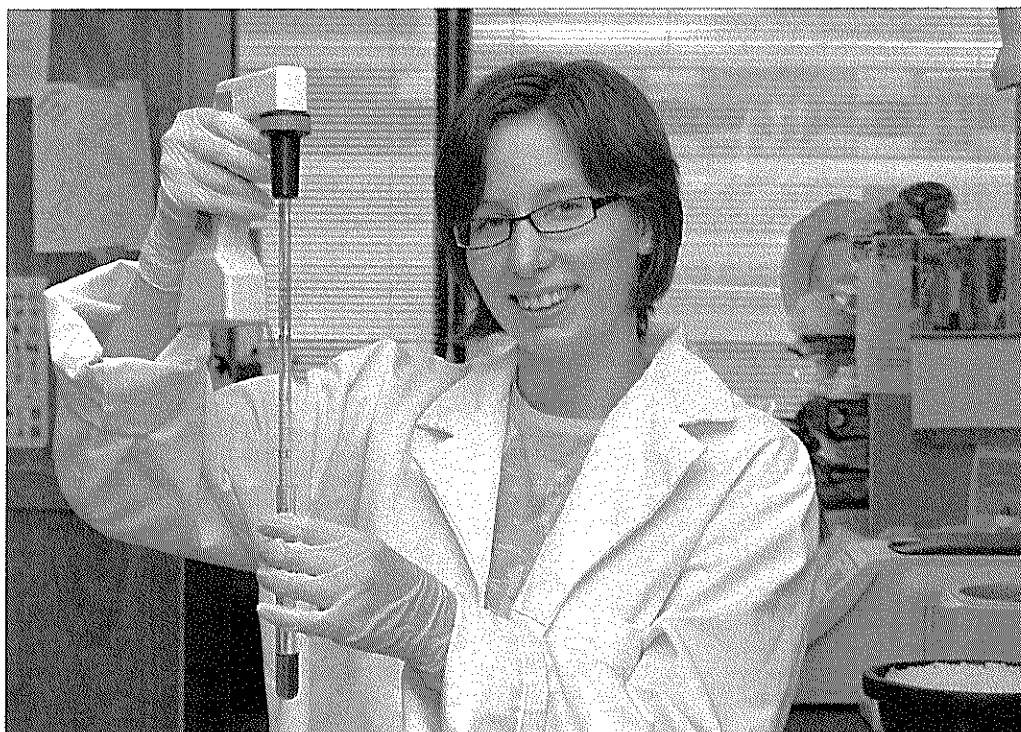
The first week of my job, I read tons scientific papers about virtual rehabilitation. I learned the advantages, and also some problems therapists were encountering. My task then, was to design a questionnaire to investigate any difficulties therapists at the Glenrose had, and to understand their acceptance of virtual rehabilitation. After much interviewing, I started compiling the information together, and found that most therapists think virtual rehabilitation is a very useful tool for motivating patients. I definitely agree! The IREX and Wii games are fun, and I sure enjoyed playing them when I was having a break.

I also did a variety of "mini projects" while I was in my lab which helped me learn more about different fields of Rehabilitation and Biomedical Engineering. I worked for my supervisor on scoliosis, osteoporosis, and kyphosis, and found the rehabilitation methods for these patients were very innovative and interesting.

For me, the best part about Wisest was all the different people I met. I had many chances to meet people in the hospital, in my lab, and from the Wisest seminars. My supervisor, Dr. Lou, even took me to the university for a couple of days, so I could visit his friend's labs, and watch student presentations. The people I met told me about their careers and education, which is aiding me in my decision of what to do after high school. Meeting other Wisest students was also wonderful because we were able to talk about our interests, and get to know people from all over, and even outside, Alberta.

As I am from Fort McMurray, I was able to live at St. John's Institute. I met so many different people there, who were really fun to be with for the six weeks! There is so much to do around Edmonton, and we sure did lots! On Whyte we did various things from shopping, frequent trips to Marble Slab and Chapters, and weekly trips to the farmer's market. (popcorn and cherries!) We also experienced all of Edmonton's many festivals. I went to Shakespeare in the Park, the street performer's festival, a taste of Edmonton, Capital Ex, and Heritage days! I had an amazing time getting to know everyone from Res, and hope that we will be friends for a long time.

In the end, Wisest was very rewarding. I learned so much about, university life, research, and all sorts of jobs I never even knew existed! My supervisor was fantastic, and always made sure I had as many learning opportunities as possible. I am very thankful I took the chance to come here, and don't regret it at all!



"My favourite seminar was visiting research labs that were on campus..."

When I first applied to the WISEST Summer Research Program, I wasn't sure what to expect. I knew the program involved me spending six weeks working in a research lab on campus; however, I wasn't really sure exactly what research entailed. Math and science, especially biology, had always been the subjects I enjoyed the most and did the best in, and it was my biology teacher who recommended this program to me. Having only four days before the application deadline, I made a quick decision and decided to apply. I asked my teachers for references, filled out the application form, and wrote an essay. I handed it in feeling unsure of my chances of being accepted. However, around a month later I received a phone call from the WISEST office telling me that I had been accepted into the program, and that I would be working in Dr. David Stuart's biochemistry lab studying yeast.

The first day was daunting because I was introduced to 60 other people I had never met before. It was interesting though, because I had never really met anyone my age who had the same interests in math and science that I did. The first thing we did at the orientation was play some ice-breaking games that got us talking to each other. The orientation also included a short tour of a section of the University of Alberta campus, a safety presentation, and an unexpected free lunch. We were also presented with water bottles, bags, and some other freebies. Nearing the end of the day we were introduced to our principle investigators, who, in my case, was Dr. David Stuart. Our principal investigators then took us to the labs in which we would be spending most of our time during the summer.

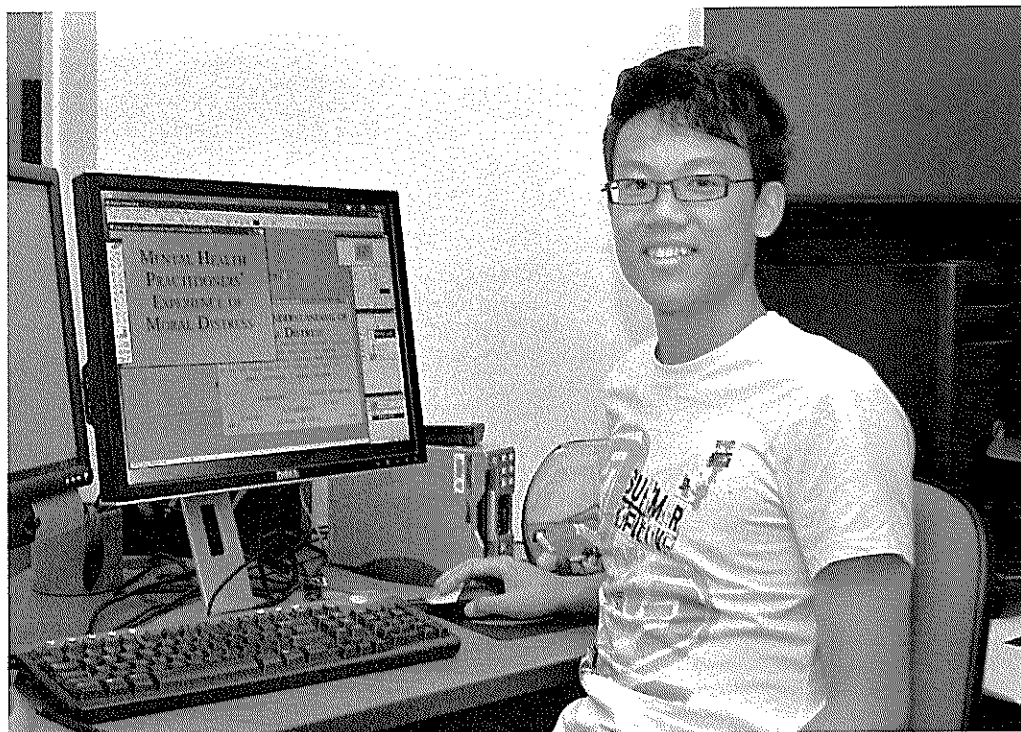
As I mentioned before, my project involved studying yeast, more specifically, the genes that are involved in controlling processes

such as meiosis and mitosis. This was exciting because genetics was the unit that I had enjoyed the most in Biology 30. One such gene, called Ume6, is critical to these processes in that it in turn inhibits other genes (called Early Meiotic Genes, or EMGs) during mitosis, and then activates EMGs at the beginning of meiosis. The question I was trying to answer was: Does inactivation of the Ume6 gene lead to chromosome instability in cells undergoing mitosis?

Working in a research lab everyday was interesting and motivating. I got to meet a range of people, from summer students to post-doctoral fellows. Every Monday afternoon I would leave the lab early to attend a seminar with the rest of the WISEST students. These weekly seminars ranged from talking to women who are involved in non-traditional roles, to visiting with U of A students who discussed with us what life at university was like. My favourite seminar was visiting research labs that were on campus, as it was interesting to see what research is like in fields other than biochemistry.

Being involved in the WISEST Summer Research Program this year at the University of Alberta was one of the best choices I have ever made. The program definitely changed my summer for the better. Instead of sleeping in until noon everyday I was meeting new people my age who are interested in science, discovering my way around the U of A campus, and learning what working in a research lab is really like. The summer flew by so fast that I couldn't believe it when the six weeks had come to an end.

"The great experiences I have had in this program have not only come from just the work environment, but also the WISEST program itself."



Exhausted from a long day of staying at school, I was surprised to hear my older brother tell me that I had missed a call from the WISEST office. However, they had not mentioned anything other than instructing me to call back the next day. I was overwhelmed with mixed feelings; was I about to receive an acceptance, or a rejection? Anxiety is the only word that comes to mind to describe the passing time until I finally received the news of an acceptance. I was ecstatic, but at the same time, I began to worry; would this program be too challenging for me? What if I do a bad job? Will the work ruin my summer? After completing this program, I can undoubtedly say that my worries no longer became worries.

I was very fortunate to be placed in the Faculty of Nursing, working in the relational ethics office, under Dr. Wendy Austin and Erika Goble. Relational ethics is the study of striving towards eudaimonia in terms of everyday actions, particularly in relationships. My project focused on Mental Health Practitioners' Experience of Moral Distress. Moral distress is a concept that describes the state one experiences when one is restricted from acting upon his/her own moral choice of action. It has continually been an issue within healthcare settings, as a growing number of practitioners are struggling to deal with it. This research project has been an ongoing project in the ethics office for many years, and at the present time, it has already concluded. As a result, my role in participating in this project was to compile an interactive DVD using all the research findings that have been put together over the course of the research. My job consisted of reading many articles, journals, literature, presentations, and posters, and summarizing all the information. Afterwards, I designed backgrounds and added artwork, photographs, and music to enrich the dry words placed on each page of the DVD. The purpose of this interactive

DVD is to inform the uninformed healthcare practitioners who all have a possibility of, or are already dealing with moral distress. Using an interactive DVD as a form of dissemination will effectively allow a larger population to become educated regarding the matter because of its portability and user-friendliness.

Working in this environment brought to me experiences that I would never have expected. The typical lab coats, test tubes, chemicals, or worms, were definitely not what my area research was all about. Rather, sitting around a conference table with many other researchers talking about random life experiences and discussing the ethical issues that revolve around them took a large portion of my work time. Through these discussions, I have found myself becoming a stronger communicator; it has trained me to be able to put my thoughts into words much easier. As well, hearing many 'words of wisdom' from Erika, Wendy, and all the other researchers in the office has allowed me to develop my own insight on many ethical issues that I have previously pondered upon but have never been able to give my input on.

The great experiences I have had in this program have not only come from just the work environment, but also the WISEST program itself. Jen and Taban's work in organizing the orientation, social events and seminars for the WISEST students have definitely added a touch of color into my experience. The seminars exposed me to many areas of knowledge that I would not normally look into, yet I still found intriguing.

Participating in the WISEST program was a choice that I will never regret. The experiences and exposure to the world of knowledge I received was absolutely priceless. My summer was definitely well spent!



"The whole experience of being thrown into something new, exciting, and scary was something wonderful."

The six weeks I've spent in the WISEST program was an amazing experience I will never forget.

It all started the week when I was supposed to learn if I had made it into the WISEST program. I was nervous, very nervous. For a week straight every time the phone rang I jumped. This one phone call decided what I would do for the whole summer! Would I have to stay in my small community and work in an office again? Would I decide to work with the children's program? And what would I do if I did get into WISEST? How can I leave everything behind for six whole weeks? My mind was reeling with all these questions.

It just so happened that I received the call at school one day during my spare class. I instantly knew it was WISEST and I was so nervous when I actually had to go to the office to take the call! As you can tell I did get into the program, so my summer plans for this year were decided. Leaving home and coming to stay in residence at St. John's institute was an even more nerve wracking experience than waiting for the phone call!

It turns out that living in residence was actually a lot of fun. We had trips to West Edmonton Mall, down Whyte Avenue, spontaneous things to do like a sleep over and our trip to Shakespeare in the park, Capital Ex, Street Performers Festival, going to Crankpots, and so much more. I missed out on a lot of things on the days where there was nothing to do, but the stuff I did join in was a lot of fun. I've met a lot of amazing people staying at St. John's and if I hadn't stayed here I would have missed out on something amazing. If I could do it all over I would and I would enjoy every last second of it. Besides, this was half of my WISEST experience!

Luck still seemed to be coming my way. I was placed into my first

choice of departments, Lab Medicine and Pathology. I was to work in Dr. Jason Acker's lab at the Canadian Blood Services building for my six weeks in the program. It turns out I would be working with blood and blood components! I was excited; it was just the sort of thing I had hoped to work with. My project had to do with comparing two methods that looked at the shape and size of red blood cells, how their shape changed as they aged and their quality decreased, and to find out the variability within and between the two methods. I found that I had a hard time explaining my project to other students since there is a lot more to it than that. For the first week I didn't know exactly what my project was and after that the terms I used people didn't quite understand what I was talking about!

Overall being in this program was a lot of fun. Friday lunches together were fun, and our Monday seminars were very informative. It seemed a little odd after everyone in residence got close though. We would all meet on Mondays and it was like "There are other kids in the program?!" I'm only joking. But it was interesting to hear and learn about other people's projects and how they were finding it. Everyone had such interesting stories to tell about their labs and projects!

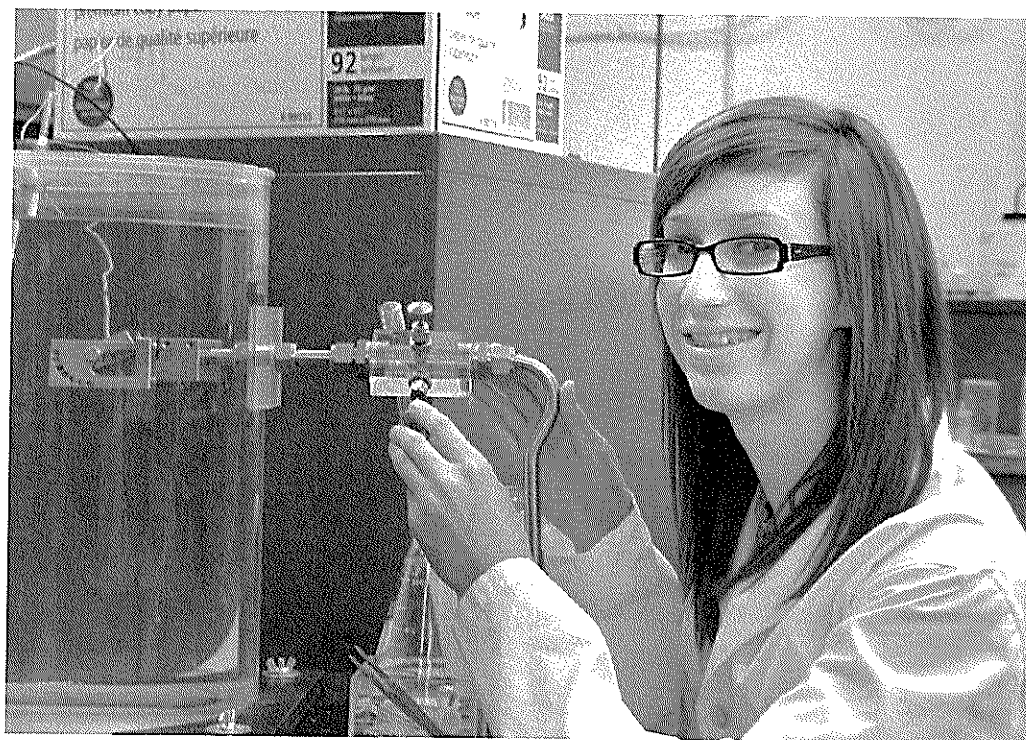
I remember my first week here still being friendless and feeling terribly homesick, I thought to myself as my stomach twisted and turned, "What did I get myself into? I can't wait to get home!" Now with the ending of the program I think to myself "Why does this all have to end!" Let me tell you this, this was one of the best decisions I have ever made in my life. The whole experience of being thrown into something new, exciting, and scary was something wonderful. I don't know who or what tipped the scales to my good fortune, but this is one summer and experience that I will treasure and carry with me for a lifetime.

kathleen szymanek

Supervisor: Dr. Jingli Luo / Chemical and Materials Engineering

Sponsor: Alberta Ingenuity Fund

"I also found out that there is a lot more to research than just running experiments; data analysis is a huge part of research."



When I was in grade ten, my biology teacher, Miss Ireland, told my biology 20 class about a program called the WISEST Summer Research Program. I remember thinking it sounded interesting. Later, in grade eleven, I saw an ad for WISEST at my school and remembered what my teacher had told me about it. After mentioning it at home, my dad looked up the website and pestered me almost everyday (that might be a slight exaggeration) about how I had better apply. In typical Kathleen fashion, I waited until much closer to the deadline before I actually filled out the application forms.

Some time later, I arrived home from school one day and was told by my mom that the WISEST office had called and I was supposed to phone back. I remember being quite nervous calling, but after Taban's cheery voice told me I had been accepted into the summer research program, I was just super excited!

The remainder of the school year went by in a flash, and before I knew it, I was moving into St. John's Institute. I was very nervous about living in residence over two hours away from home. However, it didn't take long before rez became a second home. All of the other students at rez have been a ton of fun to hang out with. Looking back, I'm so glad I had the opportunity to experience residence life.

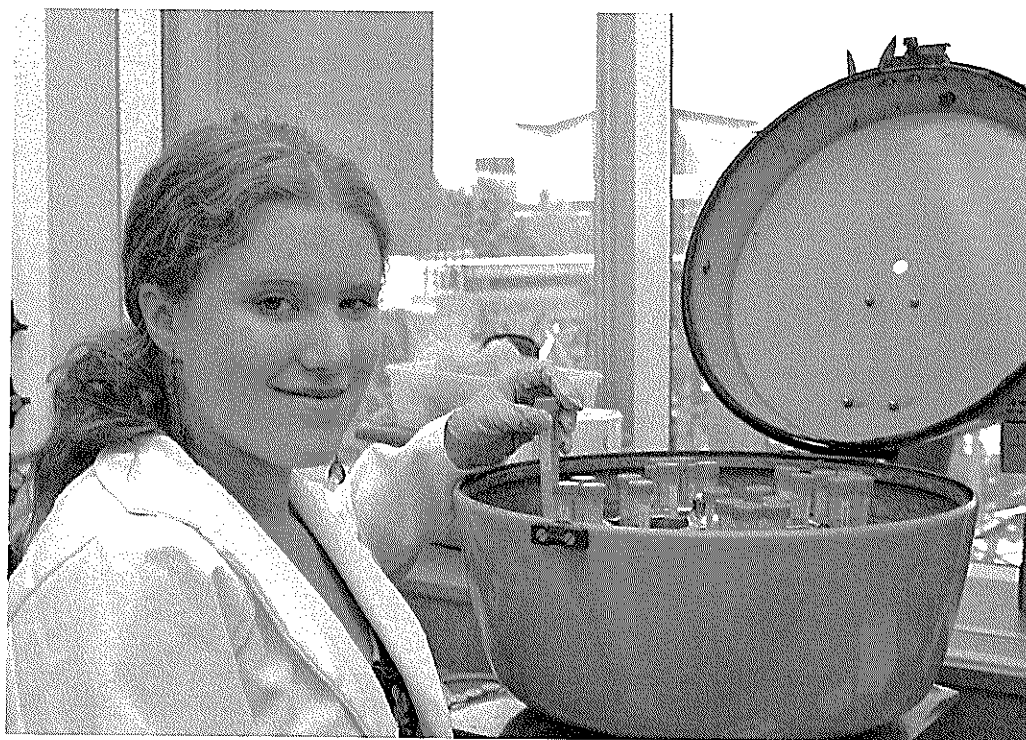
The department I worked in this summer was the Chemical and Materials Engineering Department. My principle investigator was Dr. Jingli Luo, and my direct supervisor was Licai "Leo" Mao. Under Leo's tutelage, I studied the erosion-corrosion and repassivation behavior of pipeline steel. I ran two separate experiments; one was with a Rotating Cylinder Electrode (RCE) machine, and the other was called a Scratch Test. Although sometimes quite

repetitive, I never felt bored working in the lab. It was quite satisfying every time one of my tests would finish and I would have one more piece of data for my poster. I also really enjoyed the atmosphere in my lab. My whole research team was so much fun to work with! We shared lots of laughs over the summer!

One really neat thing about working in a research lab was learning to use some of the equipment. I learned how to use a program on the computer to take pictures of my samples using the microscope. I also found out that there is a lot more to research than just running experiments; data analysis is a huge part of research. I spent hours on the computer creating graphs out of my data, and then interpreting what those graphs meant. I learned how to make graphs with a program called Origin, which was very interesting, although a little challenging at first. When I needed help learning how to use the software, my whole research team was more than willing to help me out.

My experience here at the WISEST Summer Research Program was absolutely awesome! Working in the lab, staying in rez, and going to all of the WISEST events was extremely fun. Getting together with all of the other WISEST students every Monday was always a blast. I especially enjoyed our off campus tour to Iso-technika. It was a great experience to see a research lab in industry. Overall, the WISEST experience has been truly unforgettable. I'm so glad I had the opportunity to participate! This summer has inspired me to pursue a career in engineering, and I can't wait to see what the future holds! One thing is for sure; this summer was one I will always remember!

kayla stan Supervisor: Dr. Alexander P. Wolfe / Earth and Atmospheric Sciences
Sponsors: Human Resources and Skills Development Canada - Canada Summer Jobs / Faculty of Science



"I wanted to come into work every day to see what I would be doing."

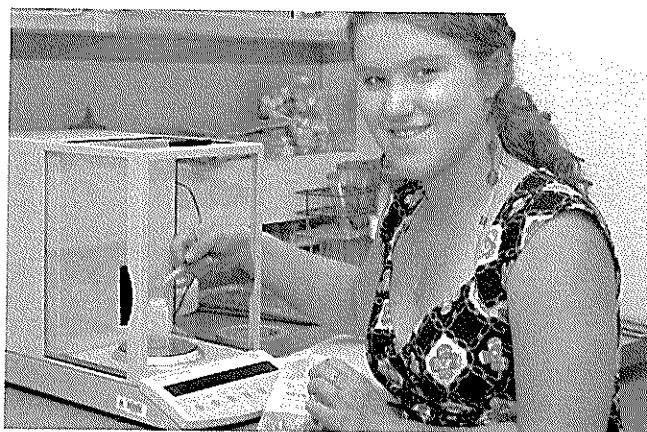
My summer with WISEST was nothing like I had expected when I was originally told that I was accepted into the program. Honestly, I didn't really know what to expect but what I found has exceeded anything I thought possible. Over the past six weeks I have met so many new and interesting people and I have learned so much.

Orientation originally seemed like it was going to be intimidating. I went to the university wondering what the program was going to be like, what my lab was going to be like, if the people were nice. Then I walked into the solarium and I found out that the program was going to be fun. The people were amazing, really interesting and incredibly nice, and my lab was even better than I had imagined. My supervisor first gave me a mini tour of campus, so that I would know how to get around from different areas of the university, and then I got to see the lab. The people in my lab automatically made me feel so welcome. Everyone was willing to talk about what they did in the lab, what research project they were working on, and even how they got to where they are right now. I left the lab that day feeling confident that this summer was going to be the best summer ever.

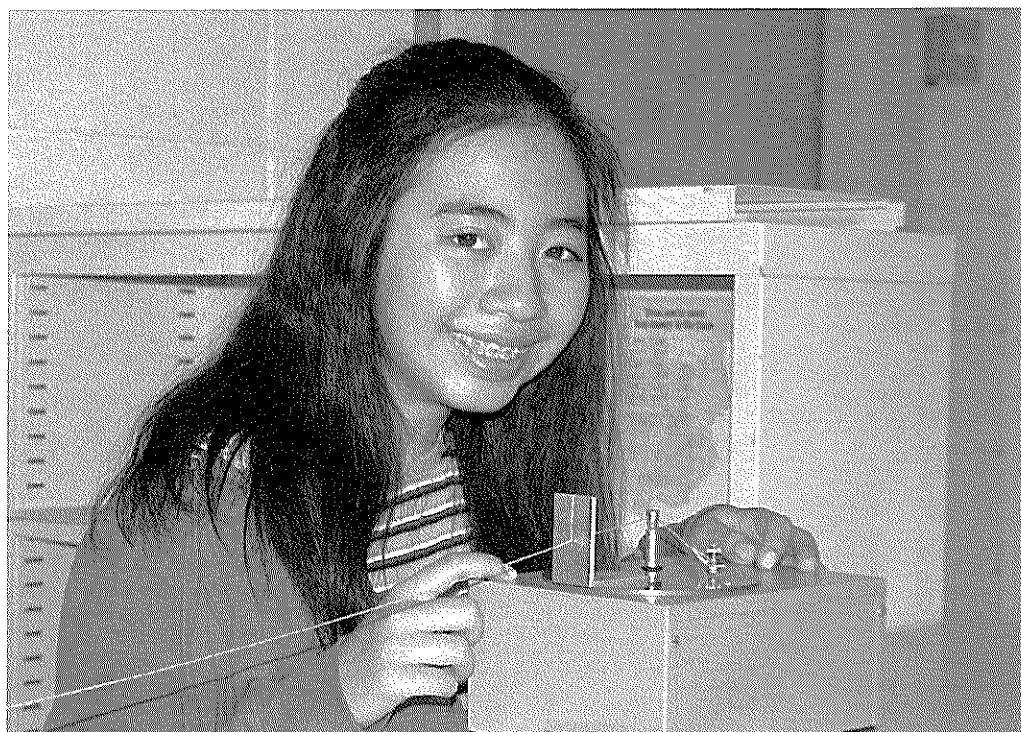
The first day turned into the second day, which turned into a week, and now I am sitting here writing this, wishing that the summer would go on forever. I was mentored by an amazing supervisor, Colin Cooke, and an incredible professor, Dr. Alexander Wolfe; both are interesting to talk to and have an immense amount of knowledge which they are more than willing to pass on. They really helped me understand what it is like to go through university and what working in a lab is like. Their projects are very interesting as well. I got to look at lake core samples from the Andes Mountains in Peru, which are some of the highest in the world, to see how global warming has affected them. I was taught to use a spectrometer to see how

chlorophyll-a had changed in the lakes over time which is an effect of global warming. There is so much information to be discovered from lake cores. I was able to process some samples brought back by graduate student, Nathan Ballard. And of course who could forget the summer students in the lab, Set and Saulo Castro, who helped show me the ropes, and who taught me an interesting lesson. Would you have imagined that a small, hot object would burn a hole right through industrial plastic? Well I found out the hard way that apparently it does, so a lesson I learned this summer is not to put hot objects on plastic, they really don't work well together.

WISEST was a program that gave me one of the best summers I have ever had. I got to work on a project that I thought was really cool. I wanted to come into work every day to see what I would be doing. I met people who I will most certainly never forget and who I hope to keep in touch with, and I had the time of my life. The memories of this program will stay with me forever.



"WISEST definitely challenged me and I struggled a lot along the way. But in the end, it was a very educational experience."



Wow! It's almost the end of the WISEST Summer Research Program. The six weeks went by too quickly. I still remember when Jennifer called me sometime in May to tell me that I got accepted into the WISEST Summer Research Program. I was so excited, but nervous at the same time because I was afraid that I wouldn't be able to keep up with all of these intelligent people. The WISEST Summer Research Program provided me with a great learning experience not only in the lab, but also outside of work talking with other WISEST students about their projects.

I was placed with Ian R. Mann and Robert Rankin's research team in the Department of Physics. My project included using NASA THEMIS satellites and auroral cameras to identify events to compare to computer simulations. I remember meeting my supervisors for the first time on Orientation Day, and they bombarded me with lots of information about what my project would be. I thought to myself, "How am I going to understand all of this in the next six weeks?" WISEST definitely challenged me and I struggled a lot along the way. But in the end, it was a very educational experience. I really need to give a big thank you to my supervisors Jonny and Clare for answering all my questions, no matter how dumb it was. I enjoyed experimenting with the SSCWeb 3D Orbit Viewer program. The program was a simulation of Earth, which gave me an idea as to when certain spacecraft left or entered the magnetosphere and the location of the spacecraft during a certain period of time.

Adrienne Parent, one of the graduate students, played a big role in my WISEST experience. She supervised me for a week while Jonny and Clare were in Montreal for a conference. I was helping her identify events when IAR signatures and Pc1 pulsations occurred. I was able to understand more about the IAR (Ionospheric Alfvén Resonator) after I experimented with the wave oscillator machine. The wave oscillator

machine was a great way for me to visualize how standing waves were formed in space. The last part of my project was to identify events when the solar wind data correlated with the Pc1 data. I found it interesting when I discovered that in some of the events, Pc1 pulsations occurred when there was a sudden increase in the solar wind pressure.

I had lots of fun being a part of the Science Olympics. My team had to develop a structure that would protect our egg when the structure was dropped from a certain altitude. I was surprised that our structure made it to the third floor because pieces of our egg structure started falling apart. We also made up a team name using the periodic table. Our team name was "American Titan". I know it's ironic, considering that we're Canadian! Another great experience I had was going to Isotechnika Inc. Isotechnika Inc. is an international biopharmaceutical company that develops and commercializes immunosuppressive drugs that would treat autoimmune diseases and to prevent organ rejection when patients need organ transplants.

As for my residence life at St. John's Institute, the experience was amazing. My new friends at residence made my WISEST experience even better. I learned a lot from both my supervisors and my new friends. No matter what situation we were in or where we were, we always made it fun and adventurous. I would definitely recommend the WISEST Summer Research Program to any grade eleventh who want to know more about the different types of sciences. Lastly, I would like to thank Jonny and Clare, Ian R. Mann and Robert Rankin for letting me be a part of the research team, iCORE for sponsoring my position, the people who donated to the Margaret-Ann Armour Endowment Fund for Rural Students, and my two science teachers Mr. Nysetvold and Mrs. Campbell for writing my reference letters.

laurelle unger

Supervisor: Dr. Stefan Pukatzki / Medical Microbiology Immunology
Sponsors: Human Resources and Skills Development Canada - Canada Summer Jobs / Faculty of Medicine & Dentistry



"The people in my lab were absolutely amazing and really quite fun to be around."

I first heard of WISEST when I was taken to an all day seminar in grade 6. I found it very fun but I soon forgot about it as schedules became more hectic and life grew busier. This year, when one of my science teachers approached me and suggested that I took part in the summer research program I was a little overwhelmed. I already had formed some plans for my summer and I wasn't sure that I wanted to spend everyday cooped up in a lab. But soon the enthusiasm of my teacher references and some past WISEST participants attending my school drew me in. I must say that I'm truly glad that they did.

In May, I received a phone call from Taban, one of the WISEST student coordinators, informing me that I had been accepted into the program and that I would be working in a lab in the Department of Medical Microbiology and Immunology. Soon I began trading e-mails with my Principal Investigator, Dr. Stefan Pukatzki and before I knew it, it was the beginning of July and the research program was about to start.

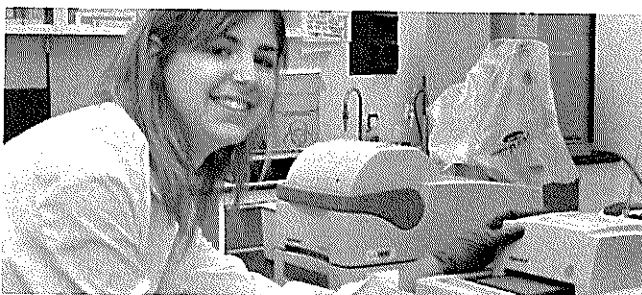
My first day at WISEST was great. We spent most of the day meeting our fellow interns, taking an awesome tour of the entire campus, as well as learning some basic lab safety procedures. Afterwards, I got to meet my supervisor Sarah Miyata, as well as Dr. Pukatzki. This was a bit intimidating as they discussed what I would be working on for the next six weeks and I didn't understand most of what was said. I soon realized that everything was going to be okay. The people in my lab were absolutely amazing and really quite fun to be around. Also, all of my worries about making mistakes were soon erased as I found out that making mistakes in the lab was not only okay, it was completely expected.

For the first two weeks, I mostly followed Sarah around, helping out whenever I could and performing my duties as her "minion" as I was sometimes called. Before I knew it though, I was soon trusted

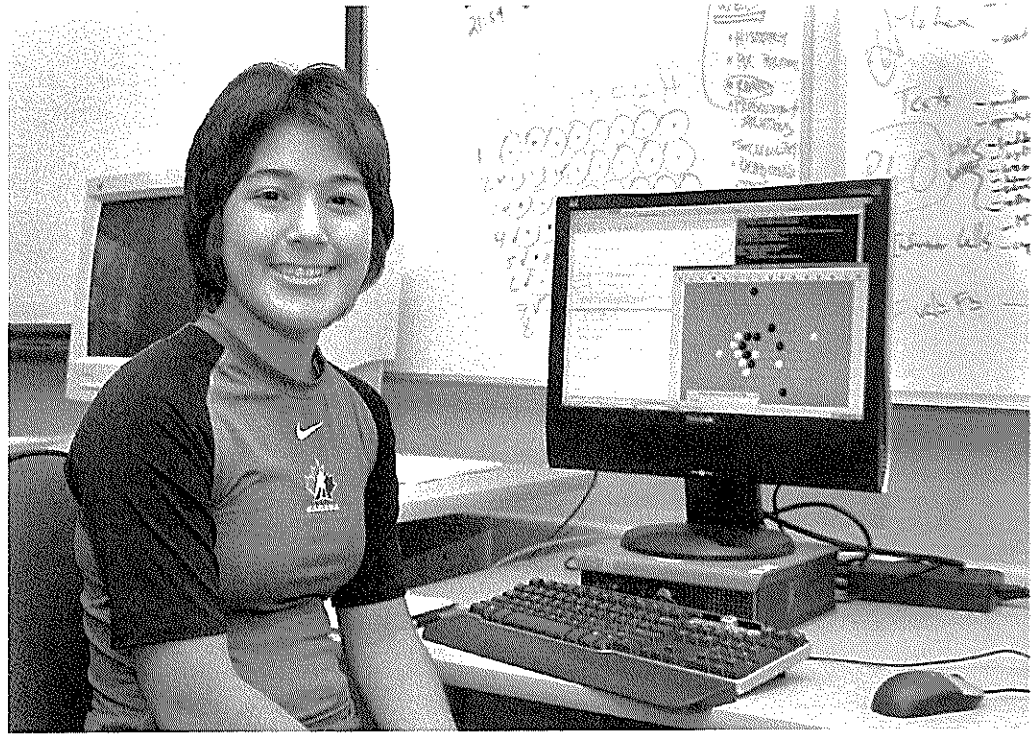
with my own project to work on for the remainder of my internship. These last few weeks have certainly had their ups and downs, and have really shown me how frustrating and how exciting a job in the field of research can be. Working in the lab gives a lot of problem solving experience and imparts a lot of fun, while working with truly helpful and caring fellow researchers.

Another highlight of this experience was the Monday afternoon WISEST seminars. They were a great way to start off the week. My favorite was definitely the on campus tours, as we were given a great deal of choice about where we would like to go. We were divided into very small groups so that we each got a lot of individual attention from the Principle investigator we were visiting. I ended up in a surgical lab researching a way to grow new cartilage using adult stem cells as well as cartilage removed from hip and knee replacement surgery. It was simply fascinating. I really enjoyed how each of the lab members tried their best to apply their research to our individual interests and it was definitely a great experience.

Overall, WISEST was an amazing experience that I am very glad I had the chance to participate in and I would highly recommend it to any young woman interested in a career in the sciences.



"I've learnt just how much research can be done in computer science."



When I first received my call several months ago, to say I was happy would have been a terrible understatement: I was ecstatic. Although I did not know at the time what sort of research you could do in the Faculty of Computer Science — let alone what sort of research I would be doing — I knew that there was no way I could pass up the opportunity to find out. A few months and more than a few (approximately 2712) kilometres later, I got my chance to experience the field firsthand.

The WISEST Summer Research Program did not disappoint. I was placed in the Algorithmics Lab under the supervision of Phil Henderson. It turned out my research experience was nothing like what I imagined. For one thing, the first week seemed to be a lot closer to summer school than anything else: I had to learn how to use a new operating system (INSERT), a new text editor called Emacs, some of the theory behind a mathematical board game called Hex, and a whole lot of math. From a few barely-recognizable grade 12 concepts to simplified third-year university graph theory, I managed to effectively fill up an entire notebook with frantic scribbles. And to think that was only the beginning.

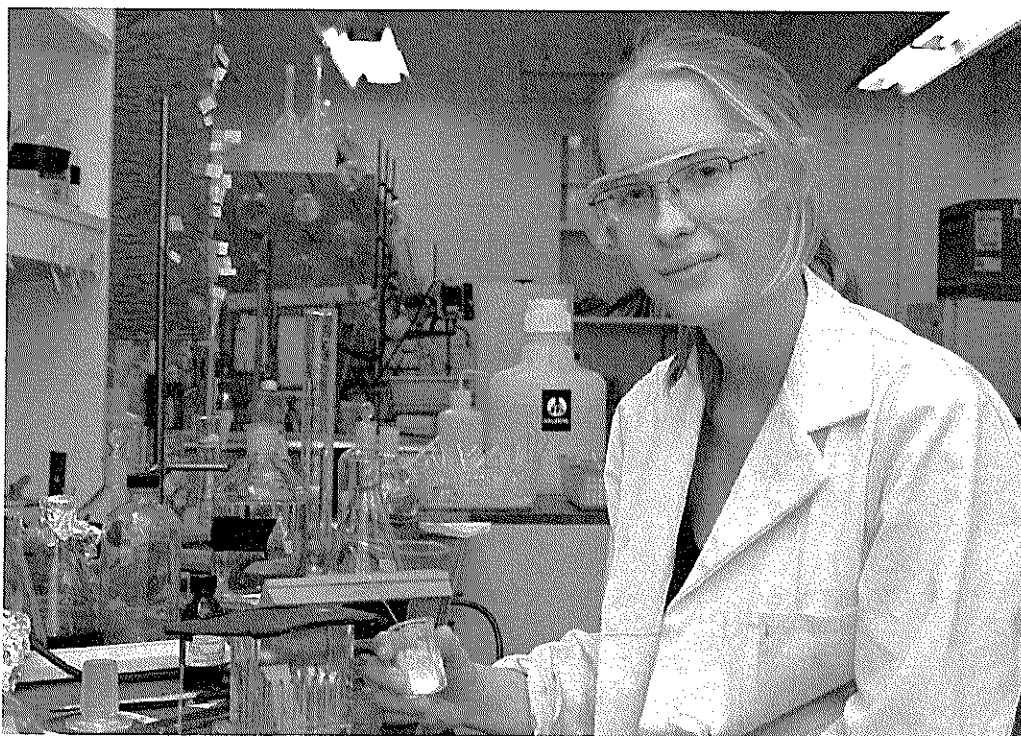
I was given my assignment half-way through the second week after the bulk of the background information I needed to learn had been taught and I had gotten over the fact that Ctrl-Z in emacs meant minimize, not undo. I would be working on designing a program that would seek and record certain formations of pieces in the board game Hex with certain properties.

In Hex, two players take turns placing pieces on a symmetrical n by n board of hexagons. Each player tries to connect their two parallel sides of the board with a line of their pieces. Certain spaces are pointless to play for a variety of reasons, but mainly because they

are useless or easily-counteracted. My job was to design a program that would find formations which created useless cells, thereby ensuring that the AI being worked on to solve and play the game would not check those moves.

This seems like a relatively straightforward task. This is far from the case. As powerful as computers are, they are still limited, and the program I designed had to be efficient enough that it could check every single possible formation of pieces of a certain size for that property without running for weeks on end. Suffice to say that even when I thought I was approaching the end of my project, there was still optimization to do and debugging (debugging is the process of finding errors in code and fixing them) aplenty. Even when I'm done my project, there will still be code to clean-up and ways to make it more efficient. The only reason my work here will be done is the fact I have to return to Toronto sooner or later.

I've learnt a lot over the past five – almost six! – weeks here. I've learnt what it's like to work on a large programming project. I've learnt a lot about graph theory and advanced math I'm not going to see for another few years. I've toured some incredible companies and met some amazing people. I've learnt just how much research can be done in computer science. When I first arrived in my lab, I had no intention of pursuing mathematics or computer science far beyond high school; this was an opportunity to get some valuable job experience and learn a bit about university life. As the Celebration of Research approaches, I cannot help but wonder if I will be applying for a program in Computer Science when I apply to universities this year. The WISEST Summer Research Program has opened my eyes to a whole new world of possibilities I never even dreamt of.



"Everything in the lab was interesting to me, especially getting a chance to observe the chemistry nerd in its natural habitat."

"High school science is like looking at many recipes but never getting a chance to cook." That's the metaphor Margaret-Ann Armour used when she welcomed all of the WISEST students to the program on orientation day. I remember sitting among the other 60 participants as she spoke those words, seeing all of their unfamiliar faces and wondering what this summer would hold. Everything seemed so fragile in that moment.

I wasn't quite sure what to expect of my lab at first. As excited as I was, I was a little nervous too. I knew it would look nice on a resume and that hands-on experience or "cooking" would be good but I had sneaking doubts—what if my supervisor was like Ramsay? What if the work was too difficult, like making soufflé even though I have trouble measuring out flour? What if I ended up doing mindless, repetitive tasks the equivalent of chopping vegetables? What if I just ended up being a dishwasher?

All of my fears dissipated as soon as I saw the lab. It was not fanatically clean but well used and abused. Everything smelled funny, from the acetone used for washing glassware to triethylamine to pyridine (a particularly eloquent wikipedia entry describes it as having a "distinctively putrid, fish-like odour") to whatever was rotting in the communal fridge. The benches were covered in seemingly random assortments of flasks and chemicals. Everything was decidedly casual, especially the first conversation I had with the head of my lab.

"We're cooking," Rik said. "Think of molecules as lego blocks. We're going to throw them all together and make something new." He laughed. "Hopefully, it tastes good."

Even though he was a professor, Rik didn't have a briefcase or spectacles but liked...mountain biking? And I was surprised to find that Shar, my supervisor, was equally nice and funny. She didn't make me read any textbooks first but let me start mixing compounds and doing hands-on tasks

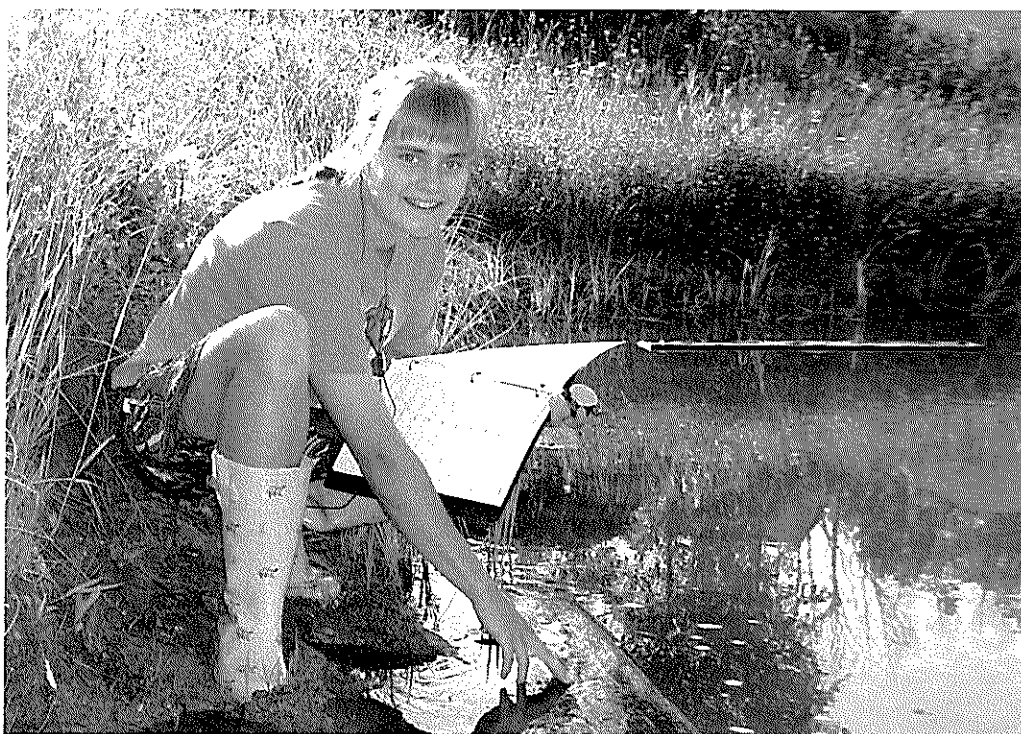
right away. Within moments, every expectation of this experience being stodgy and dry was thoroughly shattered.

Everything in the lab was interesting to me, especially getting a chance to observe the chemistry nerd in its natural habitat. The rare and unique species, which is often very pale with an abnormally large attention span, has a total lack of embarrassment about spending its summer vacation slaving over separatory funnels and deciphering NMR spectra. It is also known as a "lab rat".

It was also amazing to me that with five reactions, Shar and I were able to tease out a new organic compound that changed from its clear starting material to vibrant and beautiful yellows, oranges and reds. I learned to appreciate reaction yields as small as 11% because of the work, time and patience needed to separate our desired product from unwanted side-reactions, remaining reactants and other impurities (with flash column chromatography, silica plugs, rotovapping, gravity filtration, etc.). I also discovered the rigorous amount of testing with complicated spectroscopy methods (such as NMR, UV-Vis, mass, etc.) required in order to adequately prove a molecule's existence. I also was introduced to all kinds of fancy words to describe my molecule and procedures, "Sonogashia cross-coupling", "2D-conjugated chromophore", "aryl halides", "blue-shifted" and many others.

Back at residence, when I wasn't feeding my out-of-control coffee addiction or trying to identify the mystery meat provided at meals, I also had a lot of fun. Whether we were watching The Breakfast Club, singing Jon Lajoie songs or making another Marble Slab run, we managed to make every day as interesting and Will Ferrell-infused as possible. It's hard to believe that we only have a few more days in residence together, and that we'll all have to go our own separate ways. WISEST been such an incredible and unforgettable experience. I just wish I could do this again next year.

"My favourite part about being at the station [Meanook Biological Research Station] was the different projects going on."



I first heard about the WISEST program from my biology teacher who thought I would really enjoy it. I thought it would be a lot of fun, a good experience and it could assist me in deciding what area I would like to pursue in University. I went through everything like everyone else did, filling in the application form, writing the essay, getting teacher references, handing everything in by the deadline and waiting anxiously for the phone call. I had no idea that something that sounded so much like school work could turn out to be so cool.

My experience with the WISEST program was very different than a lot of other students, because I was stationed at the Meanook Biological Research Station. It was really cool though to be staying right where you work, and to be able to roll out of bed and down the hall to shower, then into the main building for breakfast. Being at a research station you really start to see that everyone has their own schedule and there are people everywhere doing everything. This was a definite plus for me as I got to join in and talk with a lot of different people doing a lot of different projects.

This summer I have been assisting Jennifer Jung with her research project on fathead minnows. We are looking at the effect of alarm substance on population and reproduction. At first I was curious about what my job would entail as I didn't get very many details until my first day of work. But I knew WISEST wouldn't let me down and they didn't. Life at Meanook is very relaxed and everyone works at different hours. Us "Fish People" would generally start at 8:30am, and end around 4:30pm depending on how much stuff we had to do that day. My favourite part about being at the station was the different projects going on. I got to get hands on experience with the RANA project – frogs, Caterpillar Jen was welcoming when I had questions about her project on caterpillars and moths, I got to see what water

chemistry was all about, got to go to a weather station and collect weather data and the odd jobs like washing boats, changing oil, canoeing, fishing and stuff were always fun to take part in.

Every morning I had to feed the fish in the tanks, and then I headed down to the ponds and started to count the eggs on the nesting boards. At the beginning of my six weeks we had a lot of nests to count and it seemed to take forever. But after only about a week the nests declined drastically. Every other day we treated the ponds with the alarming substance, and the days we weren't treating we were making treatment. I also got to work on a lot of computer work (data entry and egg clicking on a program called ArcMap).

I didn't mind being out of town as I would have been staying in rez anyways. The only thing I really missed was the fun activities that WISEST puts on where I could meet other students. This was too bad, but it sure wasn't all work up at Meanook. Yes we missed some of the Monday seminars, and the pot luck, and pitch n' put, and the movie night... but every night at Meanook there was something cool going on whether it be a campfire, movie night, just a conversation with the other people or another prank.

There were so many different parts of the WISEST summer research program, and they all combined to make an amazing summer. Overall it was an unforgettable summer and I would like to say thank you to all of those who are involved in organizing this program and to Jen, and all of those at MEANOOK.



"From my first time on campus to the final days of my project I've constantly been introduced to new ideas and concepts."

What an eye opening summer this has been. From my first time on campus to the final days of my project I've constantly been introduced to new ideas and concepts. I spent my summer with WISEST working in agriculture with my fantastic supervisor Alison Nelson. Alison was incredibly helpful and attentive and she made sure that I had the best experience possible while working this summer. She has helped me learn so many new things in these last six weeks and I'm incredibly grateful. The best part about my particular position was the variety of things I had to do from day to day. I had opportunities to see many different aspects of agriculture including work on south campus and the lab. Alison set me up with my own project concerning the growth and development of wheat varieties at different nutrient levels. I planted one hundred and twenty eight pots containing sixteen different treatments of wheat and put them in a growth room. Each week on Wednesdays I harvested thirty two plants and gathered data on each ones growth. While Wednesdays quickly fell in to a routine I never knew what to expect the rest of the week. I spent a lot of time working with everyone at the crops research center (F-62) on South Campus and had a lot of fun there. I got a lot of great hands on experience working in the field with everyone. From measuring wheat heights to driving the huge farm tractor I learned exactly what agriculture is all about. Everyone at F-62 was very helpful and friendly and I still laugh sometimes thinking about all the conversations we had around the huge lunch table and in the field. On my first day out on South Campus my principal investigator, Dr. Dean Spaner, was kind enough to give me a very informative tour of the fields and explain some of the work they were doing out there. I remember him showing me the little nodules for nitrogen fixation on the roots of sweet peas and thinking it was so interesting to be able to see what I learned in biology that

year in action. While the majority of my time was spent on South campus or with Alison in the greenhouse of the Agriculture Forestry building I actually had the opportunity to work in the lab with Kelly Dunfield for a few days. She showed me around and explained PCR to me, I even got to make my own gel and look at the DNA of wheat plants (which made me feel very scientific). Whether I was in the lab or in the field I was always being presented with new opportunities and gaining invaluable experience. I think the most important thing about my summer though was the fact that it was honestly a lot of fun. There was a lot of work involved but it seems we always had ways to make it interesting. I will never forget the conversations I had with Alison while we worked all those long arduous days dyeing wheat roots and scanning them onto the computer. Bruce made work in the greenhouse fun by showing Alison and I all the cool things like the beautiful passion flowers and very sweet leaves growing there. The Wisest Student Coordinators Jennifer and Taban did a really wonderful job of making sure we all got as much as possible out of the program and the Monday seminars were so interesting and informative. The opportunity to work with all of the amazing people I met made it possible for me to receive some invaluable advice concerning university and sciences. I feel I have a much better understanding of what I want to do in the future because of my experiences with WISEST this summer and the impact it has had on me will stay with me always.

"It [WISEST] provides a realistic real life experience and a look into how to become better and more knowledgeable human beings."



During this short span of six weeks, I worked in the west wing of the Chemistry department under Sulayman Oladepo and Dr. Glen Loppnow. My research consisted of looking at the protective effects of DL-tyrosine on DNA Photodamage. At first, I began measuring the absorption spectra of tyrosine to determine the theoretical concentration for optimal DNA protection. Then, I experimented with UV induced DNA photodamage and how tyrosine could possibly protect against photodamage. More specifically, tyrosine, an aromatic amino acid, was chosen in the experiment as it absorbs in approximately the same region of UV radiation as DNA.

For me, my lab was much more than just a place where I worked. Everyday, beginning at 8:30 a.m., I could learn something new. Each day was an entirely different experience, something that was not just planned out the day before. Lab work was unexpected, rather than monotonous, where I felt that I was not learning the same things over and over again; but rather applying knowledge in a wide variety of experiments and processes. In the lab environment, my supervisor, Sulayman Oladepo, and my principal investigator, Dr. Glen Loppnow, were phenomenal guides, as they not only helped me with my experiment but with becoming a better researcher. I appreciated weekly lab group meetings, which occurred every Tuesday. Precisely at 3:00 p.m. the entire Loppnow group would go into a freezing room on the 3rd floor of the east chemistry wing and one person out of the group, armed with donuts, would present their research. Each, with a donut in hand of course, would pose questions to the speaker. Sometimes the question was met with an easy and quickfire answer by the speaker and other times the speaker just staggered and said, "well I don't know". Immediately after this confession, a discussion would then ensue until a sufficient conclusion was reached. The speaker then would continue on their topic and

usually the entire question asking process would begin anew. While many people would consider this practice time consuming or inefficient, it is rather just the opposite. By introducing a topic to everyone and having questions posed, the research process is tested and in a sense perfected because the topic is looked at from all angles. The group meeting, as well, takes the very independent researchers in the lab and makes them unite for a common purpose.

During this entire process, I have learned that in research there are many unexpected turns of events. These roadblocks though, are necessary, as gaining new knowledge and asking questions is much more important than obtaining results. Questions in particular are key in research as it is only through questions people and researchers better understand complicated concepts.

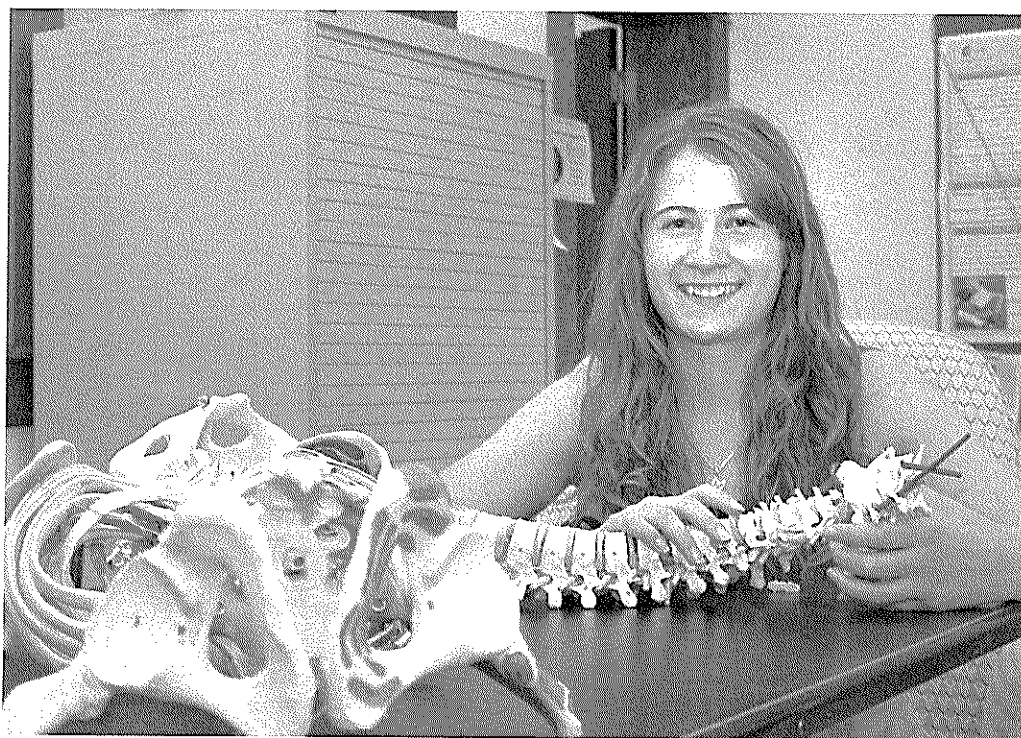
WISEST is an absolutely amazing program that I believe accomplishes much more than just emphasizing the need for more females and males in underrepresented jobs or fields. It provides a realistic real life experience and a look into how to become better and more knowledgeable human beings. As well, WISEST allows young females or males to begin making connections in different university departments that will be very valuable to them through university or even through their entire job experience.

Finally, I would like to acknowledge and thank the Loppnow group, Dr. Glen Loppnow, Sulayman Oladepo, NSERC, ACB, my twin sister Sara, my family, WISEST, Centre for Mathematics, Science and Technology Education (CMASTE) and Service Canada (Canada Summer Jobs) for allowing me to have such an amazing summer.

marie helene mcgrath

Supervisor: Dr. Samer M. Adeeb / Civil and Environmental Engineering

Sponsor: Dow Chemical



"One aspect of the program that I benefited from the most was my interactions with older students."

Waiting in May to see if I got a phone call from WISEST was nerve wracking.

I ran for the phone every time it rang. When I got that call I was so excited, I didn't hear a thing the WISEST coordinator said. That was the start to my very interesting summer.

I was placed in Dr. Samer Adeeb's civil biomedical engineering lab at the University of Alberta in the Department of Civil and Environmental Engineering. I spent most of the first three weeks working with two undergrads, Mathiew Reynolds and Craig Mathison. They are the ones who introduced me to everything in the lab and explained anything I didn't understand. During that time I had the chance to dissect cow knee. I then tension tested ligaments to see how much strain (deformation due to force) the ligament could handle. In specific I was looking at the interface between the bone and the ligament. My second mini project was entirely on the computer. I had to manually color in a CT scan of a hand using the computer program mimics. Eventually, I was able to print a 3D model of the hand although the scale was initially off a bit.

Now, my professor had some vacations planned in the middle of the summer. For that reason, I went to the Glenrose Rehabilitation Research Centre for my fourth week. At the center I got to hang out with another WISEST student, Jillaine Proudfoot. Getting to hang out with Jillaine was definitely the highlight of my summer. We had a lot of fun playing rehabilitation games. We also wandered around the hospital trying to find various physiotherapists and occupational therapists. We might have even gotten lost once or twice.

While the games were fun and educational, I was being paid to do work, so I had to get some work done. At the Glenrose Research

Center they work on developing imaging systems for scoliosis patients. (Scoliosis is a three dimensional curvature of the spine.) My job was to make a manual for the older system to enable people to use this program without having any prior knowledge to how the program works. I also did lots of random odds and ends to help other people out.

One aspect of the program that I benefitted from the most was my interactions with older students. They told me about their experiences in University. My direct supervisor at the Glenrose (Swathi Damaraju) was a 4th year math student. She is applying to Medical school and various graduate schools. I enjoyed seeing that it's possible to complete an undergraduate degree while leaving the opportunity to go to medical school and other professional schools open. I also learned the difference between engineering and science which is important because I will understand what kind of program I am signing my self up for when I apply for university. Talking to those people has definitely given me a more specific idea about what I want to do in university.

I learned a whole lot this summer. I learned about the diversity that exists in biomedical engineering. There are all sorts of research projects going on in universities and in industry. I learned more about different areas of science and engineering. In addition, I sort of figured out what I want to do after high school.

"...I got an idea of what a mining environment was like and a chance to see all the physics concepts that I learned in action."



When I first started the WISEST Summer Research Program, I did not know what to expect from it. I knew that the program was meant to help me choose a career path by allowing me to explore a career in mining engineering and other fields of engineering and science, but I had no idea of the valuable experience that it would bring me.

On Orientation Day, I did not feel scared, but I did feel somewhat worried during the presentations when I heard that we would have to do some studying of the material in the first week. This caused me to think that I would be spending six weeks of my summer in a school environment, which was what I wanted to get away from. However, when I met Dr. Joseph, his technician, Robert Anusic, and a graduate student that would be working with us, Robert Ritter, I started to feel more comfortable with what I would be undertaking, because Dr. Joseph joked around with us. I was also nervous, at first, to meet with the other WISEST students who would be working with me, but as time went by, I gradually grew more comfortable with them.

Eventually, our research projects were outlined for us. I still remember the first time that I heard about how we were going to examine tire life, find a scale factor to compare deformation on different sized tires, find a scale factor to compare wear on different sized shovel teeth, and test rolling resistance of tires on different surfaces. At first, I was worried about the new physics concepts that I would have to learn, but with Robert Ritter's help, I managed to learn and understand them.

As the weeks went by, the experience got better and better. I not only worked on the different projects that were assigned to us, but I also received lessons in basic welding and installation of copper tubing. After I learned how to install basic copper tubing, I felt that it would be a valuable skill to have even if I would not need it for my career choice. The welding was truly enjoyable for me. I not only

tried out a trade's job, but I enjoyed doing it and was sad to leave the work station. This caused me to consider welding as a possible career path.

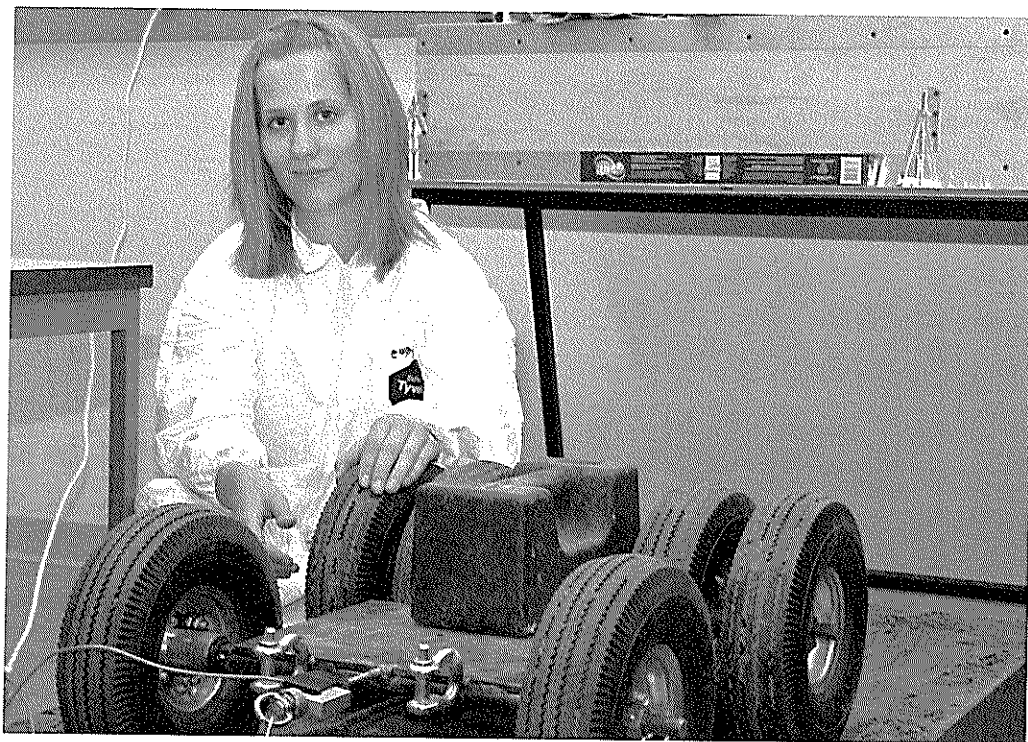
Eventually, the trip that I had been waiting for came. On July 22, I went with my research team to the Highvale Mine near Duffield, Alberta. Not only did I see a place that most high school students do not get to go to, but I got an idea of what a mining environment was like and a chance to see all the physics concepts that I learned in action. Seeing the draglines and trucks at work as well as examining the coal seams in the ground were truly amazing. I will never forget this great experience.

The research projects, of course, gave me a chance to experience what a mining engineer does. I eventually learned that engineering was taking science and applying it to various problems. Doing these projects was a whole new experience for me; I learned that an actual job in research is not like school. In a research job, you actually work toward a goal and discovering something new; you do not work just to get a high mark. I suppose that research can be stressful when you have competition in the marketplace and when you have a deadline, but the work is still for a purpose.

Monday afternoon seminars helped me to get a taste of university life and of different careers. Through a presentation about IT, a trip to Iso-technika (a biopharmaceutical company), a tour of the chemical engineering lab, and seminars about university life and choices, I gained exposure to different careers and an idea of what to expect in the future.

Through the WISEST program, I have had a valuable experience. Now, I would like to say, "Thank you" to the program and to the people who helped me get this summer position.

meagan gebers Supervisor: Dr. Tim Joseph / Civil and Environmental Engineering
Sponsor: Alberta Advanced Education and Technology



"Being introduced to first year engineering math and physics and analyzing data we collected made me feel like a real university student."

After experiencing the WISEST Summer Research, it will be disappointing going back and enduring another year of high school instead of an amazing experience at the University of Alberta. Of course this experience was so incredible; it might take my whole grade twelve year to get the word out!

This summer I was placed in the faculty of civil and environmental engineering, more specifically mining engineering. I love math and physics, so engineering seemed right for me. As a child my first love was my sandbox so mining engineering is perfect for me, since a mine is basically a gigantic diverse sandbox. Our extraordinary research team was made up of me, three other WISEST girls, a German exchange grad student Robert one, a technician Robert two, and Professor Dr. Tim Joseph. Our research projects consisted of a data analysis project, scaling down a 151 inch tire to behave like a 10 inch tire, pulling a truck through different materials to test rolling resistance, and conducting a shovel tooth wear test in a sandblaster.

Our first few days were spent in the board room where we watched some of Dr. Tim Joseph's PowerPoints and where he jotted out our projects on the white board taking up three full size boards. Other days were spent waiting on materials, in our office, where we analyzed data and did our own personal research. The most enjoyable days were spent in the lab with our supervisors doing the experiments. The best part about mining engineering was getting dirty. My co workers and I spent some of our days sifting sand, shoveling limestone and dirt, sandblasting, and welding. One very exciting day we visited the Highvale Coal Mine.

The highlights of my six week adventure were numerous. Being introduced to first year engineering math and physics and analyzing data we collected made me feel like a real university student. I en-

joyed working as a team with my co workers; I have never worked with a team so intelligent. Discussing almost anything with Dr. Tim Joseph made the days fly by. Tim, as we called him, knew so much about university, engineering, mining and life. I have learned so much from him in the past six weeks. I learned how to survive university and what life is like after university one Monday afternoon by talking with graduate students and female graduated engineers working in industry. Playing soccer on the staff team at lunch time was also very fun aspect of the job I did not expect. Best of all, I have contributed to a real university research project at only seventeen years old and gotten paid for it!

This experience has made the prospect of university and moving to Edmonton from my northern village much less daunting. I know what it means to be an engineer now. Being exposed to some of the work an engineering student would face was very exciting for me. I feel like I can break free from my small town life and know what to expect from university. I have gotten lost on campus enough already that first year I shouldn't have much of a problem getting around!

Most definitely, one of the best parts of this experience has been the amazing people I have met. It is comforting as well as thrilling to meet people who have the same priorities as me, love science and math, and whom I share many other common interests. Also, I have met some great role models. I know these people will make my university experience that much sweeter and easier. I have had so much fun with my new WISEST friends during work and after and hope to stay in touch with them for years to come!

"I never thought that art and science could be used together for research."



"Get a job this summer" is what I was told. I was reluctant to, but then my teacher told me that if I apply for the WISEST program I stood a good chance of getting in. The next thing I know, WISEST calls me to tell me I've been accepted. I was excited and nervous at the same time. I mean, a grade 11 student going to university? Then I found out what I was to be doing: developing applications for virtual reality for Dr. Walter Bischof.

I was curious to be in working in the Computing Science Centre. My previous experience with virtual reality was with video games, but I learned it can be used for a lot of different things. My principal investigator Dr. Bischof told me I was to build a virtual world that can be used for cognitive psychology and spatial navigation. The first few days were all tutorials so that I would be able to actually use the programs; my supervisor, Michelle Annett, was always there to help me. Then she stuck me with the question "What do I want to do?" I could build any kind of world. After looking at demos of cities and buildings, I settled on something completely different: an underwater scene. No one had done that before. I also noticed that in the demos, there were no people, no cars and no movement. My world will be different.

I certainly was different; my project was unique. I never thought that art and science could be used together for research. To make objects, I would start out with simple polygons such as cylinders or rectangles, and then I would manipulate the vertices until I had my desired shape. Painting the objects was a welcome challenge. Trying to get the objects to animate was a difficult challenge, but I worked hard and designed beautiful things. Michelle, Dr. Bischof and everyone else in my lab were very impressed with me. My interest and talent in design was my best asset and it made working fun.

Outside of work, there were many activities. The Monday Seminars were interesting. I particularly enjoyed the on-campus tour where I got to see the chemistry glassblowing lab. I also got to tour a pharmaceutical company called Isotechnika. There were also discussions about university and what people did after they graduated. Other than the mandatory seminars, there were social events like Fab Freebie Fridays!

Outside of WISEST, there were plenty of events in residence. There were twenty of us and we dominated the top floor of St. John's Institute. There were birthday parties, movies, late night monopoly, thunderstorms, movies at West Edmonton Mall, Dim Sum, Capital Ex and much more! Of course there were arguments as well, but if you have to live with someone, you'd better learn to get along. People had mixed feelings about St. John's itself, but I thought it was great. The rooms were small and had little storage, but I didn't have that much stuff anyways (Our poor resident advisor...tee hee). The food was better than I had imagined. It wasn't the same as home, but it's not bad either. The biggest problem I had was the lack of air conditioning. I have a thermometer on my clock that read 30°C a couple of times. I was quite happy with the thunderstorms' ability to cool things off. (Hint to all future WISEST students in residence: bring a fan!)

Overall, I rather enjoyed the WISEST program. Taban and Jennifer are great coordinators and they made the program fun. Of course, liking your research always helps too. I highly recommend residence because you get to meet so many awesome people and participate in all kinds of events. I learned so much from my experience here. Thank you WISEST!



"Asides from the researchers' patience and attention to detail, another thing that struck me in the lab was the diverse array of cultures present."

There are many things intimidating in an experimental physics lab. But, thanks to my supervisor, Dr. Jan Jung, and his graduate students, Ahmad, Mehmet and Rongchao, the initial intimidation faded with understanding and I was able to grasp the basic concepts of their research in solid state physics.

During my six weeks in the lab, I was engaged in a variety of investigations ranging from superconductors to manganites, the latter on which I spent the most time. Manganites are minerals that demonstrate magnetoresistance (MR), the ability to change the value of its electrical resistance in the presence of an external magnetic field. They are also unique among minerals that are magnetoresistive in that they have resistive properties of both conductors and insulators.

The purpose of the investigation involving manganites was to determine whether inserting a layer of lanthanum-aluminum-oxide (LAO), an insulator, between layers of the manganite lanthanum-calcium-magnesium-oxide (LBCO), would affect LBCO's anisotropic magnetoresistance (AMR). AMR is the measurement of MR at different angles.

The set-up for the experiment required layers of LBCO and LAO to be deposited onto a substrate by a process called magnetron sputtering. Four contacts were subsequently attached to the sputtered sample, which was then inserted into the resistivity machine. The sample was rotated in the resistivity machine to measure the AMR.

One of the things I've learnt about research, especially in experimental physics, is the existence of The Wait. The Wait is a magnificent creature of any color of your imagination, and a staple in our solid state physics lab. The Wait visits during the two-hour oxygenation, the two-hour cooling down, sporadically in the week-long measurements etc, and constitutes almost half of the actual research process.

The Wait has a love-hate relationship with researchers; welcomed with open arms in the wake of an all-nighter, and fumed at when all researchers want is to get the job done. Having unsuccessfully attempted to strangle The Wait myself out of exasperation, I admire the researchers' acceptance and tolerance of the pesky creature.

Asides from the researchers' patience and attention to detail, another thing that struck me in the lab was the diverse array of cultures present. There was representation from all over the world; from Egypt to China, from Turkey to Lebanon. The lab epitomized the universality of science; it transcends nationalities, cultures and tongues.

However, the diversity among cultures is not present between genders. Going into Physics, I had known that the department boasted one of the lowest female percentages in the university, but I had no idea just how much of an endangered species women were in physics until I was actually there. At first I wondered why they even bothered building a women's washroom in the CCIS (Centennial Centre for Interdisciplinary Sciences), where my lab is situated, when it seemed like I was the only person using it. After two weeks I finally met another girl in physics — who told me she was the only girl in her entire Master's class! Suddenly the 1:4 female-male ratio in Engineering doesn't look too bad.

All in all, WISEST has been a wonderful experience that has opened my eyes to the gender disproportionality in science. I am thankful to have had the opportunity to be immersed in a higher level learning and research environment, in a position that even undergraduate students covet for — while still being in high school. I'll always remember WISEST as a place of inspiration, innovation, and thanks to Mehmet's recent trip to Turkey, a seemingly limitless cornucopia of Turkish Delight.

"Because of WISEST, I am more confident about making decisions into what area of study I will pursue in university."



I am very grateful to have been given the opportunity to attend the WISEST summer research program this year. WISEST has helped me explore science in a practical and hands-on way and has broadened my perspectives about university life through its many helpful and relevant afternoon sessions. Because of WISEST, I am more confident about making decisions into what area of study I will pursue in university.

In my six week experience, I worked in Dr. Scott Chang's research team, specifically under Sarah Pattison (MSc. Candidate) in the Department of Renewable Resources. I assisted Sarah on her project which looked at the effects of different fertilizer management strategies in hybrid poplar plantations on soil biogeochemical cycles and soil greenhouse gas emissions, specifically nitrous oxide, carbon dioxide and methane. Her project is partially funded by a company called Alberta-Pacific Forest Industries (Al-Pac) who is installing 25 000 ha of hybrid poplars onto privately owned farmland. I had an amazing opportunity to go out in field in mid-July with Sarah to an Al-Pac hybrid poplar plantation; about 50 NE of Athabasca. I helped her with the changing of Plant Root Simulator (PRS®) probes that measure the available nutrients in the soil. I was also able to observe soil, gas and microbial soil sampling. Field work was an amazing experience that broadened my perspective about the research process even further.

In the lab, I processed the collected soil by sieving it, weighing it out and preparing extractions from it which were analyzed for microbial carbon and nitrogen biomass (via chloroform fumigation in desiccators and extraction analysis via SHIMADZU-TOC® machine), available nitrate and ammonium (colorimetric analysis via spectrophotometry), and soil pH. For the microbial soil samples, I was able to observe how my supervisor prepared them in a special bio-fumehood

(laminar flow hood) which was required to prevent contamination of the samples due to exposure from the air. I learned to use a BI-LOG® reader to test the microbial samples for bacterial and fungal growth; based upon changes in carbon substratum utilization monitored via change in tetrazolium dye intensity and turbidity. I prepared all of the soil samples collected from our July trip for total dissolved organic carbon and total dissolved nitrogen for analysis via the SHIMADZU-TOC® machine.

I was able to learn a lot during six weeks about both lab and field work, and was able to witness and be a part of all the steps of the research process. I am very happy to have been given the opportunity to work with Dr. Chang's research team and I am grateful to my supervisor, Sarah Pattison for everything that she has taught me and allowed me to experience. Having acquired both the hands-on knowledge from the lab and all of the amazing university experiences through the WISEST weekly sessions, I feel I am much more prepared for the choices I will make about my studies.





"I leave WISEST with a newfound sense of direction when it comes to the career path I wish to pursue in the future."

Over the past six weeks I have come to the realization that WISEST cannot simply be described as a summer job but as a life changing experience. My WISEST story started in April when I was approached by a biology teacher to apply to the program. I had just started to think about finding a summer job and WISEST sounded perfect. In late May when I received the phone call from Jennifer my excitement could not be contained. Over the next few days I could not help but tell everyone about my plans for the summer. Soon the details were given to me and I learned that I would be working under the mentorship of Dr. Tim Joseph in the mining engineering department. It was after learning this that I realized how beneficial WISEST would be since engineering is an area that I have always been interested in, but have found intimidating due to its range and complexity of areas available for study.

Working as a research assistant in the School of Mining Engineering with three other WISEST student I have had the opportunity to work on a variety of projects including; increasing the life of a mining truck tire by changing road material, creating scale factors between a 10" and 151" diameter tires, reducing wear on shovel teeth and calculating the rolling resistance of a mining truck on varying road surfaces. The projects incorporated physics principles that I had studied over the past year into scenarios seen at mines across the world. Being from Alberta I found it interesting to observe the correlation that existed between industry and academia. For instance; we were hired to do independent consulting by a limestone company to see if building roads out of limestone in the Fort McMurray region would reduce rolling resistance faced by 400 ton trucks. Memorable moments such as working with oil sand or sifting pit run made my time with WISEST fly by. Each of these research projects provided new challenges that made the work rewarding when the problems came to be solved.

One of many personal highlights of the past six weeks was visiting the Highvale Coal Mine near Duffield, Alberta. Even a cold, rainy day was unable to dampen our spirits as we spent nearly five hours learning about the inner workings of a coal mine. Being able to talk first hand with mining engineer Julie Christenson I developed a better sense of the career directions possible for a mining engineer. Seeing the sheer size of a 400 ton truck or a shovel that you park multiple cars in made me realize how fortunate I was to be able to share such a memorable day with my research team.

This summer I have grown to love the University campus almost as much as my research. On my daily walks to and from work I have seen how leafy trees, modern buildings and century old architecture come together to establish an environment that fosters learning and self discovery. The University of Alberta community as a whole has been welcoming about the possibility of new faces and ideas entering the educational atmosphere in the future.

Studying mining engineering has proved to be very interesting over the past six weeks, as it is not as widely known as other disciplines. I leave WISEST with a newfound sense of direction when it comes to the career path I wish to pursue in the future. I am no longer worried about the important choices that lay before me but am excited at all the possibilities that are available in the years to come. Furthermore, I would like to thank Dr. Joseph and my fellow research team members for allowing me to share in this research experience where I have been able to establish skills and connections that will be invaluable in my future endeavors.

natasha workun Supervisor: Dr. Tom Etsell / Chemical and Materials Engineering

Sponsor: Alberta Summer Temporary Employment Program (STEP)

"Special thanks should go out to the researchers that take us in for the summer..."



WISEST summer research program, what is it? Well WISEST stands for women in scholarship, engineering, science, and technology and the rest is pretty much self-explanatory or so I thought. I am from Camrose, Alberta a smaller city located about an hour southeast of Edmonton. I found about the WISEST program through my school newsletter and at the time, I did not even know that such programs existed. All that the newsletter said was WISEST summer research program...for more information visit www.wisest.ualberta.ca, so I decided to check it out. I had three weeks until the deadline for WISEST. Only knowing the limited amount of information that one could possibly put on a website to explain the amazing program that words could never do justice to I printed off the application and filled it out. After collecting the teacher recommendation forms and writing the essay, I mailed in the package and hoped for the best. When I got the phone call at the end of May from Taban saying that I had been accepted all I can remember is thinking that I had done it while doing a very joyous happy dance.

I was placed in the department of Chemical and Materials engineering in Dr. Tom Etsell lab with Ali Hooshair as my direct supervisor, and was told that my project would be the characterization of oil sands clays. Now if you have never studied the oil sands, as I had not when I started WISEST that means absolutely nothing to you. So therefore, I shall explain for my project I was to be working along side my supervisor Ali and visiting professor Peter Uhlik from Slovakia to determine a solvent for the extraction of bitumen from the oils to try to reduce the 2-5 barrels of fresh hot water that is currently being used. With the current method of extraction, there are three distinct levels the primary froth, middling, and tailings. The Primary froth is the useful layer of the three and contains your bitumen. The middlings is composed of your clays, which separate the two layers, and the tailing is your

solids both of these are regarded as waste products and stored in tailings ponds along with all the wastewater. We needed to test how the clays would behave when extracted using non-aqueous solvents, to see if we could find a more efficient method of extraction that would reduce the amount of wastes produced.

While gaining an appreciation for the complexity of the oil sands and learning how much research is put into them to insure that they can be used to the fullest capacity with minimal effects on the environment I also gained appreciation for the complexity of the English language. With both my supervisors Ali and Peter speaking English as their second language and I only being able to speak English there was definitely some moments of confusion on my part as they (And I must say that they did way better than I could and would like to thank them for the fantastic job) explained what we were doing and what they wanted me to do. I will never forget the time I asked how much to put in the beaker and the reply was empty. Which I now know mean fill it full.

Finally I would like to thank all the people that make WISEST possible. Special thanks should go out to the research that take us in for the summer and to our sponsor and partners of WISEST that fund the program to ensure that we are able to gain this valuable experience. In addition, a very big thank you to Jen and Taban the student coordinators of making this the fondest summer of my life. As well thank you to every one else, that makes this program possible. Thank you and always embrace your inner nerd. Go WISEST.

nini brar

Supervisor: Dr. Tim Joseph / Civil and Environmental Engineering
Sponsor: Suncor Energy Foundation



"I came across lots of new physics, university studies, but on top of that there was fun in this program."

In my opinion, WISEST is the best summer program one can ever be involved with. This summer, I got a privilege to work with Dr. Tim Joseph, Robert Ritter, three other WISEST students who were the best team members to work with and our lab technician Robert Anusic. This was the best experience in my life in all the aspects. I came across lots of new physics, university studies but on top of that there was fun in this program. More specific than that, we had fun in our group. "Human mind can have fun but still think about the various projects in the mind simultaneously", said Dr. Joseph. I was in the Civil and Environmental Engineering but our group was mainly concerned with the research in the mining field.

I was so happy when I got a phone call from WISEST telling me that I got selected. I thought this would be an interesting experience. When I actually came for the orientation, I was excited. On that day, we met all the other students, coordinators, and our most loved student coordinators — Jennifer and Taban. In some part of my mind, I had a thought that it is going to be lots of studying but I never thought of the kind of fun we had. It started from the very first day and never ended throughout the program. We had sessions to guide us in the decision making for the post-secondary studies. Some of those include Many Faces of IT, Small Group Discussions, On-Campus and Off-Campus tours. This gave me a very clear idea of various careers both at the university and the industry level. All these questions— "what an engineer does", "what is the scope of engineering in the coming years", "how much do I get paid", were answered during these different activities. On the other hand, we had sessions which proved that "its summer time" and were fun. Those include the Fab Freebie Friday lunches, Dinner & a movie night, Potluck Picnic and Pitch n Putt. The overall experience in this program was fabulous.

Now I am going to talk more about the lab I worked in and the research team. The first day, our supervisors took us into the lab and gave us a tour around the lab. I had never seen a lab of that kind before in my life. It had big machines, equipments and it did not look like a High School Lab at all. We were given an overview of the projects and they seemed quite interesting. With those projects, not only did I learn the physics in it, it also gave me a taste of the university environment and how to apply the physics we learn to our daily lives. Our projects included an actual project for limestone industry. The feeling to even think about doing research for an actual everyday company was superb and actually doing it was even better. Dealing with spreadsheets with thousands and thousands of data points was quite unusual but still a really good part of the program. On top of doing the projects, we were given a chance by our professor Dr Tim Joseph to experience welding and a trip to The Highvale Mine. At our trip to the welding place, we were given a chance to weld a shovel tooth. I never thought of getting that kind of hands on experience at the High School level. The trip to the mine gave us a chance to see the big mining trucks, draglines and actually sit in the mining trucks. That trip for a high school student like me was just awesome. I would like to thank our research team, coordinators and sponsors of WISEST for providing us this platform to explore different careers and gain deep knowledge in different possible career options.

At the end, I would like to give a short message to all the high school students. If you are not sure about which field you want to go into, come and join WISEST. It helped me by opening doors of post secondary options in front of me and guided me through to help me choose. You can be next!

"Besides the experience and knowledge I gained while doing work, or talking to the research team, I have been fortunate to have made many new friends."



For me, learning about science and getting first-hand experience has always been a passion. When I first heard about the WISEST program and what it had to offer young women like me, I knew this would be an opportunity of a life time and I wanted to become a part of it. When Jennifer phoned to tell me of my acceptance and that I was placed in Dr. Walter Dixon's research lab in the department of Agriculture, Food and Nutritional Sciences, it was a dream come true!

But the fact that I would be working at the University of Alberta for six weeks did not sink in until I met the other students who were just as excited about this opportunity as I was. The butterflies in my stomach began to flutter when we were waiting for our supervisors, but, thankfully, all of my nervousness melted away as I began working closely with my supervisors, the grad students and the rest of the research team on my project. The journey had begun!

For the first week, I worked with Taylor Smith whose job was to make protein gels using uterine fluid from sows using the procedures for gel electrophoresis. Although we had discussed gel electrophoresis briefly in biology class, I never would have guessed the number of things to do to make the gel. It was fun to use the centrifuge, the micro-litre pipettes, the gel electrophoresis trays, as well as the Typhoon, the machine that scans the gels. After the scans were printed out, we compared them and matched the spots to find the proteins used in reproduction.

I did most of my project with Rose O'Donoghue, the laboratory technician at the Swine Research and Technology Centre (SRTC), located on the University's South Campus. My project consisted of measuring pig embryos at approximately day 9.5 of their development. The sows were divided into: 1) "Control" group of sows, bred after their first estrus and 2) "Skip-a-heat" group of sows, bred after

their second estrus. Pathways to Pregnancy and Parturition (2nd ed.). Washington: Current Conceptions Inc. A sow comes into estrus every 21 days. In this investigation, the sows from the control group were bred after their first litter of piglets were weaned (1st estrus, approximately day 21). The "Skip-a-heat" sows were bred 21 days after the first estrus (2nd estrus, approximately day 42). Delaying the breeding of the sows to the 2nd estrus should result in higher quality embryos, an increased embryo size, and potentially an increase in litter size and quality. Economically, having a larger litter size of higher quality is profitable for pig producers. Along with embryo size, sow weights and size of the largest pre-ovulatory follicles will also be looked at to analyze the effect of the two treatments.

However, my six weeks did not just consist of work. The student coordinators, Jennifer and Taban, did an excellent job of organizing events. I enjoyed seeing the enthusiasm as talked about our experiences. Besides the experience and knowledge I gained while doing work, or talking to the research team, I have been fortunate to have made many new friends.

I would like to thank Dr. Dixon, my Principal Investigator, for giving me the opportunity to work with his research team and entrusting me with a critical part of their project. Taylor, thank you for giving me the chance to help you with your gels and the knowledge you have given me on various topics, research or otherwise. I would like to thank Rose O'Donoghue, Jennifer Patterson, Audrey Cameron and Alex Pasternak for helping me with my project and poster. Last but not least, I would like to thank everyone on the research team who made this experience enjoyable, challenging and worthwhile. It has truly expanded my horizon and love for science exponentially! I am very grateful for this opportunity and I will remember it for the rest of my life.



"WISEST has encouraged me to think outside of the box while demonstrating creativity."

From observing mouse heart punctures, to seeing freshly delivered placentas, to meetings, to communicating with students from all over, nothing ceased to amaze me this summer. WISEST has surely been an eye opener for me and anyone that loves science should unquestionably partake in such a valuable experience. To be honest, the only thing I was sceptical about was being able to wake up early during the summer, but the program had something new every day so I was eager to get up and see what the day had in store (trust me it's NOTHING like the strenuous workload of school—it's actually fun!).

I was placed in the department of Obstetrics and Gynecology and had the privilege of working with the sumazing (super+amazing) Dr.D.Hemmings. My project was to determine if the lipid sphingosine-1-phosphate (S1P) encourages the chemo taxis of extra-villous trophoblasts (EVT) in the placenta. Confused? Don't worry, when I first found out about my project I was like "Hmm, yeah I have no idea what this is about!". But after talking with people and reading (yes, reading) about what my project encompasses I started to grasp the concepts and it wasn't so hard after all. Trophoblasts are cells of the placenta and have different functions. One type of trophoblast, the extravillous trophoblasts, are the cells that invade the endometrium and act to anchor the placenta to the wall of the ovary. However, if there is extensive trophoblast invasion, it may lead to life-threatening bleedings, or even cancer. Dr. Hemmings suggested that S1P had the ability to control trophoblast invasion and limit the amount of trophoblasts anchoring the placenta. So basically, what I was set out to do was to test whether this lipid causes the migration of these cells.

In order to begin our experiment, my partner Maggie and I set up inserts and put the EVT cells at the top and the S1P drug at the bottom. After differing durations, the cells were given the chance to

undergo chemo taxis (a fancy word for migration) and then the cells at the top and the bottom of the insert were counted. This was either done by staining the cells or, the old fashioned way...plain old counting using a microscope. I have to be honest; this was probably the most tedious part of the whole project because there is a whole procedure before getting to actually count the cells. By the end, my eyes got so accustomed to counting cells, that when I look up into the sky at night and see the stars...I start counting them thinking they are cells. It's sad I know.

From this research experience I have learned a colossal amount that will surely abet me in my future years. Now what things am I talking about? Well, just to name a few: I have become familiar with the university campus (I just need to know where the Butter dome is then I am good to go), I have learned paramount lab research skills which will be used in future careers, and trust me it is better to learn these skills early on if you're planning towards a science based career; and most importantly, I had the opportunity to communicate with people from all around the world whom were gathered together for one common reason—a passion for science (and don't worry engineering is included :P). If I wasn't limited to writing only a page, believe me I would have gone on and on, because there is SO MUCH to take from the 6-weeks here at WISEST.

In short, WISEST was a memorable, awesome, fun, and inspiring experience. Ten years from now, when I look back on the summers that I had, the summer of 2008 will surely be crisp in my mind because this was truly an unforgettable summer. WISEST has encouraged me to think outside of the box while demonstrating creativity. Thank you to everyone who made this summer possible, and remember—you don't need to be a nerd to be part of WISEST!

"WISEST is a wonderful program for any young man or woman..."



When my Biology teacher first told me about this program, I knew that it was perfect for me. I spent days writing my application and tweaking my essay and got really excited when I sent it away. A couple of months had passed, and I guess that I was starting to doubt that I would get accepted. I started thinking to myself, 'No, my marks just aren't good enough, and there must be hundreds of people way better than myself.' But nonetheless near the end of May, I received a phone call from one of the amazing student coordinators telling me that I had been accepted! I was overwhelmed with excitement and the countdown until the start of the Program felt like the one right before Christmas!

I was a little worried about leaving home for the first time, especially for six weeks, but once I got here, I realized that I had the whole program (staff and students alike) behind me, and above all the close friends I made while staying in residence.

Res. was, or rather IS, simply, an awesome place to be. I got to meet tons of new people that were all interested in the same fields as myself, and got to know them for who they really were. Intelligence wasn't a competition anymore, and we all could finally just be ourselves and know that there are other's out there like us. As far as activities, what do you expect to happen when you put 20 girls (and one guy) together in the same small building? We never got to sleep until around midnight almost every night, because every night was a different activity that we all put together, whether it was walking down the beautiful Whyte Ave., or simply playing monopoly until 2:00 in the morning. Either way, res. has helped me make some life long friendships that I hope I will never lose.

But now onto the real program; WISEST is a wonderful program for any young man or woman, and I highly recommend that anyone go into it. This program has shown that anyone can follow their dreams,

but yet has also shown that every dream has wrinkles in it. Some may be harder and deeper than others and may force us work a little harder than expected. Some dreams may be folded up and tossed aside, but others may be left out on the board and worked at until everything fits in place. Not everything works the way we originally designed, but in the end, life seems to always choose a place that works just right for who we are.

My place in this program was in the Department of Biological Sciences, under the team of Dr. C. Paszkowski and Arthur Whiting. My job was to study the growth effect of certain amphibian fecal (Wood Frog) matter on another species of frog (Boreal Chorus Frog). This study allowed us to separate the stable isotopes of Carbon and Nitrogen from the tadpole sample, which will also enabled us to determine what nutrients are needed for quick and effective metamorphosis. The isotopes were also used to determine the fractionation of carbon which would be very interesting to note — as it either implies selectivity in metabolism in tadpoles, or selective assimilation of only certain parts of the tadpole food sources. It sounded hard, but it wasn't at all.

I'm super sad to say that this project is over. And even as I sit in my office typing this report up, I look to the calendar and realize that there isn't much time left. This was, without a doubt, a once in a lifetime experience and giving up my summer to work away from home was nothing compared to the things I learned and the friends and memories I've made. Without hesitation, I would be back next year if given the chance. And although six weeks sounded really long, at first, it went by so quick and I'm now wishing that it would never end.



"What's so amazing about this program is that students do not only get to watch and learn; they get to participate."

The WISEST summer research program has been a fantastic learning opportunity. It's amazing to think that while many of my fellow classmates have been working in grocery stores or going to summer camps, I was actually working in a research lab at the University of Alberta! Although I presently live in Cincinnati, Ohio in the United States, I was born in Edmonton and lived there for 10 years. I was fortunate that WISEST opened their arms to students like my sister and me. WISEST recognizes that not only is there a need for more women in science and engineering in Canada, but also internationally.

I was placed in a research laboratory in the Department of Pharmacy and Pharmaceutical Sciences along with another student, Sundas Mohsin. My principal investigator, Dr. Ayman El-Kadi, gave us insight about the positive aspects of working in Pharmacy. He also invited us to lab meetings where different lab members did presentations about their work. My direct supervisor was Mona Aboutabl, a graduate student from Cairo, Egypt. Mona has been an amazing teacher. She has been patient and understanding, taking the time out of her work to teach me lab techniques. At first, changing the medium of flask of cells or splitting cells was a completely novel procedure, now I can do it myself. The day that I finally realized, 'Wow, I've learned something' was when I was working with Mona under the fume hood in the cell culture room. I was changing the medium on a couple of flasks and managed to do so using only one 10 ml. pipette tip. This might seem like a minor feat to anyone that has worked in a lab, but to me it showed that after many tries, I could finally do it.

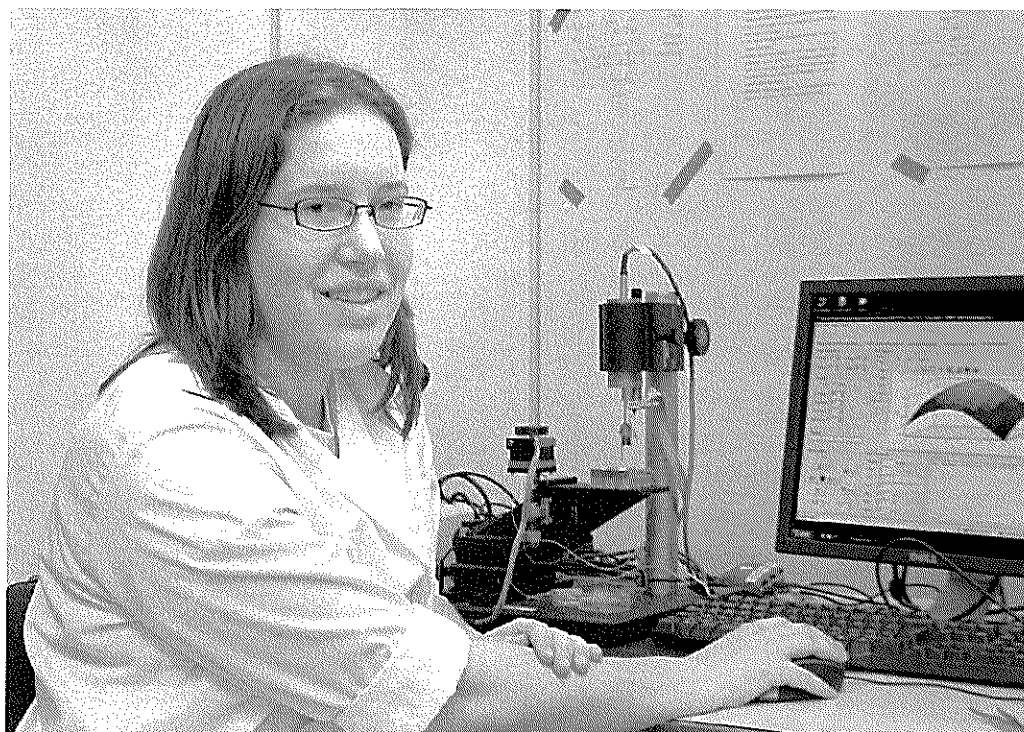
My summer project was determining the effect of different concentrations of 20- HETE (a CYP metabolite) on hypertrophic markers and CYP (cytochrome p450) gene expression. Just for this one experiment alone I had to learn how to grow cells, split cells, treat

cells, isolate RNA, measure the RNA concentration using a spectrophotometer, do reverse transcription in order to get cDNA, use the Real Time- Polymerase Chain Reaction machine and, finally, do statistical analysis. What's so amazing about this program is that students do not only get to watch and learn; they get to participate. I also learned more about research in general. Not only that research can be repetitive, and things can go wrong, but also that something can occur unexpectedly, and you can make a significant discovery. Because my twin sister, Marianne, was also in the program, working in the Chemistry Department, we were able to compare our experiences and talk about what we had learned. So in reality, I got to know a little about two entirely different types of labs.

This summer I learned about different departments, research, and University life, while also having fun and making great friends. I have always enjoyed studying and reading about science, but during these six weeks I have actually been able to apply science. Everything that I have learned, and these experiences, could not be found in high school textbooks. They could only be found in a research laboratory and that is why I am extremely thankful for having this opportunity.

I want to thank my sponsor Merck Frosst Canada Ltd for supporting WISEST and facilitating my experience, Dr. El-Kadi and his research team for allowing me to work with them, my family for encouraging me, and WISEST for allowing a grade eleven student like myself to have an experience of a lifetime. WISEST is a truly amazing organization, and I mean that with no exaggeration.

"...it was refreshing to have so many people around me all interested in the same things that I am."



Orientation day seems like a part of the distant past, but it has been less than six weeks since I was sitting nervously in the ETLC waiting for my supervisor to pick me up, full of anticipation to find out what I would be doing all summer. I breathed a sigh of relief as I greeted my supervisor, Luning Wang, who smiled and brought me up to the lab. The sign on the door said Corrosion Lab, and I immediately began remembering everything I could about corrosion, to give me a head start on understanding what I would be doing. As it turns out, my previous corrosion knowledge, which was primarily either elementary or theoretical, provided a basic starting point for the learning that would take place, but not much else. I was incredibly thankful when he handed me a textbook and asked me to familiarize myself with the phenomenon. Before this experience, corrosion was to me a simple chemical reaction and sometimes a slight mechanical annoyance. Now, I see it as a complex interaction that dictates the life of metals. There were two other WISEST students working in the lab, also with Dr. J. Luo as their principal investigator. Alex worked on the stress corrosion cracking of the steam generators used in nuclear power plants, and Kathleen worked on the erosion-corrosion of pipelines. I spent my time on a small part of an enormous project: I studied the effects of surface roughness on the corrosion and bioadhesion of a metal, one step to ultimately developing a better way to coat implants to help them function longer in the human body.

A typical day in the lab did not even begin in my lab: I spent the beginning of most mornings downstairs preparing the samples that I would use for tests during the course of the day. All of the samples had to be grinded with specific grades of sandpaper, to keep the test results valid. After that, the testing would begin. My supervisor and I preformed various different electrochemical tests. We were interested in the repassivation of the metal, the point where after

being corroded for a period in certain conditions, a metal will create a protective film over its surface that will prevent or stall the corrosion-inducing reaction. This period is very important, because corrosion can be dangerous in the human body. The tests were set up much like a simple cell, but everything was attached to a Solartron, which would change the voltage applied when necessary and record data. Another thing we had to consider was bioadhesion. In order to do this as well, we ran the tests in simulated biological fluid and had the tested samples analyzed by SEM to look for the appearance of apatite, calcium phosphate that would help the metal integrate into the human body.

Although I did a lot of work this summer, I still managed to have a lot of fun. In addition to finding the work enjoyable, the working environment was scientific but informal and I had good conversations with everybody in the lab. We even had a barbeque! Dr. Luo was friendly and very enthusiastic about my research, and Luning helped me whenever I needed. Mondays were fun, short days because we had seminars where I had the opportunity to learn about different fields of research and get to know the other WISEST students. Friday lunches were also a time for socialisation. There were so many students in WISEST that I am sure I did not get to talk to them all, but it was refreshing to have so many people around me all interested in the same things that I am. My WISEST experience is probably the best one I have had so far. I absolutely loved it, and recommend it highly to anybody who is interested in science.

sarah stanners Supervisor: Dr. Mike Brett / Electrical and Computer Engineering

Sponsor: Process Solutions Canada



"Being at the University was a great experience; I got to learn where everything is and get a little taste of University life."

I found out about the WISEST program through school and always thought it sounded like a good experience. I applied to WISEST and to my surprise I got in. I took the position because I thought it would be more beneficial than any other summer job. Once joining through the WISEST summer research program I was thrilled that I got the opportunity to participate. I met lots of interesting people, learned a ton of new things, and had an awesome time doing it.

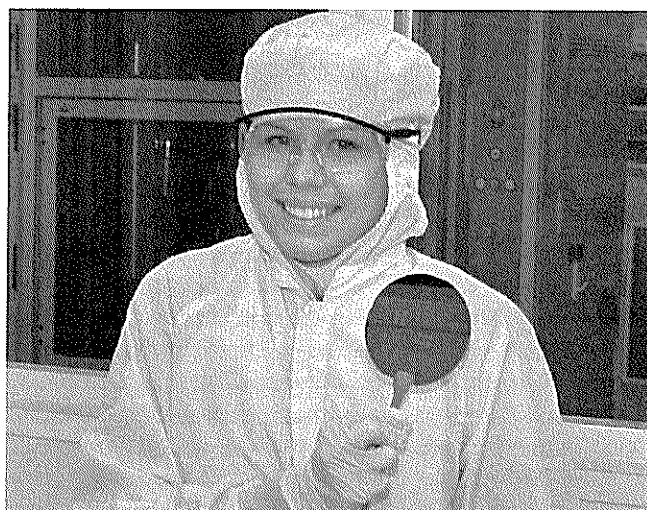
I got accepted into the department of Electrical and Computer Engineering which was really fun. In my lab I dealt with glancing angle depositions (GLAD), which is creating nanostructures that grow into little posts. It was so neat to get to deal with nanotechnology. Once I completed the deposition, to grow these structures, I did all sorts of tests on them, such as find the surface area of the film, doing humidity tests, and finding optical properties. I really enjoyed the work that I did in my lab.

Being at the University was a great experience; I got to learn where everything is and get a little taste of University life. I had no idea that the university was that big. On my lunch breaks I liked to take walks around the campus and explore the different buildings. By being able to do that I think that it prepared me for when I go to the U of A after high school.

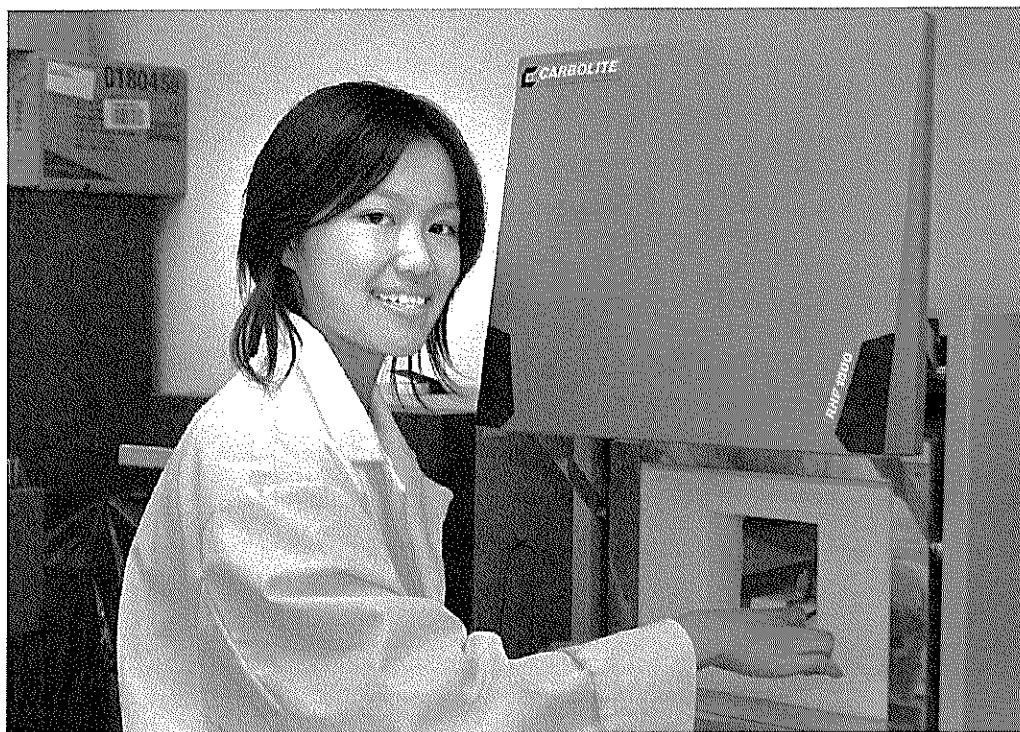
The highlight of my WISEST experience would have to be when I got to go into the nano fab and do lithography. It is a clean room so to go in you had to wear a suit. The suit covered you from head to toe and I felt like a space man or somebody that goes into biohazards on the movies. It was just really fun because I thought it was cool. I also liked all the WISEST activities; the off campus tour was really fun. Also I liked the on campus tour because the opportunity to visit someone else's lab is really interesting.

I hoped that by participating in the summer program it would give me some idea of what I wanted to do once I was done high school. It didn't help at all, it just made it harder because it opened my eyes to all the great options that are available.

When I went into the WISEST program I was a little nervous that I'd get stuck doing something I didn't like, or that it would take up all of my summer. As it was I got placed somewhere that I really liked and was interested in. Though it did take a lot of my summer I think it was definitely worth it. My experience has been so much fun and a great opportunity. I would definitely encourage any one who is thinking of applying to do so because I had such a great time and I know that they would too. Thank you to everyone that made it possible, I had a great time and learned tons.



"Each individual in the program had the will to aspire and go beyond their regular summer vacations to take part in WISEST, for the sake of learning."



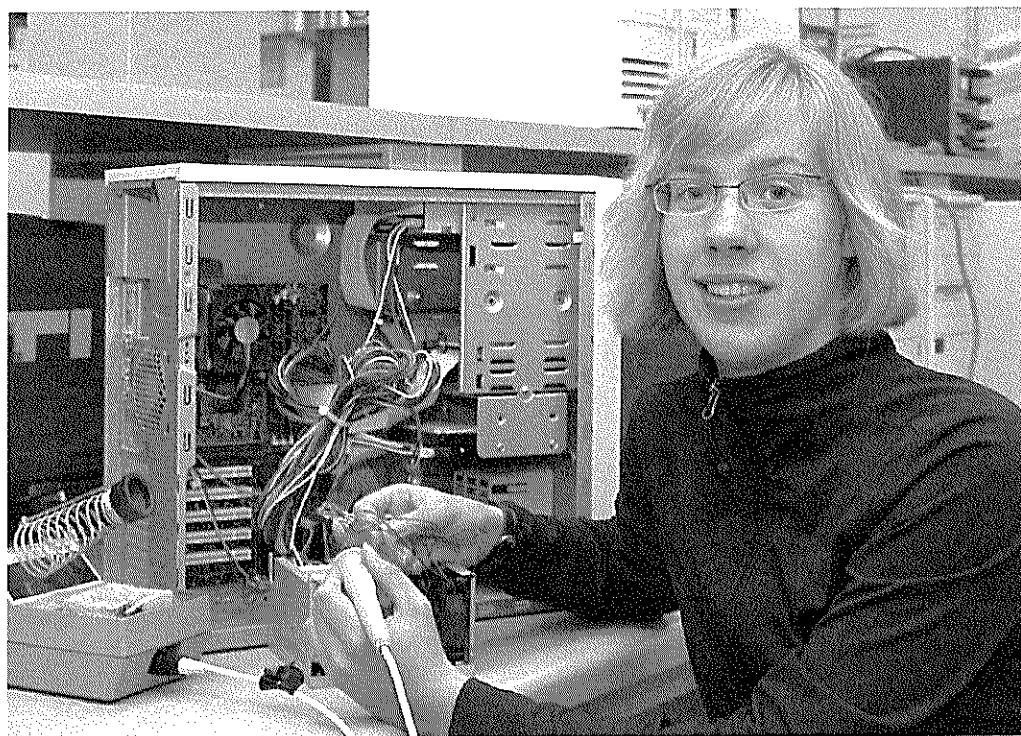
Thursday morning of July 3rd, I walked into the ETLC Solarium not knowing what to expect for six weeks. A part of me was nervous, as I stepped into the room where all the WISEST students met. Coming from Spruce Grove, a small city located just outside of Edmonton, I did not know a lot of people in the program, nor did I know much about the university. As everyone came into the room, they all carried that intensity in their eyes and knowing that I am working with most of the "best of the best" students in Alberta added to my nervousness. Ultimately, I was intimidated. When the day neared the end, the WISEST coordinators allowed us to meet our supervisor for the duration of the day. I waited as they called the students and finally, I heard "Sarah Tsang." Immediately, I rose up and followed my supervisor to the lab.

We approached the building where I would be working from July 3rd to August 15th. To my surprise and astonishment, I worked in NINT (National Institute for Nanotechnology). After formal introductions between myself and members of the lab, my supervisor, Cheng Peng, quickly described most of the equipment for my project. My research involved fuel cells, where I had to create a solid-oxidizing electrolyte membrane in the fuel cell. To my understanding, the membrane enables electricity current to pass through the fuel cell. In addition, my experiment was to create a high proton conducting electrolyte. Higher conductivity in the electrolyte results in higher efficiency for the fuel cell. Furthermore, I spent six weeks mixing different chemical compositions, such as yttrium, barium carbonate, and zirconium. Then, I followed procedures such as pressing the powders into a small disc and adding the samples into the furnace. The end result was a solid disc that I used to test the conductivity in a machine that drew impedance curves, which we can basically use to observe the conductivity. Our project concluded by monitoring the cross-section of the disc using SEM (scanning electron

microscopy) because the structure of the disc can help explain the electrolyte features of the samples.

Although most of the six weeks was spent in my lab or office, I cannot forget the memories and laughs I spent with friends. As I mentioned earlier, everyone seemed to have a fiery intensity when I first met them. During our many lunch breaks and after-work gatherings I realized that I too, was no different to them. Rather than using the word "intense," I felt that everyone carried a "passion" for science and education. Each individual in the program had the will to aspire and go beyond their regular summer vacations to take part in WISEST, for the sake of learning. Now, I have met many friends where we not only shared about our experience in WISEST, but also our dreams in the future. Within six weeks of this program, I have come to know many inspiration people and friends, whom I will never forget.

When I first filled out the application form for WISEST, they asked me "What do you expect from this program?" One of my responses was to get an idea of what I want to become when I grow up. With all that's said I would like that thank WISEST for giving everyone in the program an opportunity to explore different professions and new experiences that the people our age barely face. Moreover, there is a list of people I could express gratitude for making this program amazing, but I would like to specifically thank the WISEST student coordinators for their hard work and my research team, who gave me the opportunity to work alongside them. Finally, I have to thank all sixty-one of the student, making this summer one to remember. Honestly, I still have no strong opinion of where I will end up in the coming years of university, but I have new-found confidence that the career I decide will be driven by the passion I have for science, which has the potential to exceed all odds.



"With my interest in science and computing, I have thoroughly enjoyed learning about electrical engineering and the power system."

Power is an essential element in our daily lives. In recent years, global warming has impacted the way our society views power consumption. In response, people have begun to replace standard incandescent bulbs with compact fluorescent light bulbs. Others are considering alternatives to gasoline fueled vehicles. Upon joining an Electrical Engineering research team, I quickly learned that these new directions are producing problems on the power grid. In Dr. Wilsun Xu's power lab, his researchers have been quantifying the impact of electronics on the grid and discovering what corrections need to be made now, and in the future, to solve these problems.

For my first project, I aided the investigation of the harmonic distortion caused by power electronics. Common household appliances like computers and compact fluorescent light bulbs must convert the AC power supply to a DC power supply for their usage, and back again. This consequently injects mini wave-like harmonic distortion onto the sinusoidal power supply. We tested electronics to make a house model that will help power companies to create a harmonic filter that is more representative of the modern power harmonic distortions.

The second project that I worked on, involved researching the future technology of plug-in hybrid electric vehicles and their potential impact on the power grid. With gasoline prices steadily rising and the widespread availability of electricity, these vehicles are extremely feasible and cleaner than gasoline-powered vehicles, even if the power is partially generated by coal. The problem that will be encountered with these vehicles is that peak demand, approximately from 5-7pm, will dramatically increase if consumers plug in their vehicles at this time. By researching this topic, we have found considerable evidence favoring solutions like plugging in after peak demand or even having automated meters that charge your vehicle

once the demand drops below a designated level.

The benefit of having these topics is that I did not just study about harmonic distortion or plug-in cars, but also I had the opportunity to learn a great deal of basic background necessary to research these areas. Through both of these subject areas, I have gained knowledge about computer and compact fluorescent light bulb circuitry, power distribution, deregulated pricing and current hybrid vehicles. Both research projects have been very applicable to modern life, which made researching them especially significant to me.

WISEST has been most rewarding. Particularly, I have enjoyed the Monday afternoon seminars. Our tour to Scanimetrics was my favourite session. It was very fascinating to see engineers, in the working world, who have taken similar pathways to their career as I intend to take to mine.

Although I am still unsure of what faculty I will apply to come this winter, one thing is for sure, WISEST has helped me understand more about engineering and its influence on the world. With my interest in science and computing, I have thoroughly enjoyed learning about electrical engineering and the power system.

The advice and the mentoring that I have received, from our lab supervisors and from those people whom we have met on the Monday encounters, has been most insightful. I cannot thank WISEST enough for organizing this program, to allow high school students to work for professors and graduate and undergraduate students. For accepting WISEST students to assist his lab work I must thank Chris Lerohl, my supervisor. Finally, thank you once again to everyone who has given me a chance to participate in program and who has shown me new experiences. I wholly appreciate your effort and consideration.

"...I will take memories and friendships from this awesome experience that will stay with me for a long time..."



Time really does fly when you're having fun!! The WISEST Summer Research Program has been an astonishing and enjoyable experience that I will cherish for a long time. It just seems like a couple of days ago, in May, when my dad phoned me up at work to inform me that I had got "The Call" and was to reply to Taban, one of our Student Coordinators, to get further information on the amazing program. When I called Taban from school at nine in the morning, I was so grateful that what I had been so anxious about for the past two months was actually coming true. It was pretty funny to listen to myself reply "Yes...Ok...yup...wow!!" to everything Taban was saying. After I had asked her at least fifteen questions about WISEST and heard her detailed yet excited responses, we ended the call and I went on to thank and notify my Post-Secondary Councilor, Mrs. Gerke, who had notified me of the opportunity, and all my teachers who had written their references for me. My family and friends were very proud of me and that made me look forward even more to the upcoming six weeks of fun!

The day before Orientation, my mom and dad and I got into the van and drove to the University to search for this mysterious ETLC, where I was to meet everyone else the following day. We figured out the bus route I was to take and on June 3rd, at 7:15 am, I was off for WISEST!! The day was filled with laughs, fun and tasty lasagna, courtesy of WISEST. We got updated with all the information we would need and then, at around 3:30, a fellow student, Sara Yacyshyn, and I were off to our lab with two of the graduate students. I was fortunate enough to be placed in Dr. Ayman El-Kadi's lab in the Department of Pharmacy. It was pretty interesting, and a little overwhelming, to see all the equipment and substances that we would be working with. Our whole research team was extremely nice and welcoming to us and we both felt that we were going to learn a lot the following day.

I was privileged enough to work with Mohamed El Gendy, a graduate student, and study the effects of camel urine on TCDD mediated toxicity. Now, that may seem a little gross and stinky but it was actually pretty intense and I never heard of anyone learn so much about anticancer effects from, well, urine! TCDD is one of the most common environmental contaminants that has been linked with a range of health effects, including increased cancer rates. The effects of TCDD are caused by the aryl hydrocarbon receptor (AHR), which is a factor that regulated the expression of the carcinogen-activating enzyme, cytochrome P450 1a1 (Cyp1a1). The reason we were testing if camel urine had any anticancer effects on TCDD mediated toxicity was because camel urine has been reported to have been used for ages in the tribes of the Asian deserts to treat several illnesses. We proved our hypothesis through a series of MTT and EROD assays and came to the conclusion that, as this was the first demonstration, camel urine actually can prevent AHR ligand-mediated effects and that it can thus be used for the treatment of TCDD mediated toxicity and carcinogenicity.

Now that these six weeks have come to an end, I can look back and gratefully say that this was one of the best summer jobs I've seen offered and I will take memories and friendships from this awesome experience that will stay with me for a long time during my future university endeavors and medical career path. I would like to thank my family, my school, my fellow WISEST students, Taban and Jen, and, of course, the whole WISEST organization for their ongoing support and for making my summer extraordinary.

tyana rudolfson

Supervisor: Dr. Simon Landhausser / Renewable Resources

Sponsor: Alberta Ingenuity Fund



"I think it is safe to say that no one can fully grasp the concept of research until engaging in it."

I have always had a passion for the outdoors. My curiosity for the living world around me has always been a major influence in my life. When I first heard about the WISEST summer program, I immediately put all my efforts into getting accepted. With thanks to my own dedication and the enthusiastic support of my brilliant science teacher, Mr. Olsen, I received a call from Jennifer, asking me to participate in the program at last.

Upon arrival at St. John's Institute, I immediately made friends. Everyone seemed to get past their own insecurities quite quickly, after realizing that we all shared a quality difficult to find in others. We all were beyond the idea that exploring the world of science and engineering might be considered "geeky," when in fact, we were being given the privilege of experiencing a world that most students our age have not even begun to grasp. In that sense, no matter how different we all were, we immediately understood and embraced each others' strengths. For this reason, I can guarantee that many of us will be friends for years to come.

Several people have asked me how I liked the lab I was placed in, and my answer has always been the same. I could not have been luckier to be placed where I was! On orientation day, there was talk of the complexities of lab work, and all the small details and precautions necessary to work with large machinery and dangerous materials. By the end of the orientation, I was deeply concerned I had misunderstood the concept of the WISEST program. That was before I met Dr. S. Landhausser. His laid back and down-to-earth nature immediately comforted me, and within ten minutes I found myself quite at home in the most suitable lab I could have ever imagined.

I ended up spending most of my time in the Silviculture lab and the Dirt lab, both of which were absolutely covered in pine needles

and dust. They rarely required safety equipment, and I found myself happily digging through different types of soil and learning about all the many kinds of trees. What was even better, though, was the opportunity to work out in the field. Amanda Schoonmaker, a PhD. student studying coniferous trees, was kind enough to take me out hiking in several forests out by Whitecourt. I was exactly where I wanted to be, and I enjoyed every moment of each experience outdoors. I was also privileged enough to aid Dr. Landhausser in one of his experiments at a tree nursery. I learned the processes of a tree nursery and its impact on research involving silviculture.

My own project was based on reclamation of the tar sands. Its purpose was to determine which types of seeds were better at germinating and establishing in certain soil types and under different moisture treatments. I was given enough liberty to conduct most of the project on my own, but also had necessary guidance from Dr. Landhausser. I worked with willow, aspen and balsam poplar seeds, observing how each species took to varying environments. While the results were fascinating, I felt it was the process that was the most rewarding.

I think it is safe to say that no one can fully grasp the concept of research until engaging in it. I certainly did not realize all that it entailed. Research is a complex method. It requires a colossal amount of energy and thought, and while the WISEST program may not have necessarily pushed me any further in that very direction, it has certainly given me an invaluable amount of awareness, and a fortified passion for science. The best gift WISEST has given me, however, is an enhanced sense of what I want to pursue in a career, and in life. For this, I will forever be grateful for my experience here.

"The speakers that talked to us were inspirational and informative."



Rather than sit around on the couch, binge on potatoes chips or aimlessly surf the net, I did something constructive with this summer. By participating in WISEST, I had the pleasure of working with Dr. Gina Rayat and her research team. They have taught me so much about lab work and have shown me what research really is.

Under the guidance of my mentors, Dr. Gina Rayat, Hossein Arefanian and Qahir Ramji, the study I conducted is apart of a bigger question of finding the optimal donor for beta cell replacement therapy for type I diabetes patients. Despite the success of human islet transplantations from a human donor, there remain numerous barriers β -cell replacement therapy. One such obstacle is the limited supply of human islet donors; therefore, an alternate source of islet tissue is being developed so that islet transplantation can be available to a larger number of type 1 diabetic patients.

Pigs are promising candidates as a xenogeneic islet donor because they can potentially provide an abundant source of islets and their insulin is functionally similar to humans. After numerous studies, it has been determined that newborn pigs are the most attractive donors for xenotransplantation. Their islets contain desirable characteristics compared to both adult and fetal pigs, allowing their cells to be responsive to glucose challenge (like the adult β -cells) but also provide high islet yields (like fetal islets). Although the benefits of newborn pigs are known, the optimal age of newborn pig for β -cell replacement therapy has not yet been determined. Thus, the objective of my study is to characterize the islets isolated from different ages of newborn pigs to determine the optimal age of pig for β -cell replacement therapy.

During my time in the lab, I performed immunohistochemistry (IHC) staining on dissociated cells of islets from the pancreas of each new

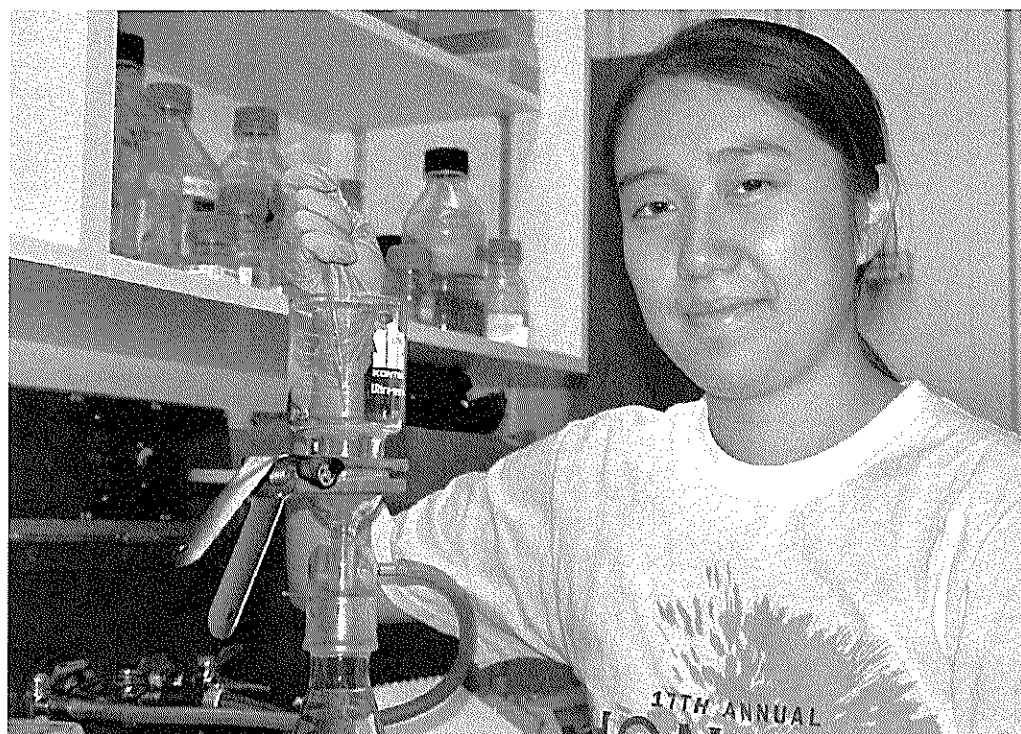
born pig. After each staining, I would characterize them by counting the number of positive and the negative cells. I also watched pig surgeries and even had an opportunity to harvest the organs myself. Most importantly, my time in the lab allowed me to witness the investigative process of research. This experience has proved my interest in lab work and confirmed my love of the sciences.

On top of the incredible things I learnt in the lab, the activities that WISEST organized provided me with invaluable insight into university life, as well as certain fields such as engineering. The speakers that talked to us were inspirational and informative. I feel that their words will definitely play a role in the decisions I will make in university.

Now that everything is coming to a close, I feel incredibly sad that it's time to part ways. I would like to thank Grace, Jennifer, and Taban for running the WISEST Summer

Research program. Also a special thank-you to my mentors Dr. Gina Rayat, Hossein Arefanian and Qahir Ramji, who have taught me so much. WISEST is no doubt a stepping stone in reaching my dreams. I will always treasure this experience.





"...even though everyone on my team was doing something, I was still able to see how everything fit together."

When I first thought about looking for things to do this summer, I knew I wanted something unique so that I would have an extraordinary summer. After some research into notable programs, I discovered WISEST and decided to take a chance by applying. The anticipation of participating WISEST only grew after I was accepted- I spent weeks wondering what the other students would be like, and what research at the University of Alberta in the Department of Chemical and Materials Engineering would be like. Remarkably, after I arrived, it only took about a couple of days for me to settle in within the program.

My project involved experimenting with different methods of extracting oil from microalgae. Microalgae are an efficient source of products for fertilizers, food, nutrients, cosmetics, and most notably, biofuels. Microalgae may be a better source of renewable energy than other sources such as corn and soybean; algae are known to be able to harbor high amounts of valuable oil. I spent my time in the lab testing the effects of various factors on oil recovery; solvents used in the extraction process, specific extraction techniques, extraction time, and sample size of the dried algae used. One of the most rewarding parts of my lab work was that even though everyone on my team was doing something, I was still able to see how everything fit together. I was able to inoculate algae cultures, watch them grow, see them transferred into and growing in the bioreactor, take a sample from the reactor, and finally extract oil from the dried algae.

I would have to say that the other most important part about my lab experience was meeting so many wonderful, interesting, and intelligent people in the lab and office. The actual lab and computer work combined with the many great conversations and discussions made spending every day in CME fun and worthwhile. I truly loved

learning from and talking about all sorts of things with my supervisors, Hector and Dr. Ben-Zvi, whether it was about lab work and results, math, or just about anything.

The other half of my WISEST experience would be my life at Rez. Staying at St. John's made that half of WISEST complete- there were always other amazing Rez kids to hang out with; it's possible to say that I didn't really get homesick. From meals watching the Osvita Ukrainian kids dancing to throwing awesome birthday celebrations to ambling down Whyte Ave to watching movies and TV, every moment was amazing. It wasn't hard to stay up really late into the early morning, it was so easy to enjoy everyone's company.

It was great to meet so many other friends who were quite nerdy if they chose to be, but equally cool and incredibly nice, not only at Rez but also at the various WISEST student gatherings as well.

I can only say that I was truly happy my entire time for the six weeks of WISEST. WISEST offered me the amazing opportunities to meet so many fantastic people and to spend time conducting research as a high school student. I was able to do so many things in the six weeks at the University of Alberta, but at the same time I wish I had more time with this program. WISEST is undoubtedly one of the life experiences that I will cherish forever.

students from the 2008 WISEST summer research program



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