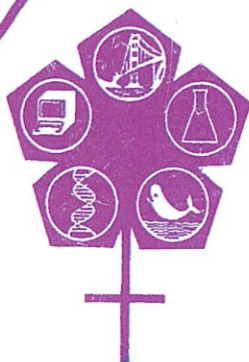


$v = F\pi$
so $\therefore$
if $v = \frac{d}{t}$
then...



WISEST

Summer Research Program

2002



Student Report Book

Women in Scholarship, Engineering, Science and Technology

WISEST

(Women in Scholarship, Engineering, Science and Technology)

at the
University of Alberta

Chair

Dr. Gary Kachanoski, Vice-President (Research) University of Alberta

Vice-Chair

Dr. Margaret-Ann Armour, Associate Chair Dept. of Chemistry, University of Alberta

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WISEST Summer Research Program

2002

Student Report Book





WISEST Summer Research Program Students, 2002

WISEST 2002 Student Report Book

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Partnership with WISEST



- ♦ The WISEST Summer Research Program students are paid an honourarium for their six weeks of work and the number of students who can be accommodated depends on the number of sponsorships available to pay the students.
- ♦ Several local industries, philanthropic groups, Deans of Faculties and Chairs of Departments at the University of Alberta, and the Provincial And Federal governments sponsor students.
- ♦ Sponsorships are \$2,000 per student. The money is used to pay the students an honourarium, the costs of special activities such as field trips, group discussions, and poster sessions, and for administrative costs.
- ♦ An endowment fund helps to support rural students who stay in an Edmonton residence complex during their participation in the Program.
- ♦ Receipts for income tax deductions are issued for all contributions.
- ♦ Please contact us at the WISEST office for further information about any of our initiatives.



Partnership with WISEST

We wish to sponsor _____ students in the WISEST Summer Research Program at \$2000 each.

We wish to contribute \$_____ to:

WISEST general funds

SET for high school girls
Choices for grade 6 girls

We would appreciate further information.
Please contact us.

WISEST Summer Research
Program
UA-WiSE for University of Alberta
Women in Science and
Engineering
Other

Receipts for income tax deductions will be issued for all contributions

Company Name: _____

Contact Person: _____

Address: _____

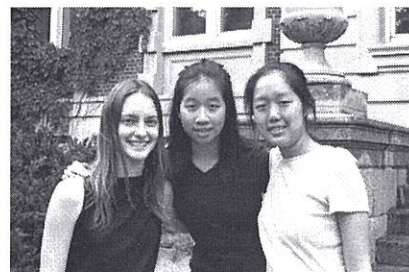
Phone: _____ Fax: _____ E-mail: _____

**Please return to: WISEST, 295 CAB, University of Alberta,
Edmonton, Alberta, T6G 2G1**



Thanks to the **2002 WISEST Partners**

- ♦ Alberta Agricultural Research Institute
- ♦ Alberta Human Resources and Employment/
Summer Temporary Employment Program (STEP)
- ♦ Alberta Ingenuity Fund
- ♦ Alberta Research Council
- ♦ Canadian Information Processing Society
- ♦ Dow Chemical Canada Inc., Western Canada Division
- ♦ GlaxoSmithKline
- ♦ Imperial Oil National Centre for Mathematics,
Science, and Technology Education (IONCMASTE)
- ♦ Merck Frosst Canada Ltd.
- ♦ Suncor Energy Foundation
- ♦ Weyerhaeuser
- ♦ Faculty of Nursing, University of Alberta
- ♦ Faculty of Science, University of Alberta
- ♦ Faculty of Agriculture, Forestry and Home Economics
University of Alberta
- ♦ Alberta Heritage Foundation Medical Research
- ♦ Human Resource Centre of Canada (HRCC)
Edmonton/NE Alberta
- ♦ Alberta Ministry of Innovation and Science
- ♦ Allard Foundation
- ♦ Dow AgroSciences Canada Ltd.
- ♦ Edmonton Glenora Rotary Club
- ♦ Epsilon Chemicals Ltd.
- ♦ National Science and Engineering Resource
Council (NSERC)- Promo Science
- ♦ Petro-Canada
- ♦ Syncrude Canada Ltd.
- ♦ Faculty of Engineering, University of Alberta
- ♦ Faculty of Medicine, University of Alberta
- ♦ Vice President (Research), University of Alberta



and the **2002 WISEST Contributors**

- ♦ BP-TEC Engineering Group Ltd.
- ♦ Dr. Arlene Ponting
- ♦ Celanese Canada Ltd.
- ♦ Ms. Esther Ondrack

A Valuable and Important Experience by Grace Ennis, WISEST Coordinator

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

One of the first major initiatives of WISEST is the WISEST Summer Research Program. It has evolved over the last 18 years into a Program that provides a valuable research experience to high school students, both young women and men, who are making decisions about their future field of study and career paths. In the Program, students who have completed grade 11 spend six weeks working as a member of a research group at the University of Alberta. The girls work in the fields of engineering, science, agriculture and the health sciences, and the boys work in the fields of nursing and clothing and textiles.

Within this Student Report Booklet you will read about the many experiences that the students had working in the research laboratories under the supervision of their scientists 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. The students also participated in a variety of weekly activities that WISEST designed to supplement their work experience. Their reports reflect in their own words what a valuable and important experience this was for them.

Each year the success of the WISEST Program is a reflection of the support of many, many people: high school science teachers, faculty supervisors, research team members, and WISEST Partners and Contributors. We thank the high-school teachers for sharing the information about the WISEST Research Program and for encouraging their students to apply.

University of Alberta faculty members continue to strongly endorse the WISEST Research Program. Each year they welcome the WISEST students into their research teams to either join the team in an on-going research project, or to work on research projects specifically designed for the students. Many, many thanks and words of sincere appreciation to all research team members who mentored, guided and encouraged the students to explore their interests, take risks, and to not be afraid to fail, as well as to succeed.

The total number of students who can participate in the Program may change from year to year, depending on the funding that WISEST can procure. The funds allow us to pay the students at a minimum wage for their work, and to cover the overhead costs to run the Program. WISEST wishes to acknowledge and genuinely thank the several local industries, philanthropic groups, Deans of Faculties at the University of Alberta, and the Provincial and Federal governments, for their financial support in the 2002 Summer Research Program. A detailed list of the WISEST Partners and Contributors is included in the Student Report Booklet and on our web page www.chem.ualberta.ca/~wisest.

It truly was an energizing and rewarding experience to work with the WISEST students. Celia Valel, the WISEST Student Coordinator, and I took great delight in celebrating with them at the Research Poster Presentation and Open House Tea, all that they had learned throughout their six-week experience. It is now time for them to share their experiences with their peers, teachers and family members and to encourage younger students to learn about the many options that are available to them in areas that they would not ordinarily consider.

A Inspirational Group of Students by Celia Valel

The date was July 4, 2002. The relentless sun beat down on the University of Alberta campus. The participants of the 18th annual WISEST Summer Research Program - 48 young women and 5 young men – arrived in the gleaming lobby of the Engineering Teaching and Learning Complex, ready to leap into the world of research.

In the weeks that followed, the WISEST students accumulated such a wealth of knowledge (not to mention such an expansive vocabulary) that all their humbled Student Coordinator could do was smile and nod as she toured their labs. Students spoke lovingly of their drosophila stocks and excitedly of their PCRs and gels. They created spectacular 3D animation sequences and explored the applications of micro-electro mechanical systems. They dropped things (with the intention of measuring the resulting vibrations) and burned things (to study textile flammability, of course). They made a contribution to their research team.

In addition to their lab work, the WISEST students benefited from other exciting experiences. They received tours of other research labs on the University of Alberta campus. They toured the research and production facilities of Epsilon Chemicals Ltd., a company providing specialized services for the food industry. They ventured to the Edmonton Research Station to learn about compost, crops, cattle and dairy research. They participated in discussions with professionals working in non-traditional fields, learning from the life experiences of these role models. The WISEST students caught a glimpse of science and engineering careers in the context of the real world.



Grace Ennis (right) and Celia Valel (left)

The date was August 15, 2002. The relentless rain beat down on the University of Alberta Campus. In a culmination of their six weeks of work, the 53 WISEST participants gathered in Lister Hall, along with their research team members, families, sponsors and teachers. The students showcased their hard work in the form of research posters and enthusiastically presented their findings. They demonstrated the myriad of opportunities available to people in the sciences and engineering.

Dr. Margaret-Ann Armour, Vice-Chair of WISEST,

was honoured in October 2002 with a prestigious national award.

The Governor General's Awards in Commemoration of the Persons Case
are presented annually to a handful of Canadian women who have promoted
equality of women of all ages.

Congratulations, Margaret-Ann!

Orientation Day to WISEST 2002 by Christina Nguyen

An Epic Tale



The year was 2002, the date was July 4th, and the time was 9:30 in the morning. At precisely this time, fifty-three young, naïve, but very punctuate students stepped into the ETLC building, expecting they would step out of it unaltered. But unknown to them, they were the chosen ones; they were little Pip duplicated fifty-three times over, all of who were bound for GREAT EXPECTATIONS! Cut, cut cut....

Let us be frank and give you a version of the Opening Session that is believable and honest...

Guided by the kind and generous WISEST and Student Coordinators, Grace Ennis and Celia Valel, they received their first lesson to becoming young men and women. These fifty-three were taught the importance of...

Not pressing the red button. The red button would...

Show vanity, a sign of self-obsession that not only drew needless attention to them, but also directed a most wicked machine to rig havoc upon the world. This machine was the...

Camera. Basically, it was a hassle to have to call in the computer technician down stairs to...Cut, cut, cut! Stop this stupidity! Here is what really happened, ladies and gentlemen:

On July fourth, the young candidates of the WISEST Summer Research Program attended an Opening Session in the ETLC building. There the WISEST Coordinator, Grace Ennis and the Student Coordinator, Celia Valel warmly received them. At this session, two invited speakers, the Associate Vice President of Research, Dr. Paul Sorenson and the Vice-Chair of WISEST, Dr. Margaret-Ann Armour, spoke of the importance of research and gave a brief presentation on the history of WISEST and its goal. This goal was not world domination or the dream of finding the elixir to eternal life; it was the goal of educating and enlightening young minds. It is their belief that the WISEST research program could exist to this day because the goal it tries to achieve is a goal that would exist throughout all generations and eras.

The students were then instructed of their responsibilities and also bestowed with a most thoughtful advice, which was not to be discouraged by failure. Science rarely yields results and grand discoveries, but when it does it is an amazing thing. Later in the afternoon, Dr. Margaret-Ann Armour gave a safety seminar and reviewed the importance of lab safety and the necessary precautions that must be taken when working in one. In all, the session was not a grand epic, or a tale of the gathering of the Greats; it was a mere gathering of simple people who shared a common, simple goal. But, however simple this goal it did indeed leave the young adults a little wiser. They left the ETLC building unaltered.

WISEST Weekly Sessions

Introduction to the U of A Library and a Tour of Campus by Juliet Van Vliet

Campus Gigantus: An extreme scavenger hunt featuring the U of A campus

Mission log: Date: Wednesday July 10, 2002

At precisely 2:30 pm WISEST students from all over campus left their regular lab schedule to meet in the basement of CAB where Celia had been cooking up "activities". Dun Dun Dun!

Challenge 1: In groups, we had to build marshmallow/toothpick towers without communicating orally or by writing. Most groups "towers" ended up as a heap of sticky sticks, but you could tell by a few groups structures that monkeying around with the molecules in science class had paid off. There was a drooping crystalline structure and (a more conservative approach) a pile of simple pyramids stacked one on top of the other.

Challenge 2: We all made our way, to the Cameron library where Elaine Simpson conducted an introduction to the GATE library catalogue. This is a great system and it definitely came in handy when the time crunch hit for our reports to be due!

Challenge 3: We grabbed our groups and set off on a mad dash around campus. Running from building to building in the smoldering heat of a midsummer afternoon, we searched the campus for a chaotic pendulum and other scientific splendors. Every now and again we'd stop to ask a passer by "Which former Prime Minister is a U of A graduate?" "Well, it's Joe Clark!" Replied a jovial old man. And what colour is the dot associated with the microbiology wing on the Biology Science Building map? Every WISEST student knows that it is red. With the help of a friendly student in the computing science building we used the *SUN Microsystems* computers to find the meaning of the U of A's Latin motto "quaecumque vera". (It means "whatsoever thing are true", for the curious or forgetful) We passed by the physics courtyard to count the ducks living there "1,2,3...eight!" and then by the Alumni building to check which three flags were proudly displayed on the roof. Challenge criteria completed, we returned to CAB thirsty, sweating, and panting to find that a cool ice cream sandwich awaited us there. An ice cream sandwich has never tasted so good.



WISEST Weekly Sessions

Discussions with Role Models

by Amanda Scott



Every Wednesday afternoon, about fifty young women and men sneak off to the basement of Cab to meet and plan to... take over the world!! Oh wait, that's another story. On the particular day in question, the mission of the rendezvous was to meet with women studying or working in science, such as engineers, graduate students, and women working for large companies, for group discussions.

We were split into small groups, with the members of each group having similar interests. It was nice to see the smiling faces of our role models when we walked into the room. They seemed to be as enthusiastic to share with us as we were to talk to them! First of all everybody told a bit about themselves, both students and role models alike. It was interesting to hear about the different career paths the women had taken, in many non-traditional fields of study and employment. A lot of the role models got to where they are now by quite a circuitous way, finally ending up somewhere they get to do something they are very interested in and even impassioned about. We got to see that though when they were our age perhaps they had no idea what they wanted specifically to do in university or afterwards, but as life and learning went on they discovered what they wanted to do and that it is okay to change your mind about the future.

The discussion turned to the question of the challenges that they have encountered as a woman in a non-traditional field of study, and trying to balance a social life and an academic life while in university. Every one of the women had a different situation and different experiences, from living at home with parents while studying, to raising a family and going to university simultaneously, to applying to medical school, to thinking of innovative new energy resources, to being the only woman in a workplace full of men. Each of them had good advice to give, which I think every student took differently and applied to their own life and concerns. The message overall though, was that things will work out no matter what you choose your life to be.

Another subject brought up was the concern of being economically able to get through university. Most of us probably had that on our minds. Sure applying is one thing, but what about the tuition? Many of the role models said that scholarships were an excellent opportunity, as lots of the funds do not end up getting awarded due to lack of applications. Another thing that everyone agreed on was that university was definitely worth their investment, and it was something no one ever regretted. One of the role models summed up the importance of university by saying that it is not simply education for employment, but education for life, and that this knowledge can be taken with you no matter what field you end up going into.

As we continued the discussion of other things, time seemed to fly by and unfortunately it was all too soon that it was over. It was quite an enlightening experience for everybody I believe, and the role models and moderators are greatly appreciated for volunteering their time to come talk with us and answer our questions we had, giving us insight and some reassurances for the often unclear future.

WISEST Weekly Sessions

A Visit to the Edmonton Research Station by Stephanie Wennerstrom

Calves like to suck on your hands. Not just your finger or your thumb, but they suck on your entire hand! Many of the WISEST girls and guys found this out on our trip to the Edmonton Research Station (ERS). The Dairy Research and Technology Centre was just one of four areas that we visited on Wednesday, July 24th. This trip, organized by Sharon Katzeff, the public relations coordinator for the Department of Agriculture, Food and Nutritional Sciences, proved to be really useful. We found out about so many different careers in the Agriculture, Forestry, and Home Economics fields.

The presentations and demonstrations really broadened our knowledge of careers in these areas. When Teodora Alampi asked if we knew a job in Agriculture, most of us answered "farming". While there are many careers related to farming, there is such a variety of different jobs in horticulture, animal sciences, business and economics, communications, food sciences. You can also be a scientist, surveyor, meteorologist, or a mechanic. All these jobs can be related to agriculture, agri-food, and food sciences. Who knew!

One of the stations we visited was the ERS Composting Facility. Grant Clark and students at the Composting Facility explained the processes and importance involved in proper composting techniques. We got a quick tour through the 130-foot-long composting 'house' where they have huge chambers for manure and other organic materials. They also have a device called a biofilter, which contains microbes that eat up the bad smells that come from the decomposing matter. Too bad they didn't have the biofilter working that day. It was really interesting but it smelled!

Another area that we visited was the Dairy Research and Technology Centre where we saw rows and rows of dairy cows. Here are some quick facts that Bill Cameron, the Unit Manager, gave us: There are over 140 stalls in the main cow building. Each cow produces an average of about 32 litres of milk per day. That's eight 4L jugs of milk a day. At the highest peak of calving, a cow can produce up to 60 litres in a day. That's fifteen 4L jugs! In other words, a lot of milk is produced at ERS. The University of Alberta sells a large percentage of milk produced at ERS to Dairyland Milk Producers. So, it's likely that some of the milk on your grocery's shelf comes from the cows at ERS.

We also toured the Alberta Poultry Research Centre, which houses thousands of chickens and roosters. The groups were equipped with coveralls and rubber boots to avoid transmitting any diseases to the chickens. Erin O'Dea (a WISEST alumna!) explained about research that is taking place at the poultry centre to improve bird and breast muscle growth, healthy feeding regimens for healthier birds, and also feeding and lighting programs promoting various effects on reproduction.

Another area that we stopped at was the Crops and Land Resource Centre. Dr. Linda Hall, who has dubbed herself the Weed Goddess, taught us about the different kinds of crops that are grown at ERS. We also found out that there are over 10,000 kinds of wheat growing in the world! Another interesting fact is that a hybrid breed of canola, Quantum, was developed at ERS. This canola is resistant to four different types of herbicides. Dr. Hall explained that this decreases the amount of herbicides in the soil and eventually in the water system, and improves crop efficiency. Research in this area consists of environmentally friendly plant disease management, disease resistance, crop agronomy (which is scientific agriculture), and optimal forage production (food for horses and cows).

I didn't know that there was so much involved in Agriculture and Forestry! This trip definitely was to my advantage. So many different careers were explained and revealed. It, without doubt, expanded my understanding of jobs in these fields. I would certainly recommend them to people that are interested!

WISEST Weekly Sessions

Tours of Lab Facilities On Campus

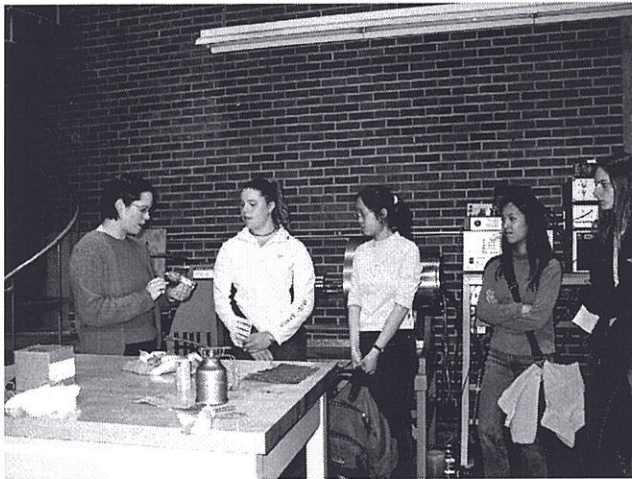
by Jane Xu

The on campus research lab tour was the most amazing tour I had in the University of Alberta! The group that I was in toured the Mechanical Engineering faculty. My WISEST research lab is in the area of genetics, so something as different as Mechanical Engineering was such an interesting choice.

Dr. Gail Thornton and Mr. Andrew Coward received our group warmly as we entered the lobby of the building. Nobody really knew what Mechanical Engineering really was, so Mr. Coward explained to us, "Mechanical Engineering is basically anything that moves!" We were then being taken through the building with six mini-presentations, and hands on activities of course. They first showed us their research in the area of testing the strength of materials and the making of strong pipelines. It was fascinating to learn that pipelines can be made out of thin stripes of fiberglass webbed together! Next, or should I say the coolest of all activities, was the trip to the air tunnel. The huge air tunnel is actually used to research on the subject of air jet fuel burning, but we had the opportunity to go in and sit in the tunnel to experience the force of 65km/h flowing air!



After that, Dr. Thornton and Mr. Coward showed us a solar car, and a couple of racecars made by the undergraduate students. Surprisingly, the solar car is only about 1100 pounds heavy and the students-made race cars can travel up to 80km/h. Another very neat activity was the tour into the acoustic branch of Mechanical Engineering. We stepped into a quiet room where every surface is covered with rows of fiberglass triangles. They also informed us on many intriguing facts of the acoustical designs that are applied in the Windspear. Its unique design allows for maximum absorption of sounds, and we all felt the dead silence that room created. Then, we were being shown to some small robotic cars that were made by the past second-year university students. And finally, Mr. Coward demonstrated to us how a machine could break a 30 pounds solid metal rod by stretching it. The deafening "bang" the metal made on its coming apart in two pieces brought our visit to an end.



During our visit, we were able to ask a lot of questions to Dr. Thornton and Mr. Coward, whether on the subject of their research or about university courses in general. By the end of the tour, we all had a pretty good idea of what Mechanical Engineering is all about and its projects and career opportunities. It was such a useful and important tour in showing us the possible areas of studies in the university. If I ever decide to major in Mechanical Engineering in the near future, my decision will be a very informed one.

WISEST Weekly Sessions

Tour of a Research Facility Off-Campus - Epsilon Chemicals

by Katherine Leung



On August 7, 2002, we went on our last off-campus tour. This time we went to Epsilon Chemicals (E-Chem), an expanding company that incorporates science, business and the environment into their work in developing sanitizing chemicals for the food industry. Upon arriving, we had the honour of being greeted at the door by the President and founder of E-Chem, Mr. Colm O'Carroll. After a brief introduction to the company, we split into our three groups to learn more about each section of E-Chem.

Ms. Janelle Meredith gave us a tour of the lab where she devised specialized chemical products to suit the customers' needs. She explained that the main objective of E-Chem is to create environmentally friendly chemical sanitizers to help the food industry treat their wastewater. We saw several samples of wastewater from a meat plant and the different methods of treating the wastewater. The two methods that she used were lowering the pH and adding the Envirofloc™ the main chemical produced by Epsilon, to the wastewater. By lowering the pH to about 4.3, the proteins in the water came out of solution and by adding the Envirofloc™ the water became even clearer. This process is extremely important for the food industry because the more waste products in the water, the more money it gets charged by the city or town.

After the tour of the lab, Mr. Les Witte took us to see the production area at Epsilon. It was really fascinating to see that from the lab in the next room, vast quantities of a customized chemical could be made. On top of that, both Mr. Witte and Ms. Meredith drew on past experiences and gave us helpful advice on post-secondary education.

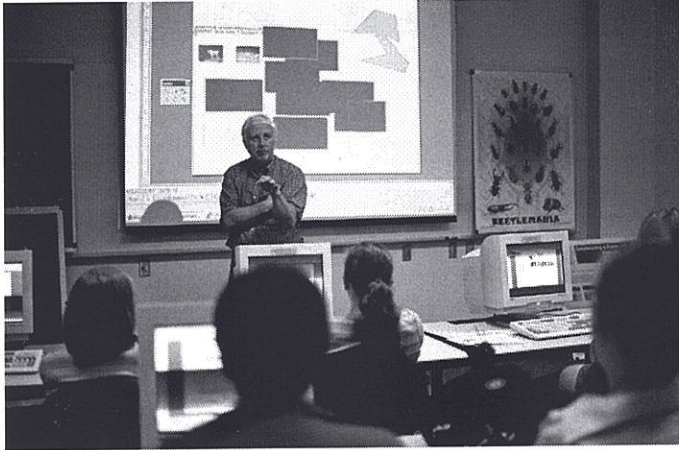


Finally, we saw a fantastic slide show presentation given by Dr. Alan Jones. He gave us further information on Epsilon Chemicals and told us some interesting information, especially about the sludge, which was removed in the treatment processes, being sent to cosmetics factories and made into lipsticks and other such items (much to Rathada's chagrin). This enjoyable visit was a great opportunity to see laboratory science being put to a practical use.

WISEST Weekly Sessions

How to Make a Research Poster

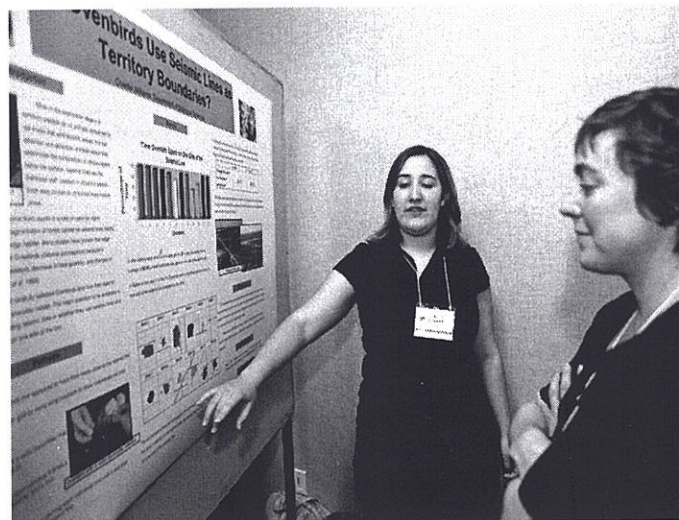
by Vicki Listoe



Making a lab poster was a scary thought at first. I didn't know what I was going to do, or how I was going to do it. Then I attended the DiTRL poster session. Granted that it was at eight in the morning for me as I was unfortunate enough to have a last name that fell in the category of Kor – Z. Apparently the DiTRL people like to get up nice and early! The people with last names A – Koe took the course the afternoon before in conjunction with the HYRS program, they were the lucky ones and didn't have to get up early to go.



Well I shouldn't complain Jack and Greg got up early and came to teach us the session. They let us use their computers and follow along on an interactive course on how to use Microsoft PowerPoint to make poster. I knew PowerPoint could be used to make a slide show (as most of us have done) but I didn't know that it would make posters 3 by 4 feet. They took us through the whole process step by step and let us follow along on the computers. They also gave us a hand out that had everything in it, so we could look back if we forgot anything. (I think they realized no one is really awake at eight in the morning at the end of July, so they knew we wouldn't remember everything.)



After leaning how to make the poster they explained how to proof our posters and offered to let us use their lab, because you need special software that they just happen to have. Then they told us how to send our posters to the printer to be printed on giant sheets of paper and ready to be presented at our open house.

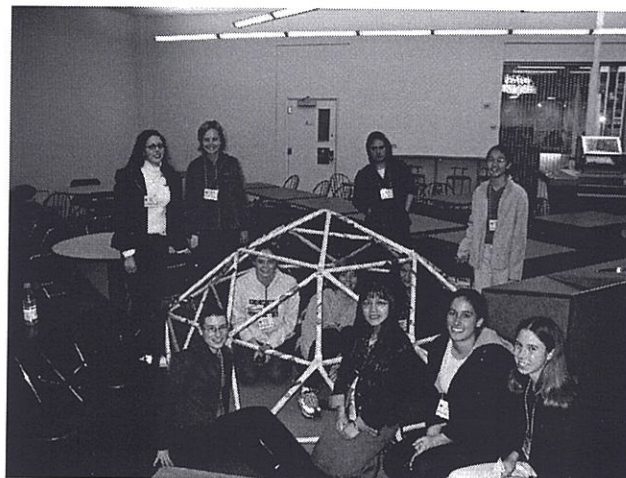
WISEST Weekly Sessions

Wednesday Afternoon Get to Know You Activities

by Lyne Koenig



What can you make with marshmallows and toothpicks? Newspaper and staples? The answer: Celia's Wednesday afternoon activities. On Wednesday July 10 before orientation to the GATE, we all met in the basement of CAB where Celia was waiting. On every table there was a bag of marshmallows, a box of toothpicks and a sheet of instructions. Our task was to build the tallest possible tower with the materials we had. After ten minutes and a lot of laughing, our time was up and we were allowed to look at the other towers. Some had strong structures and looked very nice. Unfortunately, others didn't turn out so well, but we all had a wonderful time.



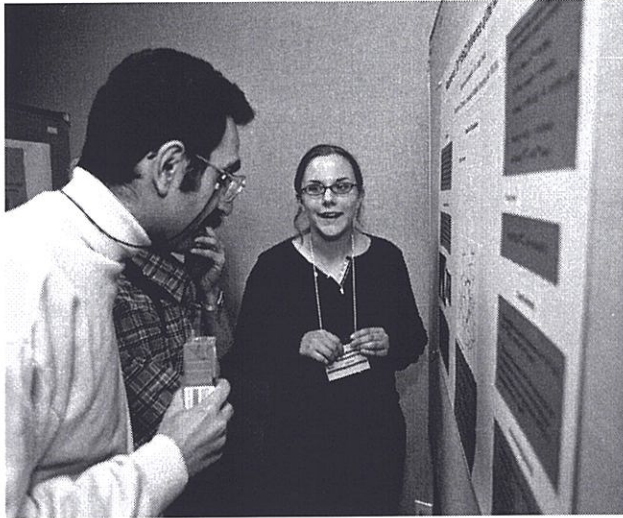
The following Wednesday, as we waited to meet the role models in the small group discussions, Celia presented the next activity. We were again spilt into groups and presented with the instructions. We were going to play a game of pictionary in which we would have to get through all our words before the other teams. We called upon our drawing skills, our imagination, and our abilities to run around tables and people to get to Celia for our next word. It was a tight race that put a whole new spin on the game of pictionary.

On July 31 before the On-Campus Research Tours, we met in the basement of CAB for our last activity. We were presented with a stack of newspaper, a roll of tape, a stapler and staples, a long tube, and a measuring tape. The assignment was to build a geodesic dome by making a bunch of newspaper tubes and stapling them together. An additional challenge presented itself when most teams ran out of newspaper and were forced to join other teams to complete the dome. Although only one team managed to finish before the time was up, their dome looked really cool.

WISEST Special Events

Research Poster Presentation

by Ilana Goldberg



The last day of our WISEST experience we were required to present our posters that we spent our summer working on to our research teams, other research teams, and each other. Each poster was so different and distinct. It amazed me how much variety in the research there is here at the U of A. I saw 50 posters that were all completely unique, and they almost all came from engineering and science.

Not only were the research topics diverse, the posters themselves were all original, and very professional looking. I felt like I could have very well been at a real research conference. Whether done on Power Point or by hand, the posters were all very creative.

I enjoyed, more than anything else that day, going from poster to poster to see what my fellow WISEST participants spent their summer doing. While listening to people talk about their poster, I was amazed at all the learning that went on. Everyone knew what they were talking about, and understood a project that was being studied by graduate students or professors.

Presenting our posters to the research teams made me realize how much I learned during the summer. To be able to explain my project to someone who had finished university or was in a graduate program was really wonderful. Teaching the other research teams about my project made me feel like I was their equal, as I'm sure other WISEST students felt.



The research poster presentation was a great conclusion to an amazing program. It allowed the participants to clearly see what everyone had been doing during the last six weeks. We got to show off what we learned, and we also saw how much others learned. I am confident in saying that from what I have seen at the poster presentation, not one person left WISEST without gaining an enormous amount of knowledge.

WISEST Special Events

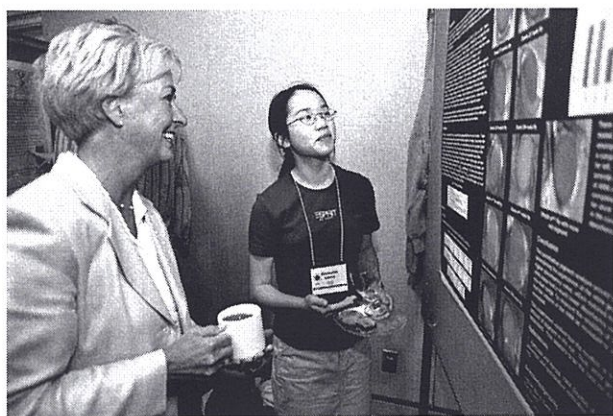
Open House Tea: A Celebration

by Marc Yu

August 15, 2002 marked the last time that the 2002 WISEST students would be together as a large group. In a way, the partly cloudy skies and showers outside effectively marked this bittersweet occasion. For six weeks each of us had worked diligently at our respective labs. And on the final day of the program, we had a chance to reflect on our experiences and demonstrate to our families, teachers and sponsors what we learned and what we have gained from WISEST. As Dr. Margaret Ann Armour, vice chair of WISEST said, "It is a time to celebrate."

Staged at the banquet room at Lister Hall, the Open House Tea brought together individuals and organizations that made WISEST the successful program it is today. Earlier in the day, our supervisors and research members were also invited to take part in the festivities. Each student had the opportunity to share their achievements which only six weeks earlier, had been our goals. The amount of time and commitment that everyone put into their posters and presentations were evident through the intriguing diagrams and paragraphs of information. Guests had the opportunity to walk around and read the posters that were created, and students would then give further explanations and answer any questions. The atmosphere was very relaxed, and it was a moment enjoyed by everyone.

An amazing group of distinguished guest speakers including, Dr. Margaret Ann Armour, Dr. Gail Thornton, Dr. Bill McBlain, and MLA Mary O'Neill exemplified the importance of the WISEST program through their speeches. It was a critical time for all of us, as we are about to make one of the most important decisions of our lives. There are countless fields of study that we could possibly pursue in university. One of the main visions of WISEST is to give youth the opportunity to explore non-traditional fields. That vision was fulfilled this summer and all the students are extremely grateful. Each of the speakers sent a clear message, dreams can become reality and you make your own boundaries. Stephanie Hui, one of this year's WISEST students gave a speech that was a clear representation of what we all felt after completing this program. Expectations that we had prior to the program were met and surpassed. Although we may not be entering the faculty that we were placed in, we still had the opportunity to learn about an area that we may not have been familiar with. All of us can also say that the university campus is no longer as intimidating as before. The WISEST program has certainly allowed us to walk through many buildings and become familiar with the surrounding areas.



The legacy of WISEST is stronger than ever and we now have the opportunity to bring back what we have learned to our peers. Even though the six-week program has concluded, the impression that this worthy program has left will be everlasting. For twenty years WISEST has made a tremendous impact on young women and men, here's to another twenty years and more.

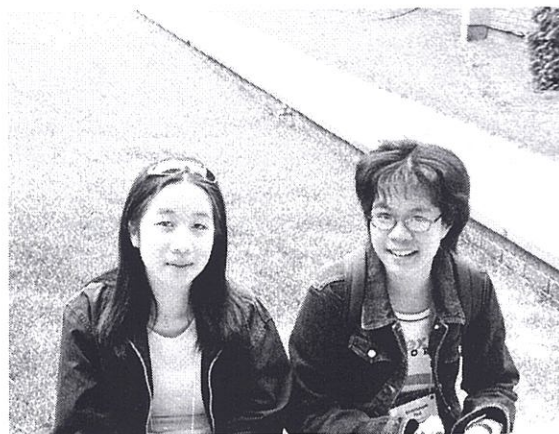
WISEST Social Activities

Eat, Quack and Quark Lunch

by Stephanie Kos

(Now you may be thinking that this is a weird and unusual title for an event, but it is really quite a simple, logical and appropriate name when you understand the meaning behind its creation. First, 'Eat' was given because it was a lunch hour event at which we all ate. Secondly 'Quack' came from the fact that there is a family of ducks in the pond in the Physics Courtyard in which everyone watched adoringly during the hour. Lastly, 'Quark' refers to the location of the event, being the Physics Courtyard, relating to physics as it was an American physicist who coined this word for a subatomic nuclear particle that is the basic component of protons, neutrons, etc.)

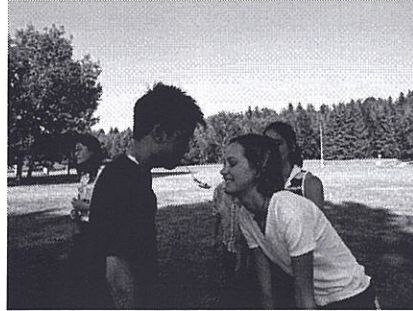
It was our first day on the job and the Eat, Quack and Quark lunch was the perfect way to break from the hard work we had been doing all morning as we got acquainted with our lab, the professors and the graduate students we would be working with for the next six weeks. Many of us were starving after desperately finding our way to the Physics Courtyard amidst the unfamiliar buildings of the University Campus and were glad to see the familiar faces of fellow WISEST participants when we arrived. Among the WISEST group, there were also the friendly smiles of the HYRS students who were just as eager as we were to meet some exciting new people. The air was filled with the enthusiasm of everyone sharing their experiences in the lab thus far, as they snacked on the cookies, licorice and chips generously provided by Grace, Celia and Tara. To conclude the lunch hour everyone joined in a game of human scrabble, grouping up with other people to connect the letter they received with those of others to create some very simple, some very weird and some very original words. It was an eventful lunch hour that was a great way to begin our journey in the WISEST program.



WISEST Social Activities

Survivor: Hawrelak Park

by Andrea Murland



In an evening of grueling challenges and amazing races, the WISEST and HYRS students battled for their tribe to rise to the top of *Survivor: Hawrelak Park*. After a meal of bunwiches, veggies, and cookies to fuel us for the hardships ahead, the contestants moved into their tribes and the challenges began.

Soon everyone was tying very small balloons to their ankles, trying to find the position in which it would be least likely to be stepped on, by themselves or someone else. The mission: Step on other people's balloons to pop them while protecting your own, and have the most people left standing from your tribe at the end. Despite the other tribes ganging up on them, The Purple Posse came out ahead.

Then came the next task: a relay race. With the first three teams already at the line, everything was explained. Ready...go! The first people to go scrambled through their teammates' legs and then ran to the pole lying on the ground. With a member of another team counting for them, they put their heads on the poles and started running in circles. At ten, they began stumbling back to their teammates for the next person to begin. Stumbling and falling, all of the teams finished with amazing times, but it was The Purple Posse that beat out the rest, again. Having now been assured that the most grueling of the challenges was over, the contestants moved to the next activity.

There they found spoons and m&m's waiting. The first three teams lined up again. Spoons in mouth, the m&m's were passed down the line. The candies were dropped and teams started over, while the next three teams tried to plan their strategy. In the second set of teams, Mellow Yellow exploded, blowing away the leading time by almost a minute. They were the undisputed winners of that race.

The next challenge was a display of trust and teamwork. Each team honored the loudest person by naming them the guide for the tribe. The others put on their blindfolds and lined up. With different colored sponges scattered across the grass, the guides yelled and shouted to lead their players, one by one, to a sponge. The catch: each sponge had to be a different color. The La Chow Chows beat the rest to take the title for the sponge race.

With only one challenge left, the tribes knew that they had only one chance left to pull ahead. The tribes planned and built towers, with the goal of having the tallest one. However, it was not as easy as it sounded. It was not until the golf balls appeared on the tables that the real challenge was explained. The ball had to sit at the *top* of the tower, not touching any tape. The towers were all looking good, but the wind was beyond our control, and towers started to topple.

After Tara and Celia measured our towers, we learned that The Confused Beavers had come from behind to take that challenge. Then, finally, the results were tallied. The final results: in 4th: The Confused Beavers, Jeff and the Pretty Pink People, and The Big Green. In third: The La Chow Chows. In second: The Purple Posse. And the Survivors of Hawrelak Park: Mellow Yellow.

WISEST Social Activities

Lunch with the Bunch

by Stephanie Yan



Lunch with the Bunch was a great opportunity for WISEST students to come together twice a week to enjoy each other's company and get to know each other.

On Tuesdays, we met at the Info Booth in SUB; when it was nice out, we all went outside to eat in QUAD. On Thursdays, we met in the cafeteria on the second floor of ETLC by the Tim Horton's. The number of attendants varied from day to day, but everyone always had a great time. Celia would always go around from group to group and ask us how we were doing in our labs. She learned our names so quickly- within the first week!



We played a game to get to know each other at the very first Lunch with the Bunch; we all sat in a circle and wrote the name of a famous person on a slip of paper and stuck it on the back of the person to our left. Then we all had to guess who we were by asking our fellow WISEST students questions (I had the hardest time figuring out that I was Johnny Depp!). After that lunch we did not play any more "get to know each other" games since we soon became acquainted with one another.

We casually sat around and chatted together about our labs, what we did on the weekend, or anything; these lunches were nice breaks from our lab-times to see each other besides the Wednesday afternoon activities. The people attending also varied from day to day, so it was fun talking to different people every lunch.



We all became friends within such a short period of time- these lunches were a wonderful way to hang out with Celia and our newfound friends.

Residence Life in St. John's Institute

by Megan Ciurysek and Erin Olovson-Cleveland

What can we say, what can we say?

July 3rd, 2002, eight seventeen-year-old girls moved into rez. Here we met two guys and two girls from HYRS, some kick-bum Resident Advisors and a hand full of Ukrainian speakin' toe tappin' campers. And so our adventure began. With a scary rule settin' talk from Linda we were ready for the summer. Handy to know a few fellow WISESTers at the orientation in ETLIC the next day, we jumped right into our skewed summer identities. With a skip and a jump, we began our summer's work. But what goes on behind closed doors we won't be telling Grace. So what can we say?

We can mention what didn't happen, like never breaking curfew, cheating the ETS system, or staying too late in the guys' room. We also did not pay a child's price for Klondike days, run up the slide at Street Fest (rather than down), or all together sneak into K-days. What we did do was go to Street Fest too poor to pay because of numerous shopping sprees, jump and scream all night at Edgefest, and go for late night snacks at Second Cup. Summer at St. Johns was as they say, part of the whole experience. We worked hard in our labs and then had a little fun in our off time, made a few friends a long the way and all had a great time.



Vicki Listoe: "Living at St. Johns has added so much to the WISEST program by allowing me to get to know some of my fellow WISEST participants better and form lasting friendships."

Linda Bui: "Lots of fun: late night talks, sleepovers at Melissa and Megan's, many walks down Whyte Ave, oh and who can forget the great food."

James Montgomery (HYRS student): "The long runs football games, Edgefest, shopping, aimless walks down Whyte Ave – it was a blast Ladies."

Megan Ciurysek: "All of St. Johns was great, the people I met, friendships I made, and stories I'll have to tell."

Melissa Paquette: "Having a 'sister' for the summer, spying at the boys apartments across the back alley, and shopping down Whyte, made living in Edmonton this summer more than interesting!"

Erin Olovson-Cleveland: "I really liked all the people at the rez. especially staying up late just to talk."

Jeff Ma (HYRS student): "The Beat Beethoven was great, and dim sum was funny"

a **mysterious** HYRS student: "I can't believe I snuk into K-days"

Sharlene Cotton: "I loved just plain hanging out"

Some words from the WISEST resident advisor... Linda Bui

I didn't know what to expect when I decided to become a resident advisor again this summer. So two weeks before I moved into St. John's Institute I was overcome by this terrible fear that the students would not like me this time around. Maybe they'd all hate me and would not want to hang out with me all summer. I had knots in my stomach the first day I had to meet the students. But as soon as I met Erin, Sharlene, Amanda, Vicky, Melissa, Megan, Tara, and Caroline, I knew we'd all get along swimmingly. The girls were all great. We had many good times. There were numerous shopping trips, walks down Whyte Ave, and movie nights in Vicky and Amanda's room. Oh, and who could forget the late night talks, sleepovers in Melissa and Megan's room, and playing Truth or Dare. All in all it was a fantastic summer. I hope everyone had as much fun as I did. Best of luck in the school year and hope to see you all in September 2003. Keep in touch!

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Cara Baergen

WISEST Supervisors: Dr. Ted Lewis & Dr. Andy Liu
Sponsor: Faculty of Science, University of Alberta



When I applied for the WISEST summer research program, I thought that I was applying for a job to work in a lab. Instead, I found that I would be working in the department of mathematical sciences.

Instead of a lab, I am working in a small room in CAB. The room is full of games. Not your Snakes and Ladders or Scrabble, no, these were mathematical games. There are puzzle books, brainteasers, and various logic games along with the boxes upon boxes of Rush Hour. I had no idea that so many different types of rush hour existed. There is Junior Rush Hour, Safari Rush Hour, Rush Hour with trains, Rush Hour with a limo etc.

Instead of playing rush hour all day, I solved logic problems. I wrote down the thought processes and logic that I used to solve the problems and adapted them to create new problems. Why??? For Math Fairs. "Huh?" Math fairs are a way of involving elementary and Junior high students in math in a fun way. They are set up like science fairs with people traveling between the displays. The work that I did will end up in a book that will provide teachers with a source of problems to use in math fairs. The reasoning that we use can help others solve, understand and help others with the problems.

This may sound boring but it is not. One reason is that I was not working alone. I worked with Sharlene Cotton. Working together allowed us to bounce ideas off each other as well as have each of us solve the problems that we enjoyed. I enjoyed the "pencil and paper" style problems while Sharlene is a whiz at visual problems. Our different talents made it so we were usually solving different problems, as well as keeping out competitive natures in check. Having two of us working together also allowed us to work with logic games. We spent hours playing games trying to find winning strategies. We also spent a day in the library photocopying old science journals to gather "new" problems.

Each day was different as none of the problems that I solved were exactly the same. The problems did not become monotonous as I could choose the problems that I found interesting to solve and leave the rest. This picking and choosing was possible as we were also screening the questions, picking the ones that others would likely want to solve as well.

I appreciated the flexibility of choosing out own hours. We had one key to the room and so Sharlene and I could set our own schedule and vary it from day to day. This made planning my summer much easier. For example, my family went to Manitoba for a week. Because of the flexible hours I was able to spend the weekend in Manitoba and fly back on Monday, still get ting to work only an hour later than usual. I just worked an hour later that day and so I still worked a seven hour day. I should mention that we worked beginning at 8. You may question our judgment, I know some days I did, but it allowed us more free time in the evenings to enjoy our summer.

My WISEST experience allowed me to play games and solve puzzles all summer, who could ask for a better summer job?

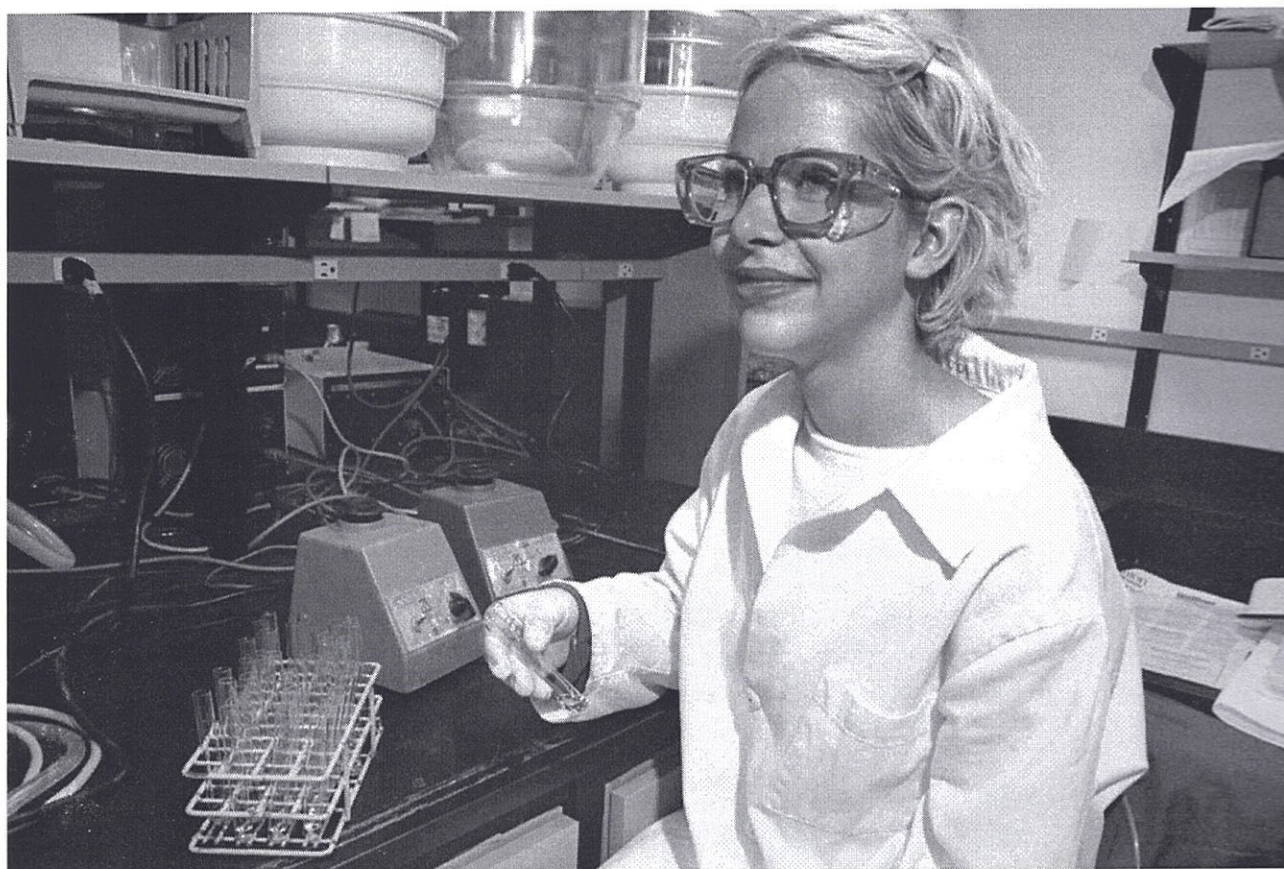
Allison Bouthillier

WISEST Supervisor: Dr. Eryck Silva

Sponsor: Alberta Agricultural Research Institute

During my stint at the University of Alberta, participating in the WISEST program, I got to be involved in two projects. They were both in the same department (Agriculture, Food and Nutritional Sciences), but they were completely different from each other!

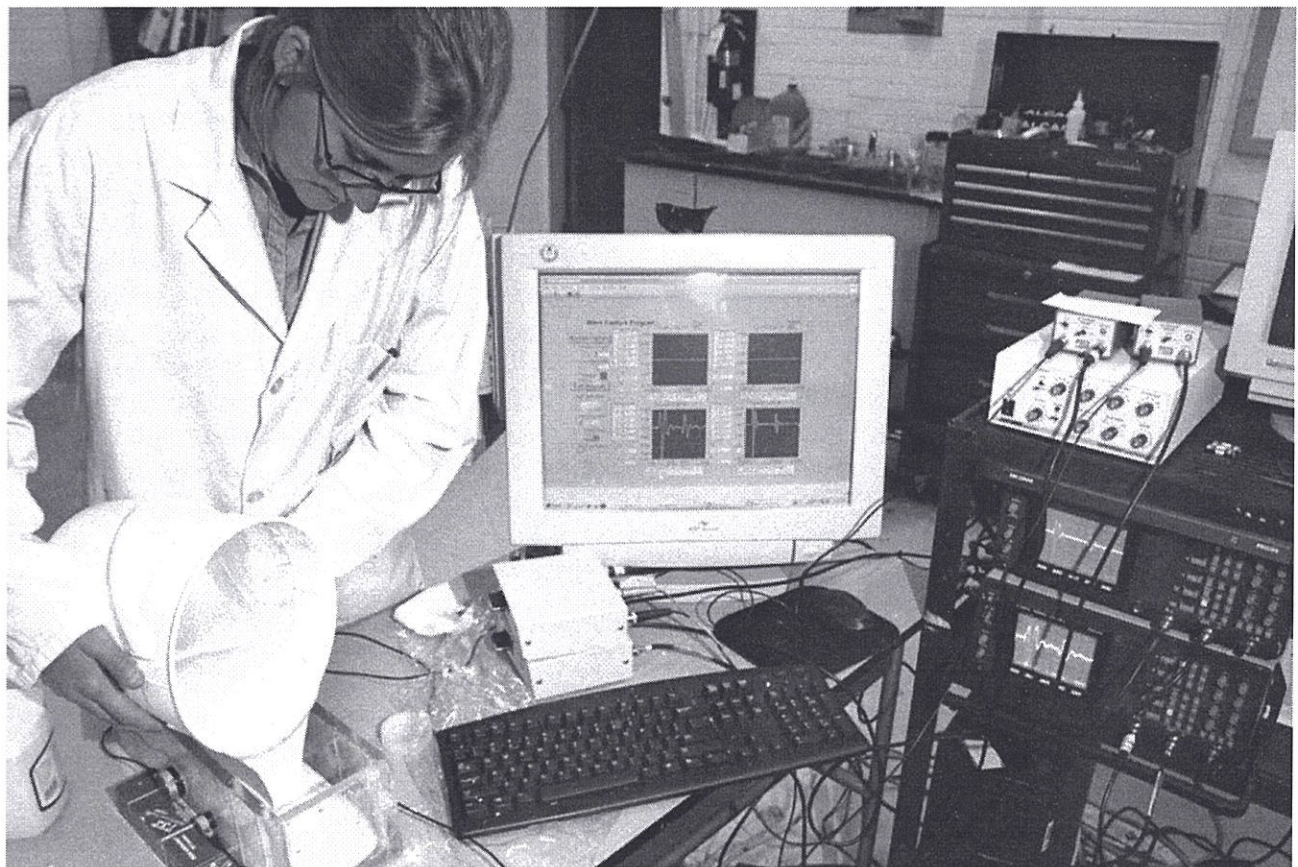
The first project I helped with involved beef. I was working in Sensory Evaluation. What's Sensory Evaluation, you ask? Taste testing!!! The research we were conducting involved evaluating beef that came from cows fed on two different diets. My job was in the kitchen, hair net and all, preparing the steaks, washing dishes and getting everything ready for the panelists. The panelists were Canadians, and Mexicans and Japanese who have been in Canada for less than two years. The information that we were collecting is going to be used by the Alberta cattle industry, for marketing purposes. They want to see which type of beef is preferred by potential customers in the international market. It is interesting to think that the work I did this summer is affecting people in different continents!



My other project was a little more “traditional scientist”. I was working in an actual lab, with the usual test tubes and pipettes (instead of baking pans and oven mitts!). I was helping my researcher with the extraction of protein from goat’s milk. Why? Because there is a certain protein (called GMP, for short) found in milk that people with the disease phenylketonuria can eat, when then can’t eat most other types of protein. This is because they do not have the enzyme which breaks down phenylalanine, which most proteins have, but GMP doesn’t. In our lab, first we had to get the protein out of the milk by chromatography. It wasn’t the type of chromatography that we did in school, but my researcher explained to me how it was separating the colours apart from each other, just in a lot more complicated way than the old “dot of ink on a slip of chromatography paper” that we did in Chem. On top of that, the colours were ultra-violet, so we could not actually see the separation without using the spectrophotometer. We passed the milk (the whey part) several times through special cylinders hooked up to tubing, which dripped the excess into test tubes (which were in a special machine that changed to the next test tube when the one it was on filled up!). After we had all the protein collected, dialyzed, and freeze-dried, we performed several different tests on it. Each of the three samples of goat’s milk that we used were all treated differently when we started testing them: one was raw milk, straight out of the goat, and the other two had been pasteurized, but by different methods. After we got the protein out, we tested it for components like sialic acid, galactosamine, and phosphate, to see if the treatment affected or damaged the protein. My job included measuring out different compounds and solutions to make reactions with these different components. Depending on the amount that was there, the solution in the test tube would turn varying shades of whichever colour the reaction made. Then we used the spectrophotometer to measure the colour, indicating the concentrations. It made me feel like a real scientist!

Even though both of these projects were in the same department (only a couple doors down from each other!), you can see how different they were! One applied to economics and international trade, and the other involved medicine and pharmaceuticals. It only goes to show that there are many sides to science, and you can find something to suit pretty much anything you're interested in.

Susan Brenneis
WISEST Supervisor: Dr. Irene Meglis
Sponsor: Petro-Canada



This summer I was assigned to work in the Department of Civil and Environmental Engineering for the Wisest Summer Research Program. I worked with Dr. Irene Meglis (a Geophysicist), Angela, (a 4th year physics student), and for the first two weeks I also got to work with Emily (a WISEST student from last year). The goal of the project that our team is working on is to develop a device that uses ultrasonic sound waves to test for segregation in oil sands tailings. This research is environmentally beneficial because the oils sands tailings are stored in ponds that occupy a lot of land and if it segregates, then it will take much longer before the land can be reclaimed. By testing to see if the tailings being put in a pond will segregate, we can decide what actions should be taken to see that it doesn't and that it can one day soon be reclaimed. My contribution to this

research was to test all sorts of mixes of different ratios of components that could be found in a tailings pond. By recording the ultrasonic waves that are passed through these different mixes we were able to compose a kind of index that will be used in the field to tell what exactly is under the pond surface. Each mixture has different properties that may either speed up a wave or slow it down and attenuate different amounts of wave energy. These characteristics are what is used to distinguish between mixtures. I worked in the basement of the Civil and Electrical engineering building and it was kind of scary looking to say the least. The room that I worked in was freezing cold too and we don't know why. Occasionally toques and mittens were worn just to overcome shivering through the day. I also helped monitor another experiment down the hall from us that was in a freezer, and that was also cold. But I rarely had to go in the freezer, which was good because I was usually cold enough as it was.

I found the Wednesday small groups to be the most beneficial to me. I really enjoyed talking to the women that had the interesting jobs. It was really informational and inspiring too, to hear about all these women who had went through all the schooling but were able to work at a job that they still really enjoy, and don't regret. I also really liked the Tour of the Mechanical Engineering lab. I found it really fascinating and encouraging to see that there were some occupations that I could really enjoy and apply myself to out there. I can't really comment on the other events that we did because my schedule usually conflicted and I was unable to make it to the Lunch with the Bunch, and being from Leduc I found it hard to attend the after hours events like Survivor, and the party that some of the girls had at the dorm.

The WISEST summer research program was a very interesting experience, which gave me a lot of exposure to lab work and many of the skills necessary to work in a lab. Patience and a lot of problem solving skills, as occasionally (more often than not) things didn't work out quite the way that they were supposed to, were definitely assets. I was also able to see what many of the other Lab-Techs were doing and learned how everything in our division was all working towards one central goal. I had a lot of trouble adjusting to the environment in which I worked but I think that was the most challenging part. I gained a lot of knowledge this summer that I would not have if I had not worked as a WISEST, and overall it was very worthwhile experience.

Megan Ciurysek

WISEST Supervisor: Dr. Marian Weber

Sponsor: Suncor Energy Foundation

During my six-week work period in the WISEST Summer Research program, I assisted Dr. Marian Weber in her ongoing research involving industrial water demand in the Athabasca Watershed. In this portion we are examining the demand for water in the Oil and Gas sector.

My work involved a great deal of literature searches in the library and online as well as contacting various companies for more specific data. I also completed an online computer class, which taught me how to use Geographical Information Systems (GIS). Using Arcview, a GIS computer program I manipulated large databases to create maps. This was the highlight as well as the culmination of my work with Dr. Weber.

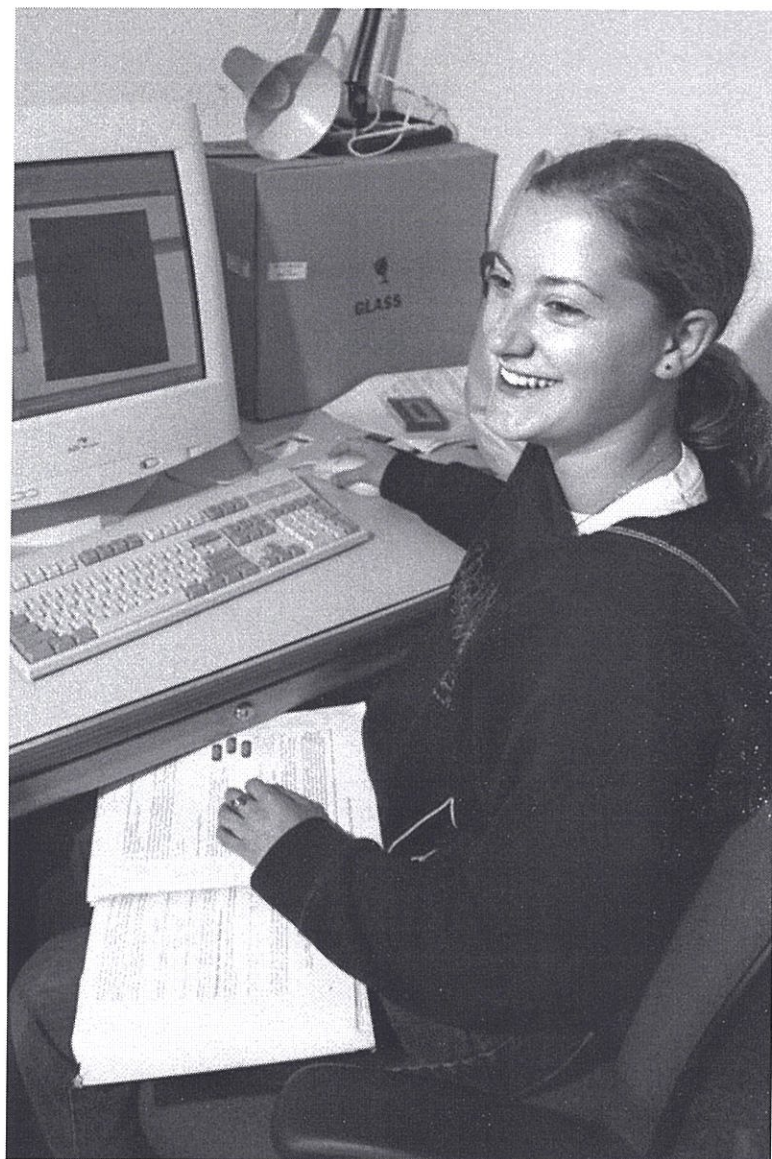
From my text and online research I learned that there are three levels of oil recovery, primary, secondary, and tertiary which is also known as enhanced oil recovery. Although there are several types of enhanced oil recovery the most widely used type requires large volumes of water. This recovery process is called thermal recovery and is used to extract the remaining 30-40% of oil left in the reserve after the primary and secondary processes. There are several variations of thermal oil recovery, but they all work with the same basic concept, by injecting hot water or steam the heated oil becomes less viscous and therefore can be pumped much easier. This is the most economical enhanced oil recovery process because water in Canada is considered a public good and is therefore free. Oil and Gas industries are literally using millions of cubic meters of water, which depletes our supplies, and if the produced water is not properly treated it can pollute the water table.

Once I had a basic understanding of the involved industrial technology I began to work with databases to build maps with a GIS program. By examining the information displayed on the maps, we hope to be able to decipher relationships between industrial processes and water sustainability. I enjoyed working with this program and was excited each and every time that I finished a new map!

Outside of my office I learned about a variety of different things. Our weekly events were fun and a great chance to see what is really out there in the world of science. This for me, along with meeting so many people with experience in my areas of interest, and the other students with whom I share so much in common was the most valuable part of the six weeks in WISEST.

Participating in the WISEST Summer Research Program has been an incredible six weeks and such a huge opportunity to be exposed to otherwise impossible experiences.

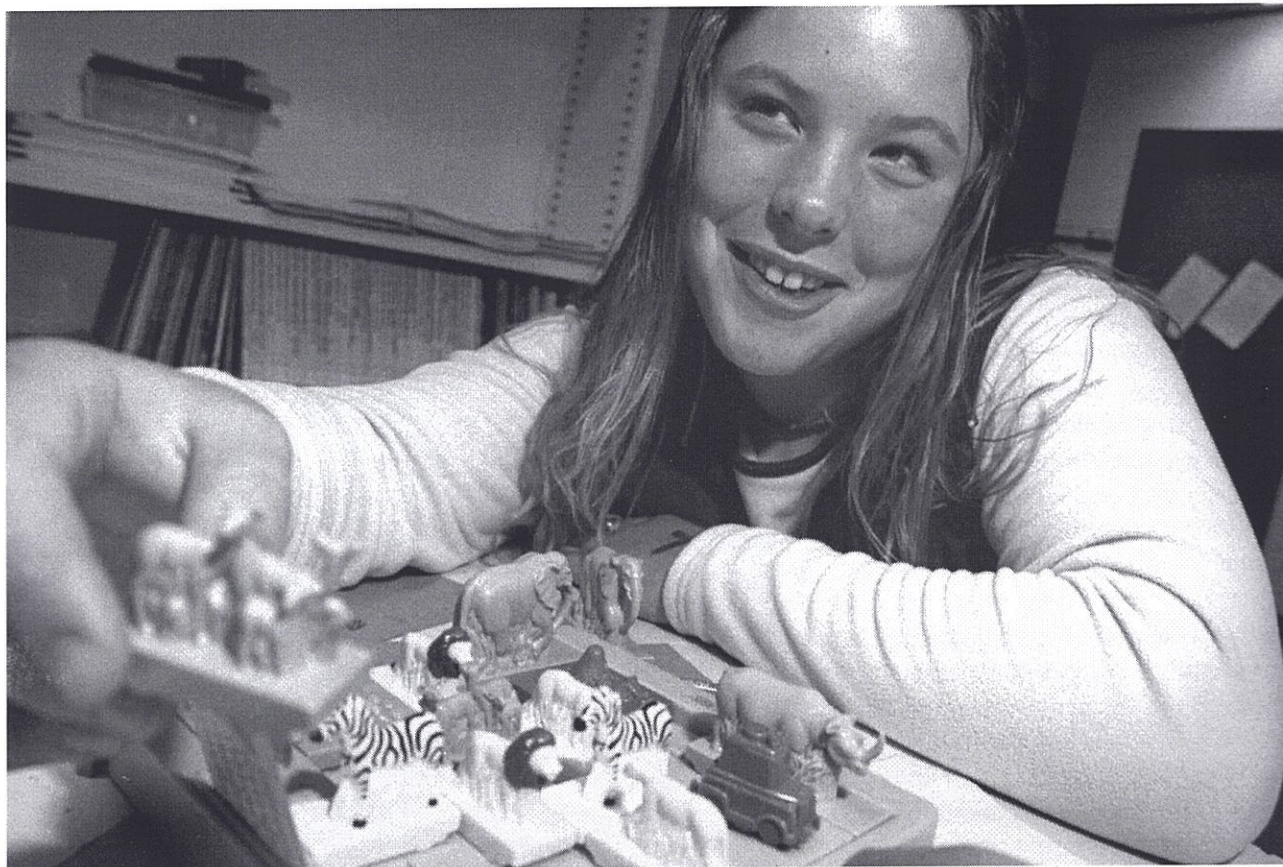
A great deal of people put a lot of energy, thought, and time into providing the fifty-three of us students with the experience of a life time, and I will never forget it.



Sharlene Cotton

WISEST Supervisors: Dr. Ted Lewis & Dr. Andy Liu

Sponsor: IONCMASTE



I had never heard about the WISEST summer research program before in my life and when I read the application form I was excited but doubtful. I didn't really believe that the University of Alberta was really going to place grade 11 students working in actual labs for the summer. I applied anyways and boy was I wrong. Even though I myself was not working in a lab, I was doing something that was just as exciting and unique as everyone else.

My project is unique in the sense that there were only two of us in the whole WISEST program working in my department. Cara Baergen and I worked in the math department. Great, now you're thinking what could you possibly do in the Math department all summer. The answer is lots. I was working with Dr. Andy Liu and Dr. Ted Lewis on a project to collect and make Math Fair questions. If your wondering what a math fair is, it is sort of like a science fair but using math instead. The propose of math fairs are to get elementary and junior high students interested in math. Sounds like a great idea right. Then why are math fairs not so common? It is because of the lack of suitable math fair questions available for the teachers. Then why can't the teachers just get the questions themselves? Teachers just don't have time to go through math questions, find the questions that will be to the students liking and alter them so they are suitable for a math fair. That is what I do.

One example of the questions I work with is: A camp counselor and eight campers come to a fork in the road with four paths to choose from. The camp counselor knows that camp is down one of the roads and he has only 90 minutes to get to camp. It takes 30 minutes to go down each road and 30 minutes to get back. Two of the campers lie sometimes, but not all the time. How is it possible for them to get back to camp in time? You're probably thinking that this is not math but a brainteaser. The truth is, that it is math but a different kind of math. The math I work with all day is called "discrete math". There are many different questions and not all of them are suitable for a math fair. When you find questions that are suitable, they usually have to be altered to make the question more workable or more interesting. Some might think I'm weird but I really enjoyed working with math problems my whole summer.

This has to be the best summer job available for students planning on entering University in the future. You have the chance to see what it is really like to work in various departments. I got to see what some mathematicians do and it really isn't that boring, as some people would think. This has been an experience of a lifetime. Thank-you WISEST.

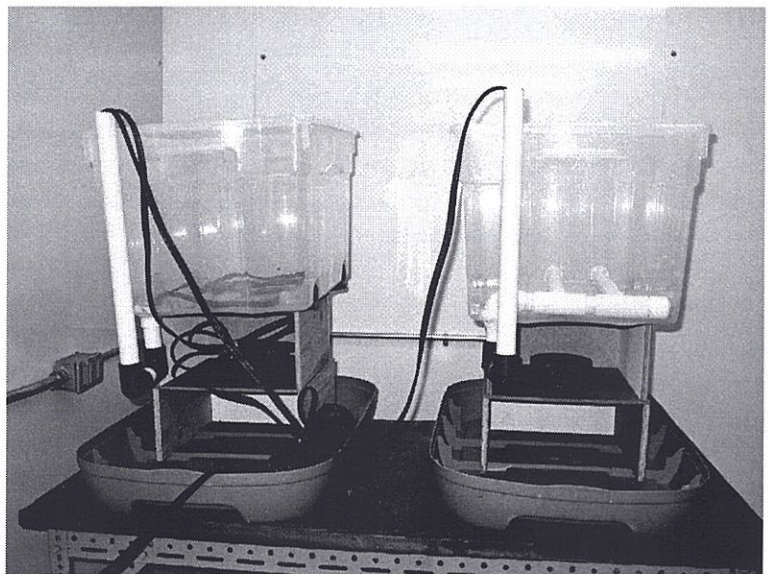
Andrea Ewanchuk

WISEST Supervisors: Dr. Dave Sego & Dr. Kevin Biggar
Sponsor: Alberta Agricultural Research Institute

When I first heard of the WISEST Summer Research Program I knew I wanted to be a part of it. I was ecstatic when I found out I was accepted, but slightly disappointed when I found out it was going to be working with hog manure. I wasn't sure that was how I wanted to spend my summer vacation, and I couldn't figure out what cleaning hog manure had to do with engineering.

As I soon found out hog manure is a major environmental issue, especially here in Alberta. There has been research as to how to dispose of agricultural waste in an effective manner, especially cost wise. I was going to be working with Amanda Willoughby with her supervisors Dr. Sego and Dr. Biggar. Her project was using thin layer freezing to extract water from the hog manure.

My project was to find out how heat tape in the collection systems affected freezing and collection. This past winter a field test was done to see how successful thin layer freezing worked in a large-scale experiment. There were some operational difficulties, as most of the piping froze up and didn't allow for the collection of water. I helped construct four different collection systems out of clear Rubbermaid containers, gravel & sand, and of course heat tape. Half of the containers used slotted piping to allow water to run





through, others were left empty. The containers were slanted slightly towards a collection bucket. These containers were then put into a freezer to be observed.

During these past weeks I have been doing various testing in addition to my project. I have helped around several different labs doing calibrations and data collecting. I learned how to do vane shears, a test to find out the strength of different samples with different amounts of chemicals added to them. After I collected the data I made up separate graphs for each sample, then combined them for a comparison. I also learned how to utilize the library resources to collect information on what has been done and what is currently going on in regards to agricultural waste management. I have learned many new computer skills such as working in Microsoft Excel, burning C.D.'s, and transferring files. I can now do so much more with computers, rather than just using it for internet purposes.

I had never heard of an environmental engineer before this summer, and it has dispelled many stereotypes that I had. I had always imagined that engineers worked in big commercial plants and polluted the environment as much as they could. This summer I found out how many people are actually involved in trying to clean up the environment or trying to preserve what is left. It is great to know that there are people in the world that are concerned with our future and are taking things seriously.

Being here at the University of Alberta has helped me decide where I want to go with my future. Before coming here I only had a basic understanding of engineering and university life in general. Actually seeing what an engineering student does, and seeing what engineering is and having the chance to actually meet with people in the jobs that I am interested in, is a chance that not everyone can have.

Ilana Goldberg

WISEST Supervisor: Dr. Cindy Paszkowski

Sponsor: Canada Summer Career Placements Program

I spent six weeks of my summer working in the WISEST Summer Research Program. At first uncertain of what to expect, I found that this experience was one of the most interesting and enlightening that I have had.

I worked in ecology, and participated in a variety projects. I was then given the choice of which research I could work on for my own research project. Working with Dr. Cindy Paszkowski and her graduate students, I saw a few very different aspects of ecology. I had the opportunity to do lab work with Caroline McParland, a graduate student. Her project involved the use of a method called Stable Isotope Analysis (SIA) to determine whether the presence of fish in a pond would have a significant effect on the diets of certain birds. SIA is a relatively new and useful way of mapping out a food web. With Caroline I helped prepare the samples to be analyzed. I worked with fish, insects, and Red-Necked Grebe eggs. Once the samples were prepared and packaged, they were sent to a Mass Spectrometer, which determined the stable isotope content.

I did some computer work with another graduate student, Brian Eaton. Brian is studying toad aging and is looking into possible reasons for the shrinking population of toads. One method for aging toads is to examine a cross-section of the toe of a toad. Like trees, the toes have a ring for every year that the toad has lived. When caught in the trap, the toad is measured, weighed, and one toe is removed before it is released. The toes are put in wax, cut into slivers, and mounted on slides.



My job was to examine these slides under a microscope that was attached to a computer, and take pictures of the clearest sections, so that they could be measured and aged more easily.

The fieldwork was one of the highlights of my work in ecology. I visited Elk Island twice; once with Caroline, and once with Brian. Spending a day in Elk Island felt more like a hiking trip than like work. We would check the traps for frogs or insects, record what we caught, then release them.

Besides from the actual lab experience, I got so much out of WISEST. I met so many people; those who worked in the same department as me, and many who did not. Each project was so different. This whole experience really opened my eyes to all of the research possibilities. Preparing my own research poster, while challenging, allowed me to be creative, and I really enjoyed making it. The on- and off-campus tours were useful in getting an idea of the many different opportunities for employment in science and engineering.

It surprised me how quickly six weeks goes by. I learned so much this summer. I feel that I have had a rare opportunity to see firsthand what working at the university is like. I believe this experience will last more than the six weeks of summer. I feel more prepared for university, and more confident about the many possibilities that exist for women in science.

Kerri Lee Hennig

WISEST Supervisor: Dr. Alidad Amirfazli

Sponsor: Canada Summer Career Placements Program

This summer I was able to spend six weeks working in a Mechanical Engineering lab with Dr. Alidad Amirfazli through the WISEST summer research program. My group consisted of me and six other researchers who all seemed to be working on completely different things. At first I could not see how a person writing computer programs, a person setting up complicated equipment and a person doing chemistry experiments could all be working on the same project. However, I soon realized that all of these different components were required to achieve the goal of replacing lung surfactant in people with underdeveloped or damaged lungs.

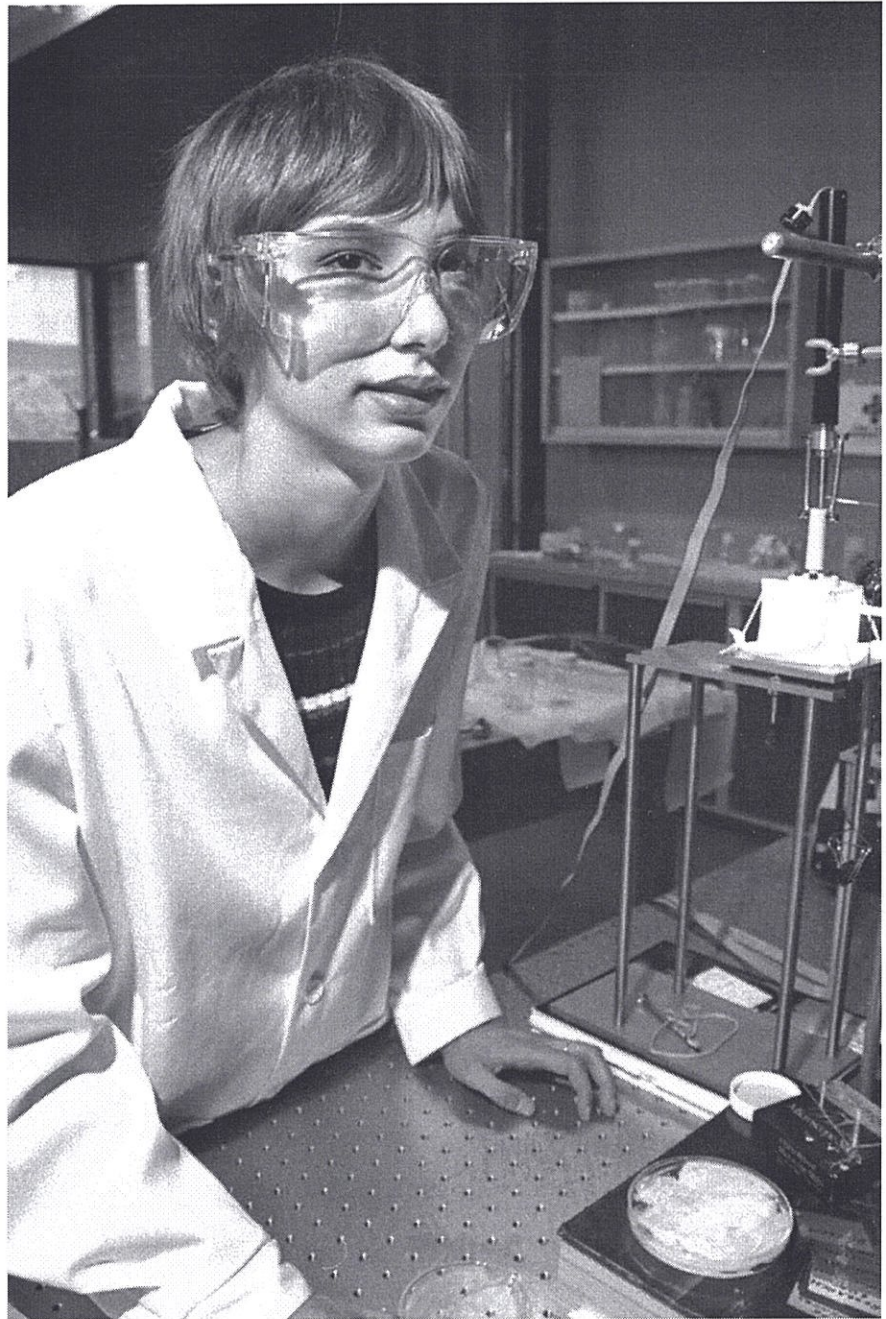
My project was to determine the effect of surfactant on the wetting of super-hydrophobic surfaces. This is important because if super-hydrophobic surfaces also repel surfactant solutions then they could be used to keep the surfactant where is wanted instead of having expensive surfactant leaking other surfaces.

Super-hydrophobic surfaces are surfaces made of materials that are already hydrophobic (such as Teflon) which are also rough on a microscopic level so that air is trapped between the surface and the water. I spent most of my six weeks in the research program trying to create one of these surfaces to do my experiments on.

Hydrophobicity is measured by placing a 5 microlitre droplet of water on a surface, and then measuring the "contact angle", or the angle between the surface and a line drawn tangent to the droplet at the point where the droplet contacts the surface. On a super hydrophobic surface the

droplet looks almost like a tiny marble sitting on the surface, and has a high contact angle. As hydrophobicity decreases this angle becomes lower.

The first surface I tried to use was a natural soot surface. By holding a glass microscope slide above a burning candle I succeeded in coating the surface in a thin carbon layer which was super hydrophobic. I discovered that carbon dissolves in surfactant, so I had to try creating a surface out of Alkyl Ketene Dimer wax instead. Melting this wax at 90°C and allowing it to dry in a nitrogen atmosphere allows it to form a fractal structure, which gives the necessary roughness to the surface. However, this wax tends to solidify with large craters in its surface, which made it impossible to measure contact angles on this surface. We are still experimenting with different containers and conditions to try to get this wax to dry with a flatter surface.



I found this research particularly interesting because super-hydrophobic surfaces are such a new area, and not much research has gone into using these surfaces with liquids other than pure water.

Overall the WISEST Summer Research Program was a great experience for me. I learned a lot about the ways the University works and about the variety of different things to do in the Mechanical Engineering Department. I also learned a lot about the research process and how real research labs work.

Amanda Henry

WISEST Supervisor: Dr. John Bell

Sponsor: Faculty of Science, University of Alberta

Drosophila?

When I first started my search for a summer job earlier this year, I never dreamed that I would be doing something interesting. Working at one of the foremost research centers in the country didn't even cross my mind. I never thought for an instant that I would be working in a genetics laboratory, learning procedures and equipment generally left to be discovered in university. I thought that at best, I could spend the summer perfecting my hamburger-frying skills and running away to the beach at every opportunity.

Now thanks to WISEST, hamburger-flipping was the farthest thing from my mind this summer. (Although I still did occasionally dream about the beach!) Instead, I found myself under the tutelage of Dr. John Bell and his research team pondering a much more complicated mystery: *Drosophila*.

To unravel the riddle of *Drosophila*, one must first ask two questions. Firstly, just what is *Drosophila*? Answered simply: *Drosophila* is the Latin name for the common fruit fly.

The second question a fruit fly detective must ask is this: Why do I want to study fruit flies?

I soon learned that there are untold numbers of books, labs, and people dedicated solely to answering this very question.

With regards to genetics, the fruit flies are useful for three main reasons. Firstly, fruit fly research has been a field of scientific interest for more than two hundred years. There is a wealth of background information already available in the field, making specialized research ideal.

Secondly, the fruit fly has a very short life cycle (approximately two weeks). As a result, breeding studies can be carried out quickly and often. For WISEST, this meant that I was able to see the results of most of my work before I left the lab.

Thirdly (and possibly most importantly), *Drosophila* has a fairly simple genome which has been entirely sequenced. Translation: Anyone wanting to do genetic research with a fruit fly is already equipped with a DNA map of the fly. (As far as geneticists are concerned, it's the greatest thing since the microscope!)

With these two questions answered, I was ready to take the next step in my summer WISEST experience. I started my lab work.

For the six weeks I spent in the lab, I was mostly involved with just two projects. My primary project was with Leola Chow, a graduate student working in Dr. Bell's laboratory. Previous to my arrival, Leola had worked on a project which involved crossing (breeding) two strains of mutant flies with sets of different constructs (flies genetically engineered for specific experimentation) to see if gene interaction between the two flies would cause rescue effects in the offspring. My project was to test the authenticity of her constructs to validate her results. To do that, I would take



an extract of DNA from the fly that I prepared using enzymes and the PCR machine. Then, using the PCR machine, I amplified that DNA, ran it in a gel with a chemical called Ethidium Bromide, and using UV light, I could take pictures of the gel and determine the size of DNA I was looking at and thus validate the authenticity of the stock.

The second project I worked on was under Ankush Garg, another graduate student in Dr. Bell's laboratory. My project with Ankush also involved authenticating stocks, but with his flies I did it through crosses. By crossing certain mutants with three groups of mutant control stocks, I determined if the test stock were genuine by recording the degree of mutation present in the offspring of the crosses. No mutations in offspring meant there was something wrong with the stock. (How's that for a cruel irony?) Luckily, most of my crosses turned out moderate to severe mutations.

My summer with *Drosophila* was amazing. I learned all sorts of new and interesting things (most of them are listed on the back of my "I'm a molecular biologist and I know..." shirt...) and met all sorts of new and interesting people. Genetics is an incredible field, and I'm glad I got to spend my summer discovering it.

"I never thought for an instant that I would be working in a genetics laboratory, learning procedures and equipment generally left to be discovered in university."

Megan Holland

WISEST Supervisor: Dr. Maria Mayan

Sponsor: Canada Summer Career Placements Program



When I first heard that I was working at the International Institute of Qualitative Methodology, I wasn't quite sure what to expect. Qualitative Methodology? What is that? Well, I was going to find out.

When I first met my supervisor, Dr. Maria Mayan, I knew the next six weeks were going to be informative while enjoyable. I also learned that my research was going to be very different than everyone else's experience at WISEST. My research was going to be about the why, the reason behind human behavior.

My work this summer had many components. First, I listened in on meeting about different projects; the Gina Browne Project, and CO-OP: Working Together. I learned how people from different aspects of the working environment come together to implement projects that will benefit the community. The first project implements a sole support welfare program, while the other project will allow ethnic communities to work together to create changes in health policies. My second work objective was watching episodes of The Simpsons to help Dr. Mayan in teaching qualitative methodology in Sweden. I was to find the underlying concepts regarding human behavior so that students could examine the why behind each concept. My third and most important work objective was to research cultural competence in the hospital setting. I listened to

numerous interviews with hospital management. Questions inquiring about whether they believed the use of terminology to describe minorities were an issue, or if their needs were being met, were asked. Then using these interviews from the hospital management I coded and categorized the information. Dr. Mayan will be using this information to write up her final report. This third objective proved to be very interesting. Often people do not have the same idea of the meanings behind different terms, thus many misunderstandings can occur.

This research really opened my eyes. I learned that not all research is conducted in wet labs, with white lab coats, test tubes and mice, holding interviews and asking questions is another yet very valuable way to find much needed knowledge. To understand the why behind human actions we must look at the question with a qualitative approach.

Nicole Holowack

WISEST Supervisor: Dr. Margaret-Ann Armour
Sponsor: Canada Summer Career Placements Program

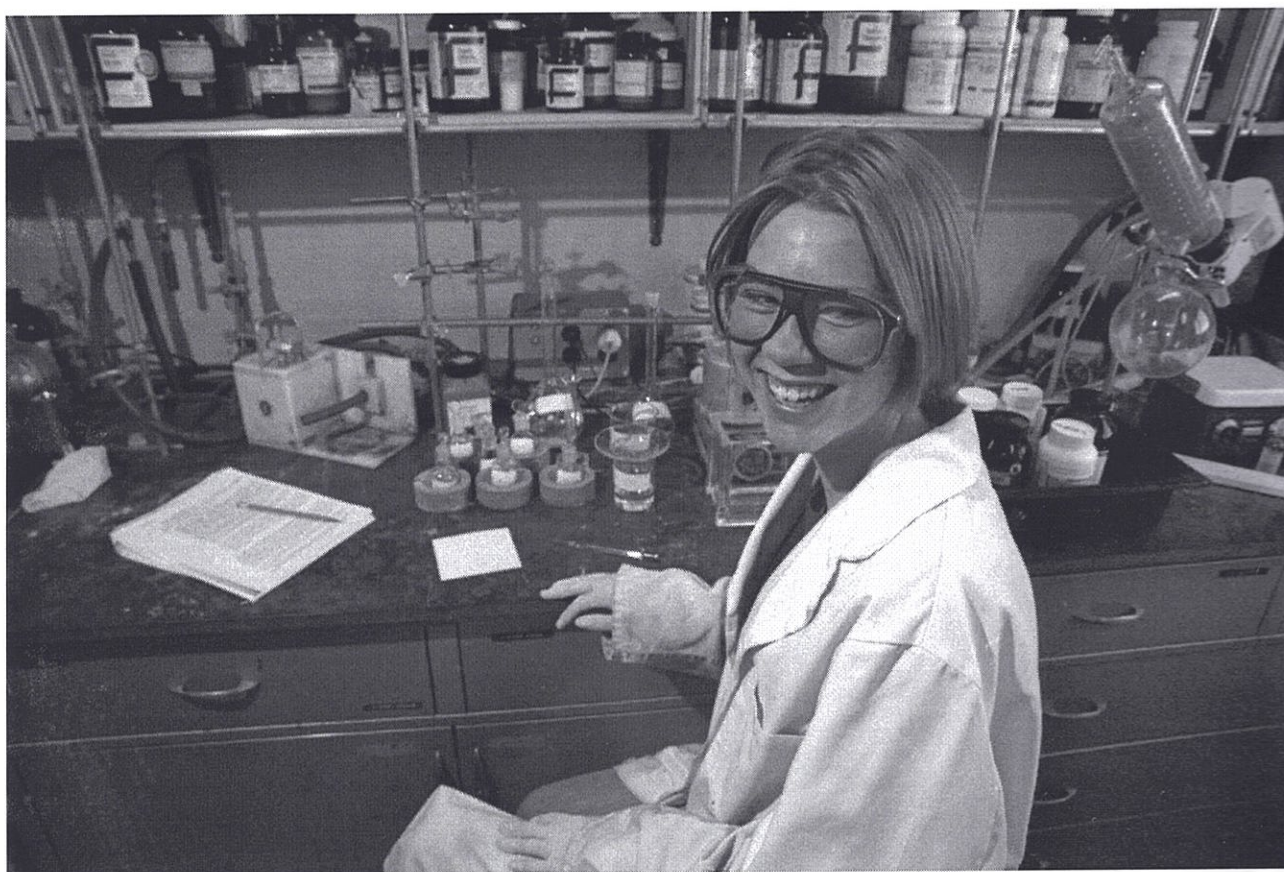
Well, well, well. I wouldn't say that I have an unbridled passion of science, but I do like it. The WISEST summer research program was my first job, and I just have to say that it was pretty good for a first job. It was more relevant, hands-on and educational for me than being behind a cash register. It gave me a taste of university life: my surroundings and what is to be expected of me. I spent my six weeks working on my project in the Chemistry building with Dr. Armour and Dr. Hunter.

My project involved the pesticides diazinon and chlorpyrifos. My job was to find the most effective oxidizing agent to breakdown and destroy the harmful chemicals. I followed a procedure allowing the solutions to react for various periods of time with various agents. The longer the solution was left reacting, the more pesticide was destroyed. The longest ones were left for a week.

This type of research would come in very handy in regards to the manufacturers of these chemicals. If there's a major (or even a minor) spill in the factory where the product is produced, workers/employees need to know how to clean the area quickly and effectively before it is spread to other areas.

To find out the amount of diazinon (diazoxon and other compounds) and chlorpyrifos, tests were done on TLC (Thin Layer Chromatography) plates. A plate was prepared by drawing the number of columns needed (number of samples being tested including the standard solution), and an extremely small amount of a sample was placed in its appropriate column. The carrier solution (i.e. Ethyl acetate) broke down the solution into its main compounds. The amount of the compounds left over could be observed under a 254 nm UV light source.

The compounds could be analyzed using a GC/Mass Spec (Gas Chromatography/ Mass Spectrometer). The gas chromatography portion of it takes the solution you had inserted and breaks it up according to its affinity (or solubility) due to the coil it travels through, which is lined with a liquid. The mass spectrometer part gave me the molar mass of the compounds. You could then look on the periodic table and determine the compounds or elements by looking up its molar mass.



I must say, my job was much more interesting than chemistry class. Here, I was running an experiment or working in the lab pretty much the whole time. (Except for writing in the log book; argh, having to write down my observations which is just not the best part!) In our chem 20 class we did all of about three lab experiments, which weren't all that exciting. In my project I got to "play" with chemicals and compounds that they don't allow in schools. Why they don't allow children to do tests with sulfuric acid, we'll never know. I knew how careful I had to be and the precautions I had to take, so I didn't end up spilling anything on myself (well, not too many times anyway).

The WISEST program has given me the knowledge and experience to make decisions regarding my future career.

Jia Hu

WISEST Supervisor: Dr. Suresh Narine

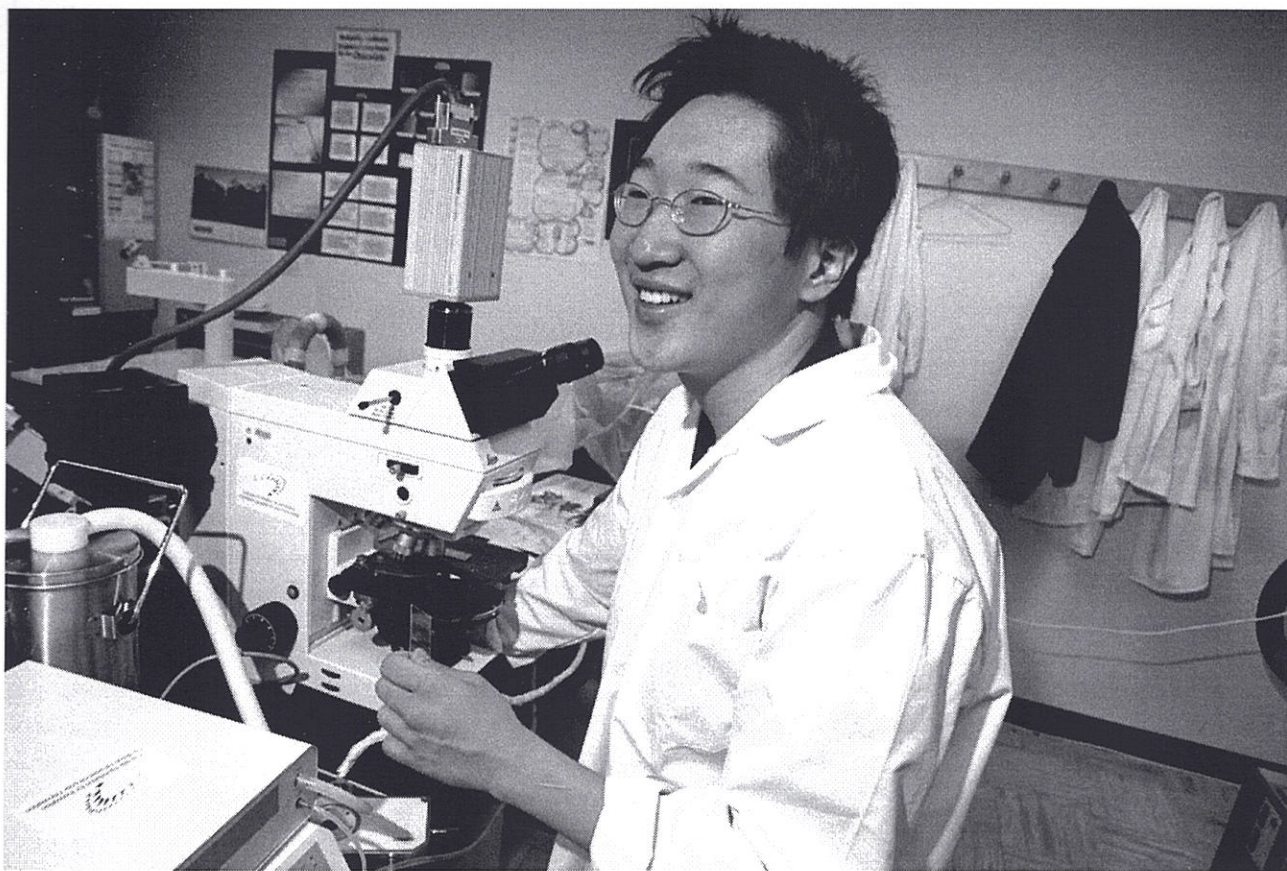
Sponsor: Canada Summer Career Placements Program

Would you believe that something as mundane as the butter we enjoy every morning on our toast and bread and bagels can be analyzed and even improved by employing physics principles? By participating through the WISEST summer research program in the Agri-food Material Science Lab, I discovered that sophisticated machinery such as the Nuclear Magnetic Resonance Analyzer or the Differential Scanning Calorimeter (DSC) are reserved for some of the supposedly simpler things in life - namely, food products.

During my six-week stint, I worked in the Department of Agriculture, Food, and Nutritional Sciences under Dr. Suresh Narine with the direct supervision of Baljit Ghotra, one of Professor Narine's graduate students. At any given time in the lab, research is taking place in a number of facets. Days upon arrival, my WISEST colleauge and I, Liana Wong, were placed to work in the tail-end of the shortening processing project.

Now, what exactly does "shortening processing" mean? Research indicates that when fats, oils, or fat/oil mixtures are processed or cooled at different rates, dramatic differences in their physical properties can be engineered. The butter that was cooled at a rate of $10^{\circ}\text{C}/\text{minute}$ might melt at a lower temperature and be softer and less viscous than an identical counterpart cooled at $20^{\circ}\text{C}/\text{minute}$. However, the research went beyond just altering the rate of cooling. All of our samples were fat/oil mixtures, but by changing the proportion of a given fat to a given oil, significant deviations in physical properties were exposed. For example, a 25% fat mixture would be much, much stronger than merely a 10% fat mixture. All of this research was done towards finding ways to emulate the physical properties of expensive or unhealthy fats in cheap, healthier fats – work that has significant potential towards improving both industry as well as scientific understanding.

The instruments we use to test food products mirror the sheer complexity of food science. In our shortening processing project, zero hour and 48-hour tests on our fat/oil samples were done with the assistance of a variety of equipment. A brief description follows. The Nuclear Magnetic Resonance Analyzer (NMR spectrometer) detects the percentage of solid fat in a sample. To test hardness and strength, the Instron, a device resembling a huge drill is utilized. Melting and crystallizing points are found using the DSC. Finally, the digital camera linked with the Leica microscope enables researchers to easily take pictures and even construct movies of a sample's



changing microstructure. The above are just a few of the machines we used in the course of our research.

The lab experience alone would have made for one of the most unique and exciting experiences possible, but the WISEST program went beyond work and research. The weekly activities gave me the opportunity to perceive the immense scope that science encompasses while strengthening old friendships and forging new ones. This broad spectrum included the science of composting manure (off-campus tour of the University Farm) to the use of high-precision lasers in the study and manipulation of cancerous tissues (on-campus tour of experimental oncology lab).

The WISEST program provided me with so much: a snapshot view of life as a researcher, knowledge of science's great understanding and its more immense unknowns, and so much more. On the whole, involvement in the WISEST summer research program has been one of the most constructive and fulfilling experiences in my life.

**“The WISEST program provided me with so much:
a snapshot view of life as a researcher, knowledge of science’s great
understanding and its more immense unknowns,
and so much more.”**

Stephanie Hui

**WISEST Supervisor: Mr. Rob Lake
Sponsor: Edmonton Glenora Rotary Club**

When I found out I was assigned to work with Rob Lake in the Department of Computing Science, my first thought was, how can you research something in the computing science area? Although my job wasn't exactly research, I had several opportunities to meet some graduate students who were involved in research in the area. Nevertheless, my six weeks was filled with learning and I gained as much from my work as I would have if it were actual research.

My job for the summer was to update two sets of webpages, the Chinook checker pages and the Department of Computing Science's Systems Support Group's pages. First, they had to be upgraded and validated from the HTML 2.0 or HTML 3.2 standard to the HTML 4.01 standard. Having the pages conform to an HTML standard ensures that they will render properly on any browser supporting the standard. The files then had to be renamed from HTML (Hypertext Markup Language) files to PHP (Hypertext Preprocessor) files so that PHP headers and trailers, which I had to write, could be added to every file. Written in the PHP headers are cascading style sheets, which control elements such as background color and font type, affecting the overall look of the pages. The insertion of PHP headers and trailers give the pages a more standard look but also make them much easier to edit in the future. Since most of the files refer to the same header, trailer and style sheet, changing the file containing that header, trailer or style sheet can change all the pages at once.

After spending a couple of days learning how to use a completely new operating system, UNIX, I began my actual work for the summer. Because I had several hundreds of webpages to change, I didn't want to manually change all of them. Therefore, the first thing I had to learn was how to develop shell scripts. In UNIX, shell scripts can be created to run on any number of files to change them in whatever way the script has identified. It usually involves using the UNIX text editor within the script. However, when the editor has even the tiniest little input error, the program doesn't tell what is wrong, but just prints out a question mark and expects you to figure it out and fix it. Frustrating! It took me a few days to get my first working shell script but it was extremely rewarding when I ran it on one of my files and there was no question mark in reply! I went on to produce a couple more scripts, which were almost, but not quite, equally difficult to make error-free. For the rest of the summer, I updated the other pages for Chinook and the Systems Support Group. It became a lot easier once I got the hang of how to use my shell scripts.



Besides just benefiting from the WISEST summer research program by learning more about using computers, I also made some new friends and learned from the other activities that I participated in. I got to know the other WISEST students who were working in my lab, met some friends of friends who were all in the program, and also refreshed old friendships. The weekly activities helped me to gain more knowledge about careers that I am interested in and to expand my perceptions of the working world. The WISEST summer research program was an incredibly useful experience for me, not only allowing me to work in one of my areas of interest, computing science, but also introducing me to other areas that could be involved in my future career.

Angela Jantz

WISEST Supervisor: Dr. John Feddes

Sponsor: Alberta Agricultural Research Institute



When the phone call came notifying me that I had been accepted into the WISEST Summer Research Program I was unsure of what to expect. As I awaited the beginning of the program I asked myself many questions, but on July fourth when I entered the ELTC I realized that all of the other students were feeling just the same, and it was normal.

After orientation it was time to meet my supervisor and lab. I was met by two friendly people who informed me that Dr. Feddes was busy, and I would get the chance to meet him tomorrow. They showed me around the olfactometry lab, and introduced me to the different people, and their projects. The next day I met Dr. Feddes. He told me that I had the option of working on campus in the olfactometry lab, or working in the poultry unit at the Edmonton Research Station with Dr. Gaylene Fassenko.

I went for a tour of the poultry unit and decided that was the place where I wanted to be for the summer. The position at the poultry unit provided both hands on, and lab experience. This was exactly what I wanted from my summer. There was always something to do at the farm while between lab work.

At the farm I did many smaller, but very necessary jobs. Whether it was weighing feed, birds or eggs, collecting eggs, dying eggs or birds, feeding birds, building pens, cleaning pens or recording

information there was never a moment when there was nothing helpful to do. These tasks helped many people with their projects. Some projects included studying the use of probiotics on growth and health of broilers, examining different feeds and their effects on turkeys and broiler breeders, as well as fertility and egg production studies.

Although most of my time was spent at the farm, my project was done on campus. It was part of a much larger project that Dr. Fasenko had undertaken. The project was designed to use the embryo metabolism from newly hatched chicks to optimize hatchability and mortality of broiler breeders. The basic, simplified idea was to get more good quality output with less input.

For my project I had to do a glycogen assay on heart and liver tissues from recently hatched chicks. The samples had been taken and stored in a 7% perchloric acid solution at 4-5°C. I then had to homogenize the tissues with a grinder. Next the tissues had to be centrifuged. The supernatant (liquid) was placed in another test tube and the solids were discarded. The supernatant had to be cleaned at this point. To do this I had to add petroleum ether to each sample, vortex to mix, centrifuge to separate, and then aspirate the petroleum ether off of the sample. This step had to be repeated until the sample was clear. After achieving a clear sample I had to mix glycogen standards to compare the samples to using a spectrophotometer and an iodine solution. This would tell me the amount of glycogen in the samples therefore providing the results.

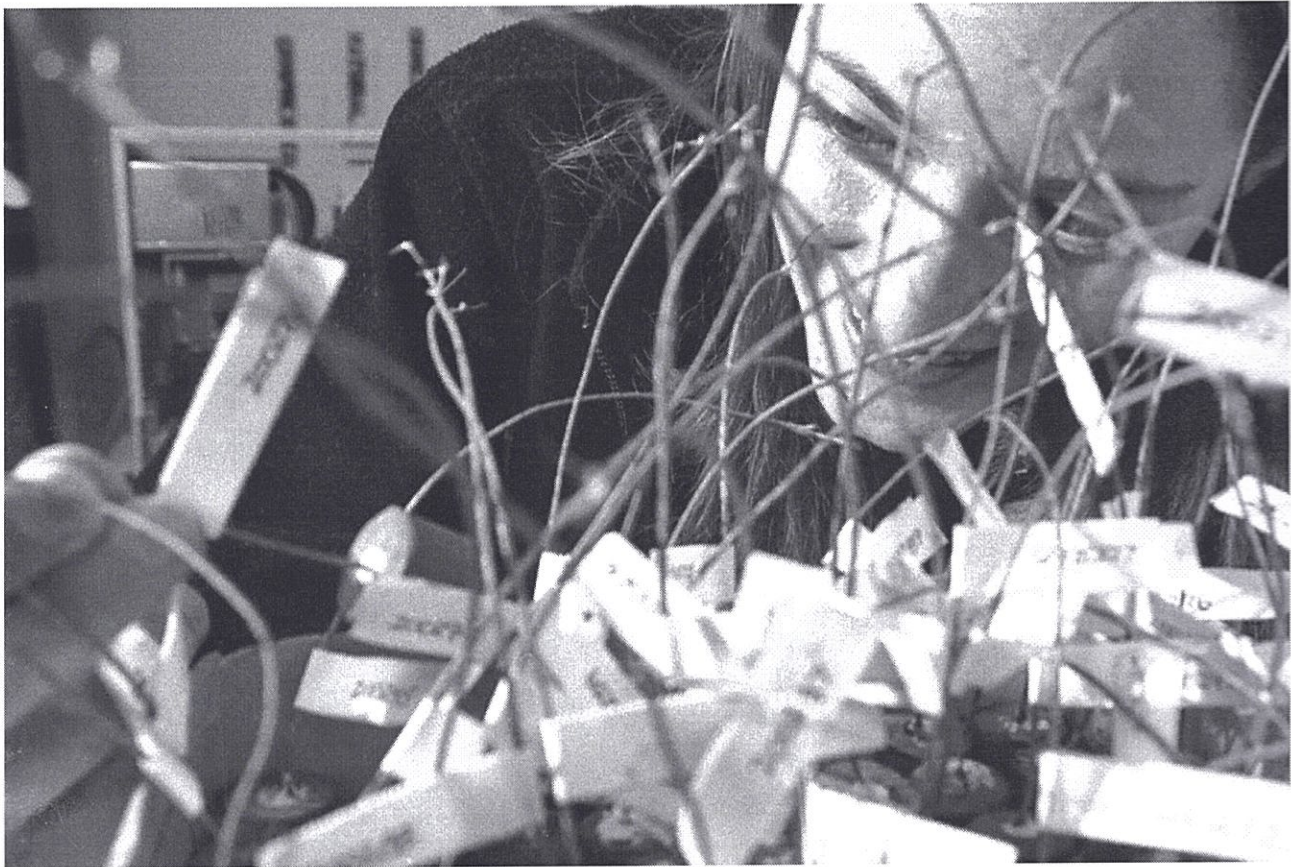
The WISEST program was an invaluable experience. I met many interesting people and was provided insight into the life of a woman in science. I learned that you have to do things for yourself before you do everything for others, and I learned not to be afraid to make a mistake because everyone does it, it is usually fixable, and it is a learning experience. WISEST has helped me to become a better person for myself, and the others around me. Thank you.

Dominique Koenig

WISEST Supervisor: Dr. Mark Ackerman
Sponsor: Alberta Ministry Innovation & Science

This summer I worked six weeks in the department of Mechanical Engineering. Supervised by Mr. Marc Ackerman, I divided my time between projects at the U of A and at MEANU (Mechanical Engineering Acoustics and Noise Unit). MEANU is an off campus lab on the east edge of Edmonton, about twenty minutes from the University campus.

Contrary to what you might think, our project at MEANU had nothing to do with sound. Aided by a mannequin fittingly named Harry Burns, we tested the quality of fire resistant clothing for several clients. Various companies bring their garments to the University of Alberta to get them tested. During my experience with the department of Mechanical Engineering, we tested garments for Westex (a textiles company) and the Canadian army. Harry is a fiberglass mannequin equipped with 110 temperature sensors. Working closely with the department of Human Ecology, we dressed Harry in the garments to be tested. After struggling to get often tight fitting clothes onto the stiff mannequin, propane flames were aimed at him from five directions. The readings from the sensors were then transmitted to a computer that produced a colourful image showing where Harry would have received second and third degree burns.



During my time spent at the University, I assisted one of the grad students in designing a stand for calibrating the temperature sensors. The current method of calibrating is by shining a concentrated beam of light on the sensor and if it records the rise in temperature, the sensor works. But the bulb is currently in a sort of gun and my supervisor thought it might be more efficient in a stand. The idea was to attach a bulb to the stand and be able to place a sensor on a movable table positioned under the bulb. After drawing the parts needed, we sent them down to the machine shop who manufactured them. However, we didn't miss out on all of the hands on work. We made the dimmer switch for our light and experimented with the new bulb and in the process I learned to use a lot of new equipment.

In order to test the new bulb for calibrating temperature sensors, we attached the light to a milling machine and placed a sensor on the moving table beneath it. The sensor was then linked to a chart recorder that was used to collect the temperature variations as the sensor passed under the light. We then used the graphs produced by the chart recorder to calculate the width of the beam at the peak of its intensity. From this experiment, we concluded that the new bulb produced a much smaller beam than the current one, therefore it will not cover the entire sensor surface and we must find a new one.

**“Over the summer, I learned to solder, made some new friends
and went a long way in understanding the research process.**

WISEST was a great experience!”

Lyne Koenig

WISEST Supervisor: Dr. Simaan AbouRizk

Sponsor: Alberta Ingenuity Fund

This summer I was able to spend six weeks working in a Mechanical Engineering lab with Dr. Alidad Amirfazli through the WISEST summer research program. My group consisted of me and six other researchers who all seemed to be working on completely different things. At first I could not see how a person writing computer programs, a person setting up complicated equipment and a person doing chemistry experiments could all be working on the same project. However, I soon realized that all of these different components were required to achieve the goal of replacing lung surfactant in people with underdeveloped or damaged lungs.

My project was to determine the effect of surfactant on the wetting of super-hydrophobic surfaces. This is important because if super-hydrophobic surfaces also repel surfactant solutions then they could be used to keep the surfactant where is wanted instead of having expensive surfactant leaking other surfaces.

Super-hydrophobic surfaces are surfaces made of materials that are already hydrophobic (such as Teflon) which are also rough on a microscopic level so that air is trapped between the surface and the water. I spent most of my six weeks in the research program trying to create one of these surfaces to do my experiments on.

Hydrophobicity is measured by placing a 5 microlitre droplet of water on a surface, and then measuring the "contact angle", or the angle between the surface and a line drawn tangent to the



droplet at the point where the droplet contacts the surface. On a super hydrophobic surface the droplet looks almost like a tiny marble sitting on the surface, and has a high contact angle. As hydrophobicity decreases this angle becomes lower.

The first surface I tried to use was a natural soot surface. By holding a glass microscope slide above a burning candle I succeeded in coating the surface in a thin carbon layer which was super hydrophobic. I discovered that carbon dissolves in surfactant, so I had to try creating a surface out of Alkyl Ketene Dimer wax instead. Melting this wax at 90°C and allowing it to dry in a nitrogen atmosphere allows it to form a fractal structure, which gives the necessary roughness to the surface. However, this wax tends to solidify with large craters in its surface, which made it impossible to measure contact angles on this surface. We are still experimenting with different containers and conditions to try to get this wax to dry with a flatter surface.

I found this research particularly interesting because super-hydrophobic surfaces are such a new area, and not much research has gone into using these surfaces with liquids other than pure water.

Overall the WISEST Summer Research Program was a great experience for me. I learned a lot about the ways the University works and about the variety of different things to do in the Mechanical Engineering Department. I also learned a lot about the research process and how real research labs work.

Hiromi Koriyama

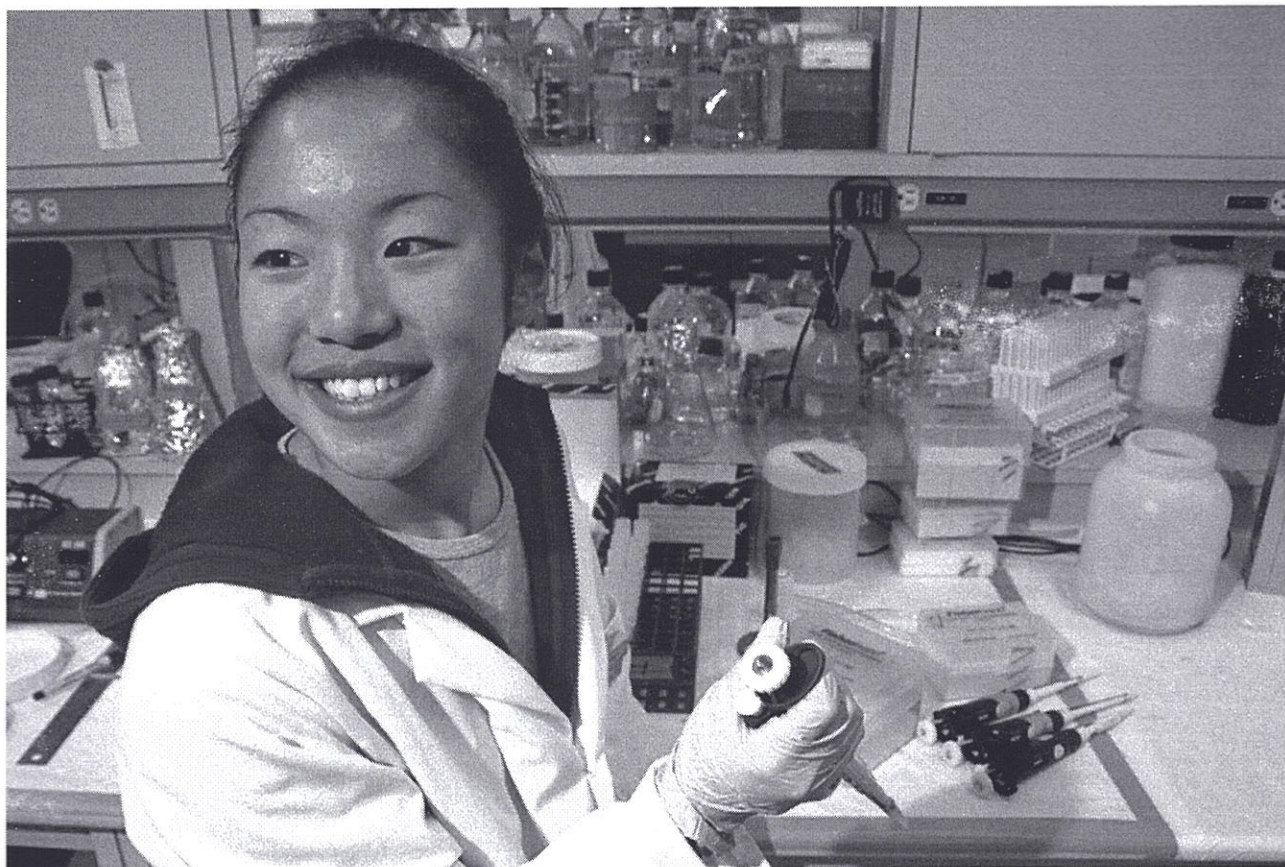
WISEST Supervisor: Dr. Luis Schang

Sponsor: Faculty of Medicine & Dentistry, University of Alberta

Through the WISEST Summer Research Program, I was able to work in the Department of Biochemistry with Drs. Luis Schang and Prerna Diwan. The research done in the lab dealt with studying the role of cellular proteins in viral replication and pathogenesis.

My project looked at the effects of a cellular protein inhibitor on herpes simplex virus (HSV) transcription in a stable transfected cell line. Stable transfected cell lines are cells that have integrated foreign DNA into their chromosomes. My first job was to create the DNA to be introduced into the vero (monkey) cells. This mainly involved the use of molecular cloning techniques, such as restriction digestion, gel electrophoresis, and the transformation of *E.coli* cells (the bacterial cells take up the foreign DNA). The plasmids were cut into fragments by using restriction enzymes and the desired fragments were then ligated together. *E.coli* cells then took up the ligated plasmids, were grown overnight, lysed, and then treated, to extract the plasmid DNA. The plasmid DNA was then screened by looking at the fragments created when digested with various restriction enzymes and by checking the expression of specific proteins. The plasmid DNA is then taken in by cells and eventually becomes integrated into the cell's chromosomes. However, since this takes a long time to achieve, I was unable to see my cloned plasmid become part of a stable cell line.

Instead, we used a stable cell line that was already established, although the properties of the plasmid that was integrated were slightly different. The cells were divided into three petri dishes. Two were infected with HSV, one of which was also treated with the cellular protein inhibitor,



Roscovetine. The third dish was not infected. The RNA was extracted from the cells and a Northern Hybridization was performed to measure the amount of mRNA that was transcribed by the cells.

This research is quite interesting, since this cellular protein inhibitor is a potential antiviral drug. These drugs differ from conventional drugs in that they target the cellular proteins instead of the viral proteins, have a relatively large spectrum of action, and are potentially effective against viruses that have become resistant to traditional drugs.

Working in the lab over the summer has taught me many things and was a great experience. It was very interesting to see many of the concepts learned in school, actually being applied in research science. Working with substances and measurements smaller than anything I've worked with before was also very fascinating. In my six weeks, I have found that it takes a great deal of careful planning, patience and a whole lot of luck for any research to succeed, and that the only magic word in research is "REPEAT!"

In addition to learning a great deal about molecular cloning, I have learned what is involved in working in a research lab, as well as many other careers in the fields of science and engineering. The WISEST Summer Research Program has provided an opportunity for me to meet some great and knowledgeable people, gain some insight into possible careers, and have one of the most memorable summers ever.

During my six weeks in the WISEST Summer Research Program, I not only had the opportunity to work in a lab in the Department of Biochemistry, but I was also able to take part in some of the WISEST activities organized by Celia and Grace, the coordinators of the program. These included

things such as Lunch with the Bunch, the Scavenger Hunt, Small Group Discussions, and On-Campus and Off-Campus Research Tours.

Lunch with the Bunch was a twice a week event, where we would meet either at SUB or ETLC to have lunch with Celia and the other WISEST students. It often provided a nice break from the occasionally overwhelming lab atmosphere, to something more relaxed and familiar.

The Scavenger Hunt/GATE Session was our first Wednesday afternoon activity and it proved to be fun, yet still informative, like all the other sessions would also prove to be. The GATE Session got us orientated to the library system, while the Scavenger Hunt forced us to become more familiar with the university campus as we searched for answers that lay all over campus. We were later rewarded with ice cream (a nice break considering that it was about 30°C that day).

Small Group Discussions was a calmer Wednesday afternoon session, as women from various fields of science and engineering came to talk to small groups of WISEST students. After a fun ice-breaker game of "Who am I?" we learned about the various career choices that are open to us, what it takes to get there, and the challenges that they faced going into a non-traditional area for their gender.

The research tours were also another way of exposing us to the different research areas at the university. Our first off-campus tour was to the Faculty of Agriculture, Forestry and Home Economics at the University farm. There we got to visit the Dairy Research and Technology Center, the Poultry Research Center, the Crops and Land Resources Center and the Enclosed Composting Facility. Although the smell was definitely the strongest impression left by the tour, we learned a lot about some of the world-class research being done at the facilities. One of the best parts of this tour was getting to see the cute calves (including one that was born only the day before). For the on-campus tour, we were split up into groups to visit various research labs on the campus. I was able to go to a Chemical and Materials Engineering lab and learn about the exciting world of pipes, pumps and fluids.

Although the research we did on a daily basis was very specific, the WISEST activities provided a broad range of experiences and helped to put everything into perspective. I have not only met some wonderful people and seen some amazing sights, but I like to think that I have also come out of the program with a greater knowledge of research science and the options that lie ahead of me when I make my decision about my future.

Rathada Korn

WISEST Supervisor: Dr. Dave Sego & Dr. Kevin Biggar
Sponsor: Epsilon Chemicals Ltd.

This summer, I am working in the Department of Civil and Environmental Engineering with Dr. David Sego and Dr. Kevin Biggar's research team under the direction of Jason Kopan. My project involves the thin-layered freeze separation of chemicals from ground water. My job was to establish conductivity calibration curves. In order to do this, I first had to run a number of experiments.

I had to make several solutions made with Sodium Chloride and Calcium Chloride in three different types of water (tap water, distilled water, and de-ionized water) in various known concentrations. I then tested the conductivity of the solutions at two different temperatures, at 22oC and at 4oC with



a conductivity probe. Electrical conductivity is the ability of different types of matter to conduct an electric current. The greater the amount of ions in a solution, the greater the level of conductivity. This fact was proven with the results of my experiment. As the concentrations of the solutions went up, so did the conductivities of the solutions.

After I had finished with the experiments, I had to make several spreadsheets to place the data that I had collected. I had never worked with Microsoft Excel in my life, I had always tried to avoid it as much as I could but this time I had no choice. I learned to use Excel rather quickly and it is a lot easier than I thought it would be. I was able to graph the data on the spreadsheets which gave sort of a visual of the results gathered. These graphs or conductivity calibration curves gave me a better understanding of the results. From the data collected, we were able to conclude that the type of solute and solvent used, the type of water used, the temperature and the concentration of the solution, all affected its conductivity.

For the first few weeks into my project, I had no idea why I was doing these experiments and making these graphs. I was not sure as to what my purpose was and what it had to do with thin layer freeze separation of groundwater. However, after Jason had explained the purpose of the experiments to me several times, I finally understood what it was.

Thin layer freezing is a process that can be used to remove impurities from water. As the water starts to freeze and form ice, the growing crystals of ice reject the impurities. The impurities then become concentrated in the unfrozen runoff water. The level of conductivity is directly dependent on the concentration of ions in the solution, therefore with this knowledge, the concentration of the runoff water can be determined quicker by testing its conductivity and comparing the results to the established curves. The greater the measured conductivity, the higher the concentration of impuri-

ties in the runoff water and the more effective the thin layer freeze separation.

I finished making the conductivity calibration curves in a few weeks and so my supervisor decided to let me assist him in another project that he was working on. He was to design a flume for Dr. Sego and Dr. Biggar's research team. This flume is to be used to test the freeze separation of chlorides from industrial wastewater. In order for me to help him with his design, I had to quickly learn how to use AutoCad. I was able to pick up the basics and I made a few changes here and there to the design.

For the last two weeks or so, I have been working on writing a lab report about my experiment. I am still in the process of developing it, but I think (I hope) that it is almost done.

Overall I think that the WISEST summer research program is a very important program. I am very grateful for this experience. I didn't necessarily enjoy my time here, I found that working in a lab can be very repetitive and rather boring. I'm going to be honest, I hated being here for the first few weeks. The good thing about my whole experience here in this program is that I realized that maybe civil engineering is not for me. I was seriously considering becoming a civil engineer but thanks to this program I was able experience civil engineering first-hand and found out that it does not interest me after all. I still am interested in Engineering but I'm not sure what kind of engineering I want to go into yet. Being at the University made me aware of the many different possible careers and it has opened my eyes to University life. I learned a lot in these past few weeks, I learned about lab work, how to write a proper lab report, how to use Microsoft Excel and AutoCad. I know that this knowledge will greatly help me in the future when I hopefully attend the University of Alberta.

Stephanie Kos

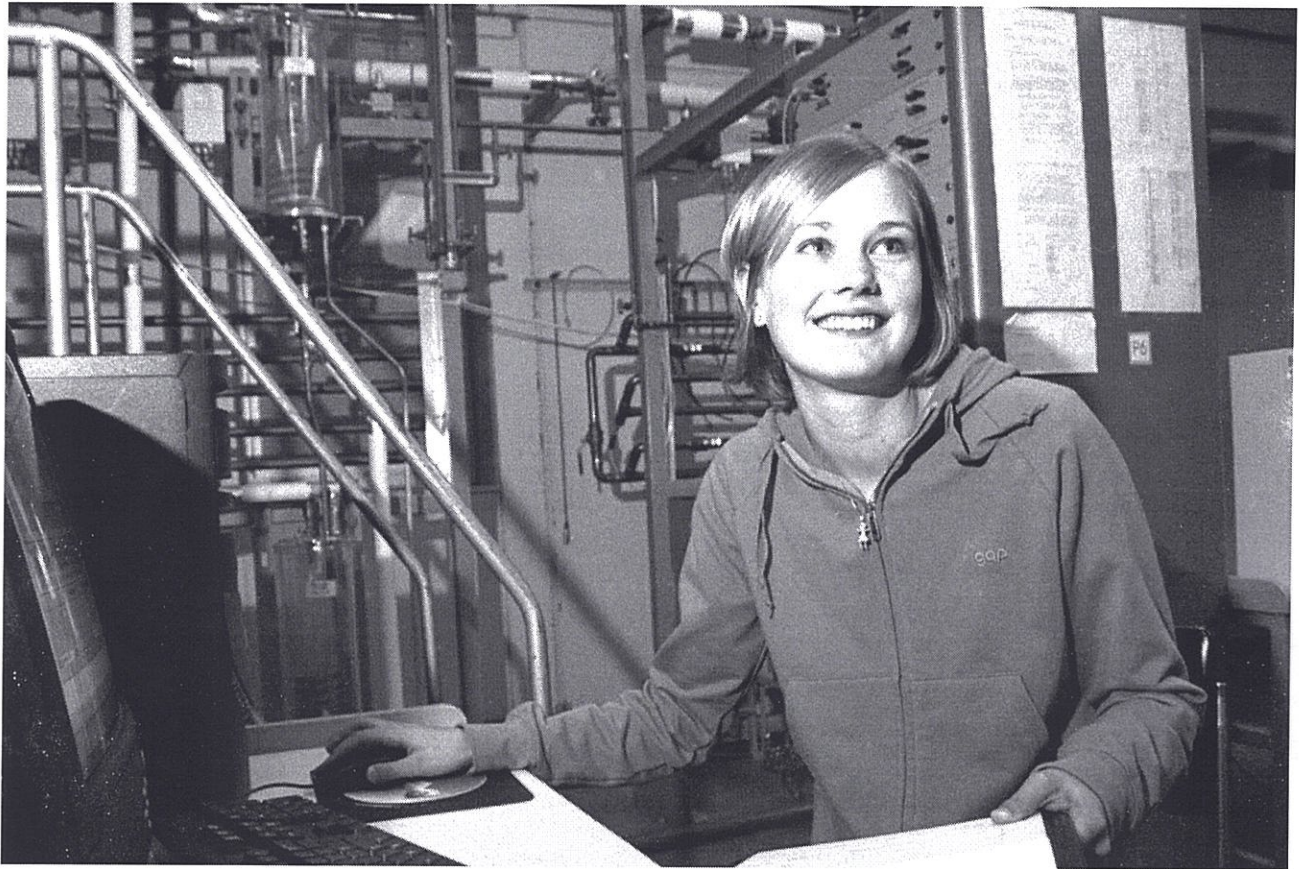
WISEST Supervisor: Dr. Scott Meadows

Sponsor: Suncor Energy Foundation

Participating in the WISEST Summer Research Program has been a challenging, yet rewarding experience that has allowed me to explore many aspects of research and the abundance of its application in our world today. I spent six weeks this summer working in the Chemical and Materials Engineering Department at the University of Alberta, supervised by Dr. Scott Meadows, in the area of Computer Process Control. Through lab work and the use of the engineering software MATLAB, my objective was to design a controller that would regulate and control the temperature of a tank of water that was being heated by the flow of steam through a metal coil located in the center of the tank. The controller can change the temperature of the water or maintain it at a steady state by automatically changing the position of the steam valve allowing more or less steam to travel through the coil, depending on the desired water temperature.

My first step was to learn how to operate the equipment in the lab as well as how to use the computer program in order to determine the parameters for a controller. It was exciting to work with the equipment in the lab, which was basically a small-scale version of a process that could be found in any chemical plant.

In the actual designing of my controller, I created mathematical models of the system on the computer, and used the data I obtained from running an open-loop system in the lab to calculate a



starting point for the controller. Running an open-loop system simply involves letting the system run by manually changing the position of the steam valve. A closed loop system refers to when the controller is implemented into the system and the output of the system (water temperature) is measured by the controller causing the input (steam valve position) to respond, therefore connecting the input and output and closing the loop. My calculations for the controller were based on the design relations developed empirically by Cohen and Coon in 1953¹ to create a closed loop response. I could then test this controller on the computer using a simulation program and inputting signals through the model of the system I had created. Seeing that in simulation the controller created a reasonable response, it was time to try my controller in the lab. Unfortunately the controller was too aggressive and caused the system to become saturated, meaning that the valve could not open to the degree that the controller required it to. Therefore the controller needed to be tuned in order to make it less aggressive. The effect of this tuning created an acceptable response for the system with little overshoot and an efficient settling time.

For the purpose of comparison, I designed another controller using a different method called the continuous cycling method and used Ziegler-Nichols controller settings to calculate the parameters for the controller. The original response for this controller was very oscillatory and was also too aggressive for the system. Therefore I used the modified Ziegler-Nichols settings, which would have hopefully reduced the oscillations in the response. It did decrease the magnitude of the oscillations, however the response was still too oscillatory to be effective for its purpose.

Comparing the two methods, the Cohen and Coon calculations created a more successful controller for the system. However, the benefit of the continuous cycling method is that it takes much less time in the lab as well as in making the calculations from the data to obtain parameters for a controller. From the work that I have done and in my attempts to create an acceptable

controller for the system, it can be speculated that the noise, disturbances and time delay in the system have made developing a controller for the system more of an engineering challenge than expected. The equations and methods developed by various individuals for creating a controller do not include variables for calculating noise and disturbance in the system and therefore, in order to create 'the best' controller for this system more time in the lab playing around with the parameters would be required. However, the disturbances in this system, such as an inconstant steam pressure and a varying starting point for the temperature of the water, would be very realistic problems to be faced in an actual process in a large-scale factory.

These past six weeks in the WISEST program have gone by incredibly quickly as I learned many new things pertaining to Chemical Engineering, the University of Alberta and other research teams on campus. It has definitely been a privilege to work among professors and graduate students at the University and be given the opportunity to discover research for myself as well as get a glimpse into life at the University. My interest and knowledge of Science and Engineering has grown since participating in the WISEST program, which has definitely fashioned my summer into an interesting and inspiring experience.

¹ Dale E. Seborg, Thomas F. Edgar, Duncan A. Mellichamp, Process Dynamics and Control, John Wiley & Sons, 1989
(Footnotes)

Kathryn Kully

WISEST Supervisor: Dr. Dwayne Tannant

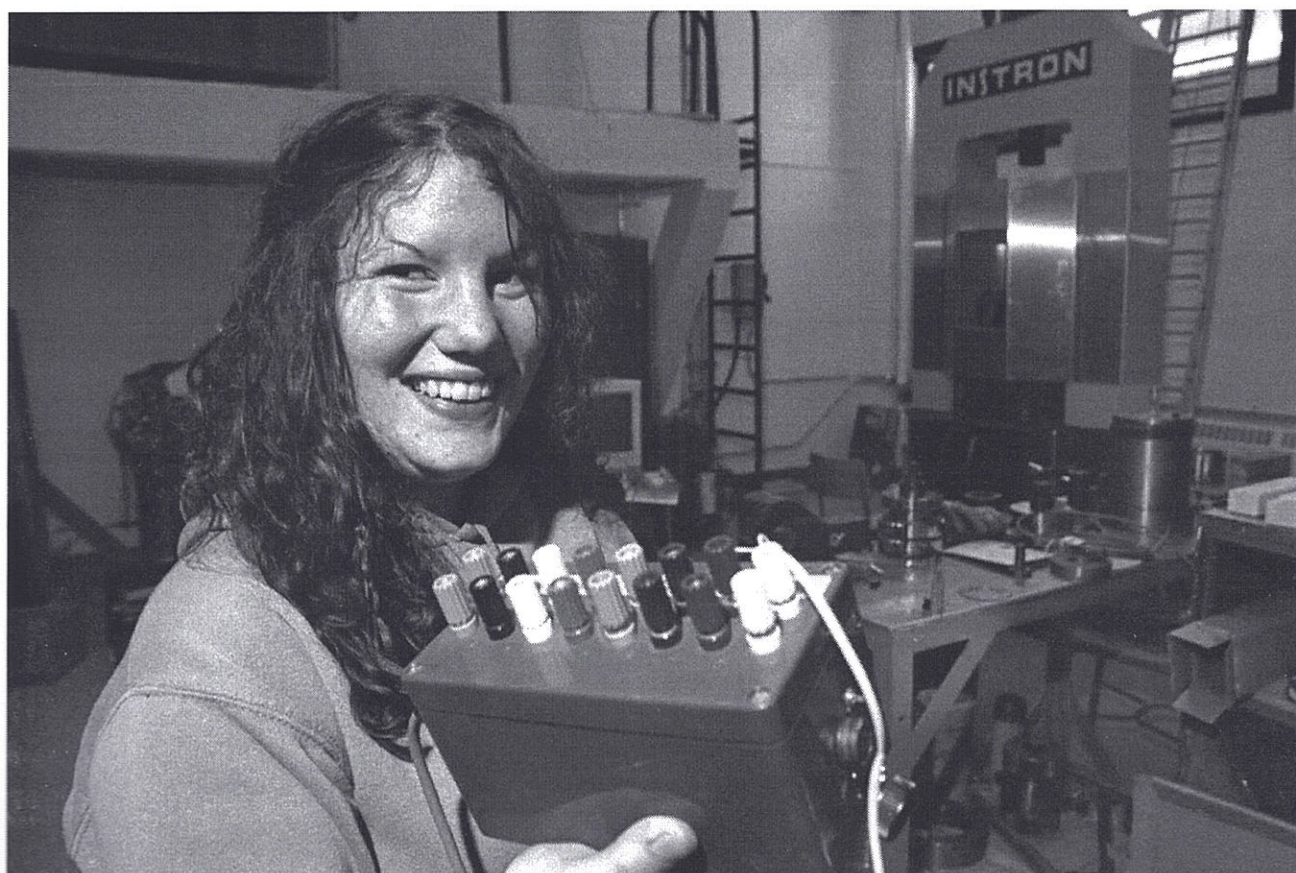
Sponsor: Faculty of Engineering, University of Alberta

Because of my interest in physics, I was assigned the task of studying seismic waves. My six weeks were divided up into three modules where I would design and run tests, analyze data, and interpret it to define some of the variables and characteristics of different materials.

The first task was to read some background information on the subject, which helped me understand what was expected of me first and foremost. As a perk, much of what I read gave me insights into how to design and construct my tests and how to use the information I would receive and turn it into something useful. That took up the first week. The second week involved applying what I'd learned and working out the equipment so I could get readings once my actual trials began. The last four weeks were spent on completing the experiments.

The first experiment involved finding the velocity of compression waves in different media: concrete, soil, and air. Compression waves are the fastest type of surface wave, created at an impact point in any material. The wave moves through a substance at a certain speed called the wave velocity, which differs between substances, and causes the medium's particles to vibrate at another speed as it travels, called the particle vibration velocity. To calculate the velocities I would set up my sensors at fixed distances and drop an object on the media, download the recorded waves onto a PC, figure out differences in times between sensors for when the wave was received, and divide distance between sensors by that time. This took about two weeks, partially due to bad weather, but it made the next two experiments easier.

The second and third experiments were based on principles and data that could be gathered from the first one. One involved triangulation of an impact point, or epicentre, and I had to create my



own scenario for that. I would place three sensors on a medium, drop an object in their midst, and work backwards to find out where the object was dropped. By then I knew how fast a compression wave travelled through that medium, cement, and I once again was able to find differences in time between the sensors, and this time calculated distance. That distance would represent a radius of a circle for each sensor, extended around each corresponding sensor. The place where the three circles met was an approximation of where the object hit the cement.

The third experiment was figuring out a method of defining a compression wave's intensity. I would drop an object, much like in the first experiment, only I would drop it from several different heights, so the force with which the medium was hit would vary from height to height. This did not mean that the wave velocity would change as a result, but the particle vibration velocity. This is a measurement of how fast particles vibrate once the wave passes through, and this is an important factor because damage can result if the vibrations are too fast. Surface waves cause no damage by moving at high speeds, but when they cause the particles they travel through to vibrate at high speeds, i.e. with a high intensity, then they cause damage. The sensors automatically record this velocity, so I had little processing to do here.

This science is very important because it affects most developments in society, from infrastructure to civil. The data helps define safety regulations and helps prevent disasters from occurring in such engineering feats like blasting and mining, so the research has proven important to society.

Katherine Leung

WISEST Supervisor: Dr. John Locke

Sponsor: Alberta Summer Temporary Employment Program



For my part in the WISEST summer research program, I had the privilege of working in Dr. John Locke's *Drosophila* lab doing genetics research at the Biological Sciences building. At first, when Celia called to tell me where I was going to work, I was extremely skeptical. Fruit flies? I had never handled insects in my life because I was so scared of anything that even remotely resembled an insect, real or plastic.

One of my jobs, ironically, was to take care of the numerous *Drosophila* stocks in the lab. This usually involved tipping the flies from one bottle or vial of food to another. With so many stocks in the lab, this process took me quite awhile. These stocks had to be tipped either once or twice a week. For one of the stocks, I prepared an antibiotic solution, which included chloramphenicol, penicillin and streptomycin, to put in the food. Although this solution slowed down the overall growth of the stock, it helped the stock survive a bacterial infestation in some of the bottles.

These stocks that I tipped were part of a larger experiment involving gene suppression and the P element. The P element is a transposable element meaning it can move from place to place in the genome.

Another of my projects entailed a different transposable element - the Hobo element. I tried to find a way to test for the Hobo element in the fly stocks. I froze single flies, mashed them up and

added a squishing buffer with proteinase K, which when put into the PCR machine (Polymerase Chain Reaction), extracted fly DNA. With that DNA, I then added PCR mix (a solution with the forward and reverse Hobo primers) and put it into the PCR machine. Using gel electrophoresis, I could see if a Hobo band appeared. The key was to find the correct annealing temperature so that the reaction had as few extra bands as possible. For this whole process to run, it usually takes a day. Previously, the experiment used to test for Hobos, called a Southern, took about two weeks to complete and used about fifty flies from each stock. This experiment on which I worked helped to save time and used considerably less flies.

The other experiment that I did was a pigment analysis for different stocks of flies. Normally, flies have a brick-red coloured eye and are called wild type. However, with certain mutations one can develop flies with white eyes or even with combination red and white eyes. The pigment analysis determined how much pigment was in the eyes. First, I let the flies eclose (change from pupa to adult). I collected the newly eclosed flies and put them in vials to age for five to eight days. The aging process allowed for the flies to fully develop pigment. Once properly aged, I froze the flies and vortexed them so that their heads popped off. I then collected the heads and allowed for the pigment to be extracted by a solution called AMA. Afterwards, I used a spectrophotometer to measure the absorbency of the pigmented solution. From the results, I could determine generally the amount of pigment in each stock of flies.

Overall, this summer research job was an amazing experience. I had an opportunity to really discover what it is like in a research lab. The people with whom I worked were fantastic and patient and I realized that working with fruit flies wasn't so bad after all!

Victoria Listoe

WISEST Supervisor: Dr. Fiona Bamforth
Sponsor: GlaxoSmithKline

I was told that I would be working in Lab Medicine and Pathology for the summer, and I thought I was going to be running tests on peoples blood to see if they were sick. That is what the words Lab Medicine brought to mind, but I was psyched and couldn't wait until the day came when I got to move to Edmonton. Living in a town that is smaller than most peoples high school does that to a person, you just can't wait to leave, even if it is only for six weeks.

The first day at the lab and meeting my supervisors was a big shock! I wasn't going to be working on blood, I wasn't even in the hospital as I had expected. Well, the other person working with me (Amanda) was in the hospital but the project I was working on was in Clinical Sciences. I was to work in HILA (Human Identification Laboratory for Archaeology). The people I was working on hadn't been alive for over 7000 years! I was amazed that they would let me work on samples that old.

Then came the dreaded word in our lab, contamination. I know no one likes their samples to be contaminated, but with ours we dreaded it. The ancient DNA (aDNA) we were extracting from the bones was so degraded that any modern DNA that entered would ruin our test. The modern DNA would amplify in the PCR instead of the aDNA. Now I know some of you may be asking what a PCR is, and so was I at first. It is the Polymerase Chain Reaction, and basically what it does is uses an enzyme called Taq from a bacteria that can survive high temperatures to make millions of



copies of the DNA strand that you want. Well that is the really simplified version. I came to know this test very well, as I did one at least every other day.

What was the use of all this? Well the DNA that we amplified was of a certain chromosome that would tell us the gender of the person in question. Basically males have a different gene than females, they are XY and females are XX (everyone has two copies of a gene, one from each parent). Males have a Y chromosome, so if you get a double band, you have a male. This is useful for skeletons in which the sex can not be determined by the bones (males' skulls and pelvis differ from those of a female), or skeletons that have not reached puberty as the bones have not matured yet. Archaeologists can then tell if more males or females died.

During the summer I got to do more than run PCR though. I did bone extracts and helped make our lab poster. My supervisor made up the name (HILA) and I helped her make a poster for our door so that we could be easily found, not that it was really that hard to find our lab anyway. I also got to look at pictures and hear stories about when my supervisor went to Siberia to dig the bones that we were working on. I did visit the Pathology lab in Walter C. Mackenzie a few times, but I didn't really do much up there, they were working with RNA in twins. I also got to briefly visit one of the Archaeology labs in Tory. I learned that there is a whole lot more to the world of Pathology than just sitting around trying to decide if someone is sick or not.

**“On the whole I would have to say that
this was one of the best summers I have had.”**

Caroline Lyster

WISEST Supervisor: Dr. Margaret-Ann Armour
Sponsor: Canada Summer Career Placements Program

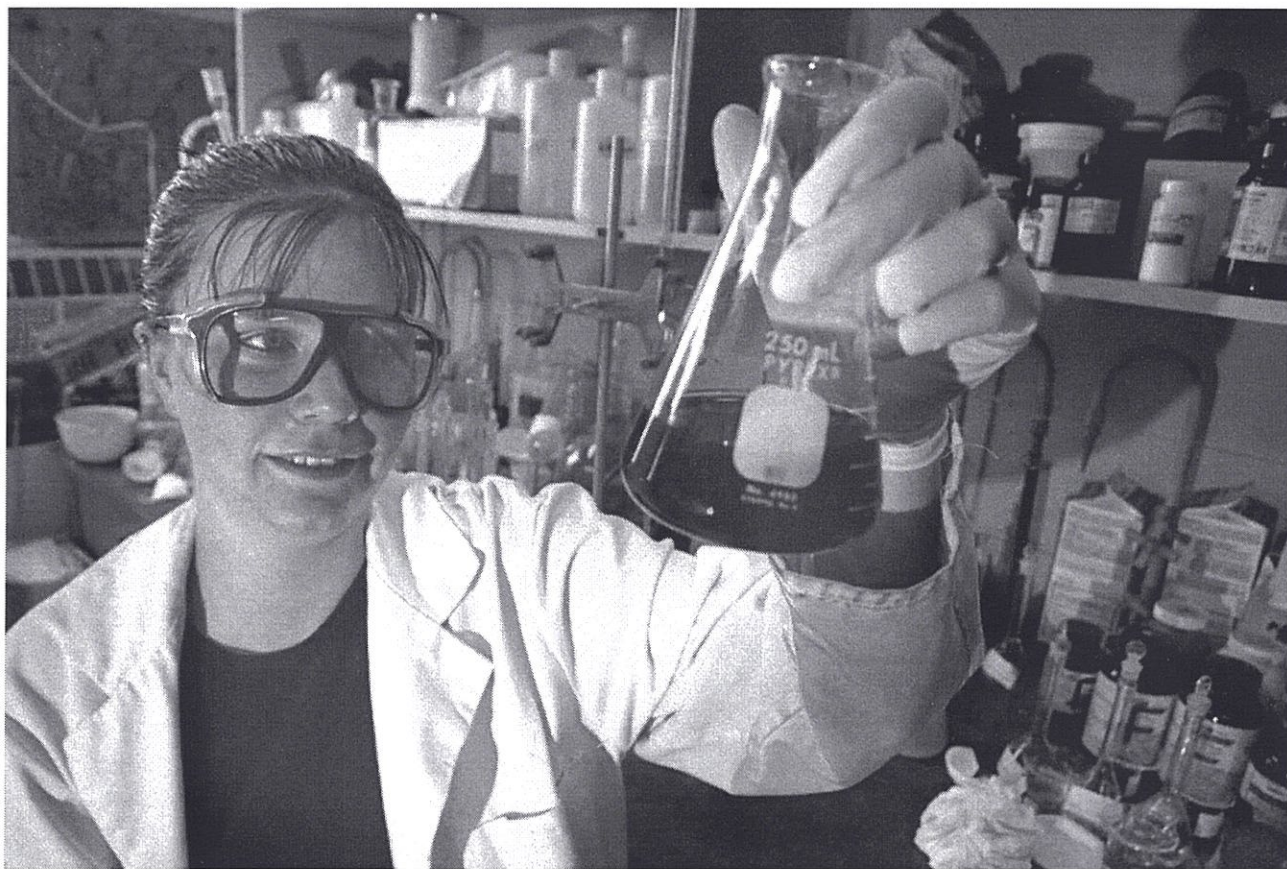
My Summer as a Lab Rat

This summer I was privileged enough to be chosen to participate in the WISEST summer research program. In simpler terms, I got to be a lab rat at the U of A. Which is not as degrading as it sounds. But I was a certified geek, giving up my summer holidays to go and do more school related junk. It was worth it though. I got paid. Ha ha.

When I applied for the program, I did not expect to get in. My average was less than stellar (86%, with the minimum being 85%), and my application essay was kind of sarcastically arrogant. But for some reason that I will never quite understand, I was accepted to the program. The icing on the cake, they were sticking me in a chemistry lab where I could play with dangerous chemicals.

But upon arrival at my lab, I realized that it wasn't going to be all fun and games. There was actual work involved. Not good for someone like me. I'm allergic to anything that requires effort. So getting into the swing of things was, to say the least, interesting. But my project was enjoyable, so once I got into it, it didn't feel like work anymore. Which was good. I don't like work.

But I guess I should tell you what my project was. My project involved the disposal of dangerous chemicals, specifically, arsenic, antimony and bismuth salts.



Now, there were already disposal methods for these chemicals, but they were long and complicated. It was my job to, through various experimentation and titration, to find a quick, easy, efficient method of disposing of these chemicals. Let me say now, it's harder than it sounds. There's a lot of math involved. (Blah. I took chemistry so I didn't have to do math. Oh well. Too late now.) Before adding each chemical I was going to use, I had to calculate the amount I had to add to completely react each salt, and then add double that amount. Then, before titration, I had to calculate how much iodine I should be using, so I would know vaguely how well I was doing while the titration was going on. But that was about it for math, and after awhile it became easy.

It was the titration that really got to me. For the first little while, I was standardizing my solutions, so I had to titrate the same thing over and over until I got consistent results. That took about a week. And by the end of that week I was ready to kill myself. But now it's not so bad. I mean, it's still hopelessly boring, but I realize that I am going to be an expert at titration come chem. 30...there are advantages to every boring project.

There's nothing else about my project that I think you would like to hear. Everything else is just techno babble and stoichiometric calculations. Nothing overly interesting. Or nothing I want to type out anyway. Too much work. Plus, I doubt you'd even read it anyway.

This summer has been one of the best experiences of my life, allowing me to work in an area that I find truly interesting. I genuinely love the area of chemistry, and I have been glad to work in the field for the summer. I know now that while I may not go into research, my career will definitely have something to do with science.

Ursula Madej

WISEST Supervisor: Dr. Stephen Moore

Sponsor: Alberta Agricultural Research Institute

Throughout the past six weeks of the WISEST program, I have been dedicated to the mysterious and microscopic world of genetics. Under the supervision of Dr. Stephen Moore, a prominent head of the Beef Genomics Research team, I have been working diligently in the department of Agricultural, Food, and Nutritional Science. The name of the department itself might give someone a homely vision of wheat and barley testing, but in fact there is much more to the AFNS department than meets the eye. In fact, there are floors in the agriculture building simply devoted to the study of genetics-in bovine, swine, poultry, crops, plants, etc. The genetics work being done here can easily rival that of the work being done in medical labs. This is because the research being done on the animals can readily be applied to research in humans, and that's what makes my work so exciting.

At first I needed to understand what was going on in the lab. I was given a handsome yellow Biotechnology textbook to read and look through, to give me a foundation of basic genetics information. Fortunately, an abundance of lab technicians were at my disposal so that I could ask them as many questions as I needed answered. Everyone in the lab was extremely friendly and knowledgeable, and with their help I was able to understand what was going on. I learned that DNA (short for deoxyribonucleic acid) is a long chain of nucleotides that forms a double helix structure through hydrogen bonding between nucleotide bases. Nucleotides are molecules made up of deoxyribose sugar, a phosphate group, and a nitrogenous base of adenine (A), thymine (T),



cytosine (C), or guanine (G). It is important to understand that A and T, as well as C and G, are complements of each other, and will only hydrogen-bond with one another to form the double helix.

So what was really going on in the lab? The research being done involved studying samples of DNA from 12 steers (male cows). A specific region of DNA that was of interest was amplified (its quantity was made larger), loaded into an agarose gel, and then examined under ultraviolet light. Through a computer, I was able to determine which DNA samples were long or short enough to use for sequencing. Then a sequencing reaction was performed to get rid of any unwanted reactants, and the DNA samples were sequenced using a CEQ 2000XL-sequencing machine (worth a whopping quarter of a million dollars!). After the sequencing, the samples were aligned with one another so that the vertical columns of nucleotide bases were identical, using an online-based sequencer. In other words, there were columns of all A's, then all C's, then perhaps A's again, then T's, and so on. If a column was found not to have identical bases, then there was a chance that a single nucleotide polymorphism (SNP) may have occurred. Or more simply, a change in base pairs had occurred (i.e. there were 2 A's in a column of C's). Finding SNPs was in fact the theme of my research.

Detecting a SNP is an absolutely essential part of the research, because, using analytical data such as growth rates or amounts of back fat in different cows, a SNP could very well explain how a genetic mutation affected, for example, the ability of a cow to produce more milk, or why a cow was more aggressive. Once such relationships are identified in bovine, the research can then be taken to the next step: to humans. Genetic links in cows could very well be similar in humans, and this could lead to dramatic progress in fields such as gene therapy and early diagnosis of disease.

My experience here in the lab has been an absolutely amazing one. I've learned much about genetics, and I know that the knowledge I've gained here will carry through to my next scientific endeavors. Through the WISEST program, I have become familiar with the vast university campus, and I've also come to really enjoy genetics and realize that I belong in the field of biology!

Megan Mallet-Paret

WISEST Supervisor: Dr. John Shaw

Sponsor: Petro-Canada



During my six-week work term with the WISEST Summer Research program, I worked with John Shaw's thermodynamics research group in the Chemical Engineering department of the University of Alberta and was supervised by Dr. Maham. My research, as well as the research of many other researchers in the group, was to understand how asphaltenes, a heavy oil fraction, behaves in different situations. Because they are found in crude oil, it is important for the petroleum industry to understand them. For example, how they react to different solvents and temperatures effects how they can be pipelined.

My part in the research was to find the densities of asphaltenes, an asphaltene containing compound, ABVB, and heavy oil in various solvents, including toluene, 1-methyl-naphthalene and dodecane. I dissolved different amounts of one of the compounds into one of the solvents to make solutions of various concentrations. I then insert them into a vibrating tube density meter, at the temperatures, 25, 40, 60, and 80 degrees Celsius, to find the densities. We plotted them to see how the densities change as the concentrations increase, and calculated to find the partial molar

volumes. Both help us to understand how the compound is reacting to the solvent, and if it is truly dissolving in the solvent, or whether it simply looks like it is.

The WISEST summer research program has not only taught me about my specific lab work and the procedure of my experiments, but has given me the opportunity to discover for my self what working in a lab is truly like. While learning how to work in a lab, I learned how the university works and all the jobs related to working in a lab that I hadn't expected. I learned about the researcher's responsibility to attend meetings, order supplies, write reports, give presentations and still have time to do actual research. If a person can not organize their time appropriately, they will face many problems. I was given the chance to meet people, not just chemical engineers, but all of the people needed to make lab research work. Their experiences and regrets will help me on my life journey.

Before my six-week discovery opportunity, I was only vaguely aware of what a chemical engineer really does, and what is involved in working in research of any type. I now know that they do much more then I had ever thought and was able to find out for myself. This knowledge has given me ability to make a responsible and educated decision on my future career choice. I am now able to spread the information that I have attained, to other women who were not fortunate enough to be involved in this learning experience.

Tara Martin

WISEST Supervisor: Dr. Catherine Field

Sponsor: DowAgro Sciences Inc.

Throughout the WISEST six-week program, I worked in the Department of Agriculture, Food and Nutritional Science on a project supervised by Dr. Catherine Field and her technician Sue Goruk. Dr. Field is studying how nutrition affects the immune system. I discovered through this experience that immunology is a rather new and complicated discipline of science. Although I initially had trouble understanding what was occurring in my first few weeks in the lab, it soon became more familiar with my exposure to terms and procedures.

The project that I was mainly involved with was determining how certain diets fed to rats would affect the type of immunological cells present. The immune system has different types of cells with specific purposes. The goal of the lab project is to find a connection between diet and cell phenotype present in certain immune tissues. The tissues that we studied were the spleen, the Peyer's Patches in the small intestine, and the mesenteric lymph nodes.

The procedure that we used to determine the type of immune cells present involved a method called immunofluorescence. After isolating cells from the immune tissue from rats, we added several combinations of antibodies which would detect the corresponding antigens present. The percentage of cell types are detected utilizing a FACS Scan. This instrument sorts the cells through granularity and size to determine the type of cells present. How cells of the immune system will change by adding nutrients and fibers is the premise of the study.

Another project that I assisted with involved a similar study with pig immune cells. Due to the fact that pigs are very similar to humans, this study can better be connected to the human immune system.



This experience has been very useful for me. It allowed me to get a feel for lab work and scientific processes. Not only did it introduce me to immunology and nutrition, but it helped in exposing me to research that others in the WISEST program were doing. I spoke with many people about their summer jobs in the program, but I also discussed with others in my lab about their career paths. This helped me to understand different programs at the University of Alberta. The WISEST program was also beneficial because it exposed me to the campus at the University of Alberta. I was introduced to the computer labs, faculties, libraries, and food courts during this event. When I attend in another year, the campus will not be completely foreign to me.

This experience has been a very worthwhile job and I am happy that I was chosen to take part in it. To be a step ahead in decision making for the future is very beneficial and I appreciate this opportunity. These past six weeks have been a very educational and fun experience. I enjoyed the work that I did and the skills that I have gained.

“This experience has been very useful for me. It allowed me to get a feel for lab work and scientific processes. Not only did it introduce me to immunology and nutrition, but it helped in exposing me to research that others in the WISEST program were doing.”

Amanda Meleshko

WISEST Supervisor: Dr. Fiona Bamforth

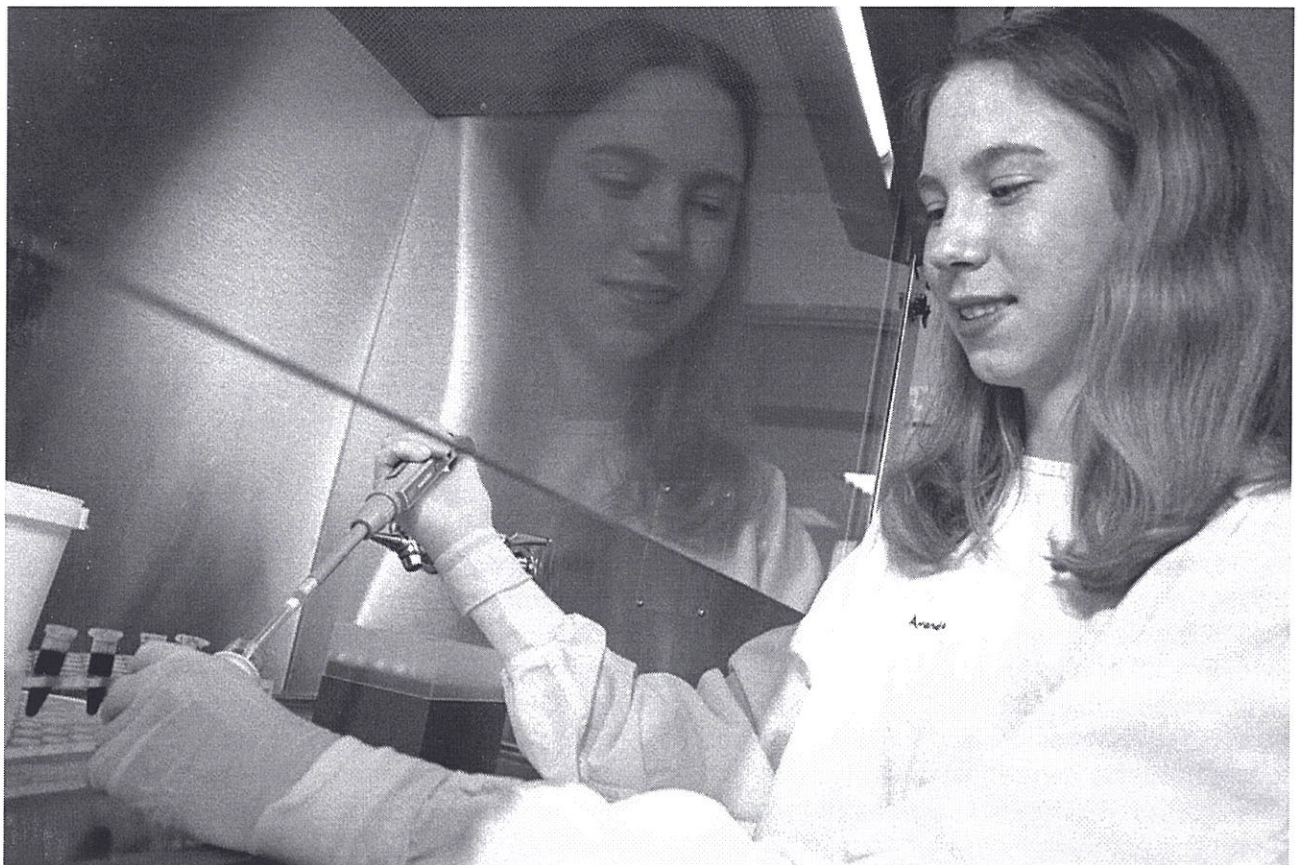
Sponsor: Faculty of Medicine & Dentistry, University of Alberta

A SUMMER OF TWIN RESEARCH USING RNA AND DNA

During the six weeks I spent participating in WISEST, I worked in the Department of Laboratory Medicine and Pathology under the supervision of Dr. Fiona Bamforth. In that time, I was involved in two research projects, as well as helping my supervisor with some of her data organization.

For both of my projects, I relied on a process called PCR, or the Polymerase Chain Reaction, to amplify the DNA and RNA for analysis. Amplifying the DNA is taking a small amount and replicating it so that there is a sufficient quantity to work with. PCR allows amplification of DNA segments through a succession of incubation steps at different temperatures. The 1st step in a cycle is the denaturation of the DNA into two separate strands. The 2nd step is the annealing of the primers to the single stranded DNA. The third step is the extension, doubling the amount of DNA each time.

My first research project involved evaluating methods of extracting DNA from cheek smears. Its purpose was to test if enough DNA could be collected from buccal (cheek) cells, rather than from blood, to test twin zygosity. Monozygotic (MZ) twins are formed from a single zygote and are commonly referred to as "identical twins." Twins do not have to be identical to be monozygotic. Dizygotic (DZ) twins are formed from two separate zygotes and are commonly referred to as



"fraternal twins." Every pair of same-sex twins should know their zygosity, primarily for medical reasons. The assay, or lab test, I did, will provide the answer to the question, "Are they identical or fraternal?" To start off, I had to collect the samples, extract and isolate the DNA, amplify it and then detect the alleles of different genetic markers. I could detect the alleles by a final colour reaction. For MZ twins, all alleles are shared in common, but the chance of DZ twins sharing all tested alleles is only 1/128.

My second project involved looking at RNA expression of a growth factor in placental samples from twins. For this, I worked with RNA (ribonucleic acid) instead of DNA. After I extracted and isolated the RNA, I amplified it using RT-PCR. After the RT-PCR, a gel electrophoresis was performed. The purpose of the project was to detect and analyze gene expression at the RNA level. The insulin-like growth factor II (IGF2) gene is important in fetal and placental growth and could likely be involved in the splitting of a zygote, forming MZ twins. Therefore, I examined the relationship between IGF2 expression and MZ twinning by looking at IGF2 expression in placental tissues of MZ and DZ twins.

Feeling slightly overwhelmed at first, I am still glad I decided to participate in WISEST. Overall, I enjoyed the lab, research and campus experience. My research gave me the opportunity to work with equipment, such as pipettes, centrifuges, vortex machines, flow hoods, and thermal cyclers, as well as substances such as dry ice and liquid nitrogen. By participating in the summer research program, I learned so much about my field of research, as well as others. I accomplished this through conversations with other WISEST students and through some of the Wednesday afternoon activities and "lunch with the bunch." These activities gave me new insights into other areas of studies I may want to pursue.

I would like to thank Dr. Fiona Bamforth, the Faculty of Medicine, Laurie, Cheryl, Donna, Teresa, William, Colleen, Karen and others, for making my research experience fun and for all your help throughout the summer.

Andrea Murland
WISEST Supervisor: Dr. Tom Etsell
Sponsor: Syncrude Canada Ltd.

Throughout the six weeks of WISEST, I worked in the Department of Chemical and Materials Engineering under Dr. Tom Etsell. Working directly with grad students and technicians, I was involved in two projects.

The first project that I worked on involved the extraction of silver from used color photofix solutions and regenerating them for re-use. A process has already been developed for black-and-white solutions, but we were investigating the role that iron in color solutions plays in the extraction. This process allows companies to regenerate their photo solution for reuse. Because photo solution is toxic waste, this eliminates an environmental problem. This is especially important for places that develop a lot of photos, like hospitals. Our results came out a little strangely, with the black-and-white solution doing **exactly** the opposite of what it was supposed to. Considering that this was the solution that has already been figured out by someone else, we were a little surprised. But I guess that's the way research works.



The other project that I was working on was helping out a grad student on his work extracting vanadium and other metals from oil sands fly ash. The ash is a byproduct of the extraction of bitumen from the oil sands. Trace metals in the oil sands concentrate in the ash. About 150 tons of fly ash is produced per day in Fort McMurray, so the potential of the ash for providing metals is enormous. The metal that is most important for extraction is vanadium. We were also trying to produce molybdenum. Hopefully, titanium and nickel will also be extracted at some point.

In one test, I bubbled carbon dioxide through a mixture of ash and water for three hours. After analyzing these samples (big fancy expensive machine!), we realized that wasn't working, so we decided to try something else. The next day, I started a few weeks of mixing ash with an acid or base and filtering it every hour or half hour (the same sample of ash for the whole time). Then I spent a couple of days dissolving metals out of the ash and making a variety of colors of solutions yellow, green, blue, red (until I filtered it at least). This was producing results that have never been achieved with this method before, so suddenly we had some work to do trying to figure out what went wrong and what we did differently from the times that it worked.

Juliet and I spent one day at Syncrude's research facilities in Edmonton. We got to talk to researchers and engineers there about their projects and experience. This gave a different perspective to the work that I was doing. Many of the people that we talked to tried to give us the goal of the projects from the point of view of industry. The lab work, on a small scale, is more of an academic approach to a problem. At Syncrude we were able to see a pilot plant being built and get an idea of the scale that the real operation would be.

Working in the lab this summer not only gave me lab experience and allowed me to get involved in research, but it also offered insight into what the areas of science are really about. While tests were running and I was monitoring them with the grad student that I was working with, I spent a lot of time asking him about his university experience. I learned a lot about the engineering program

that I didn't know before, and this will help me make decisions of what branch of engineering to choose when that time arrives. As well, I was able to talk with grad students in other labs, supervisors, and the other WISEST students to get an idea of what different areas involve. I couldn't ask for anything more for a summer job – not only did I get to work, but also to learn more about science and engineering in order to ease the decisions that will have to be made in the next few years.

Tamara Murray
WISEST Supervisor: Ms. Kate Murie
Sponsor: Dow Chemical Canada Inc.



This summer I worked at Meanook Biological Research Station where I participated in a small part of the Forest Watershed and Riparian Disturbance (FORWARD) project. The goal of this study is to determine the impact of natural and human disturbances on water quality of Alberta streams. It is hoped that this study may provide the important information needed to help improve forestry techniques. I worked under the supervision of Dr. E Prepas, who is in charge of the FORWARD project and Kate Murie, who is the manager of Meanook Biological Research Station.

At Meanook, I worked mainly in the lab analyzing water samples from a number of different streams from around the Whitecourt area. These samples usually arrived twice a week and in the lab we analyzed them for a variety of different nutrients including nitrogen and phosphorus. Nitrogen and phosphorus are important nutrients for all living organisms but in some places can

only be found in limited quantities. Nutrients such as these can be the limiting factor in an ecosystem and makes them very important when studying water quality. However, previous experiments have shown that unlike phosphorus, nitrogen is very unstable. Bacteria and other organisms in the water cause the nitrogen to constantly change forms. After 24 hours, a sample being taken, the nitrogen readings no longer accurately portray the original amounts and types of nitrogen found in the stream. Since it may take up to a week for the samples to reach the lab, the nitrogen component of water cannot always be analyzed.

Therefore, I was given a project of my own to work with water samples, which dealt with, trying to stabilize nitrogen in the water. The idea was by acidifying the water it would lower biological activity and prevent nitrogen from degrading/changing caused by bacteria within the samples. After numerous tests to determine how much sulfuric acid was needed to lower the pH level by one and two points, I was finally able to add the right amount of acid to each container of sample water. For the next six days I analyzed the amount of phosphorus, ammonium and nitrates in the water to see if the nitrogen remained constant.

Even though I spent most of my time in the lab, I also had many other opportunities to learn about the other studies that are taking place within Meanook. There are many different research teams that work here both part time and full time. New people are always coming and going bringing new experiences and knowledge. This gave me the opportunity to talk to many people that work in a variety of different fields. A few times I even got to go out into the field with them to experience first hand the kind of work they do. This gave me a little more information about the different jobs that I could get in the environmental field of science as well as the different programs that I could take in university.

Through the WISEST Summer Research Program I have learned a great deal about what is required of someone working in a university laboratory. Before the summer started I had no idea how careful you had to be in a lab or how easy it is to contaminate a sample of water. I found that sometimes the work can get repetitive but overall I really enjoyed myself. This program has not only provided me with a range of new and interesting experiences but it has also helped me better understand my goals and where I want to go in the future.

Christina Nguyen

WISEST Supervisor: Dr. Andrew Keddie

Sponsor: Edmonton Glenora Rotary Club

I work under the guidance of Dr. Andrew Keddie and his crew in the department of Biological Sciences, specifically that of entomology. Dr. Keddie's work primarily concerns incorporating a variety of biological control agents, such as pathogenic insects, fungi, bacteria, virus, etc. to produce the most ideal repression of specific greenhouse pests.

A common greenhouse pest that feeds on a wide variety of cultivated plants and weeds is the caterpillar, *Trichoplusia ni*. In its larval stage, a T.ni can consume three times its weight in plant material daily. Thus, upon my arrival I was told that I would be experimenting on *Podisus maculiventris*, one of the major predators of the T.ni. Overall, my responsibility was to maintain my own individual *Podisus* colony, as well as, the specific sets of insects I was to be experimenting with.



My first experiment involved the direct and indirect exposure of Podisus to two different types of bacteria, *Enterococcus Mundtii*, and *Serratia*. These bacteria are pathogenic to the T.ni and can be great biological control agents. However, if they produce aversive effects in the Podisus, their effectiveness in eliminating T.ni will have to be reassessed. Therefore, my experiment was designed to answer whether or not the bacteria would cause mortality in the Podisus. Unfortunately, during the experiment the possibility of contaminated T.ni diet arose. Although, the experiment was carried through, its results could not be considered valid. Hence, a new experiment had to be implemented.

This second experiment also involved directly and indirectly inoculating Podisus with a microbe that was pathogenic to T.ni. The difference was that a specific Beauveria fungus; the Spruce Budworm isolate was utilized. The objectives of my experiment were to: 1) determine whether the Beauveria isolate was pathogenic to T.ni and/or Podisus 2) determine whether the consumption of Beauveria-inoculated T.ni by the Podisus would produce adverse effects in the Podisus 3) determine whether there is an age susceptibility amongst Podisus to the fungus and 4) determine whether there is a difference in the mortality rates of the Podisus under direct and indirect exposure to the fungus.

Several controls were also put into place to ensure optimum results. A total of eight jars, each containing five Podisus, were set up. Four of these jars were devoted to the controls, while the remaining others contained the directly and indirectly-Beauveria-exposed Podisus. The T.ni and/or Beauveria were inoculated only once. After each jar of five Podisus was given either its direct or indirect dosage of the Beauveria, a daily recording of the pathogenicity and mortality of the Podisus was kept. Deceased Podisus were immediately isolated and labeled in 1 oz plastic cups. The cadavers were placed onto nutrient-rich agar petri dishes and sealed shut to induce re-emergence of the fungus. Once re-emergence transpired, the fungus was isolated and cultured

on another separate dish. The development of spores and the identification of its morphology under a microscope determined whether the Podisus died as a result of fungal penetration.

Prior to my lab experience I was, dreadfully, one of those stereotypical female who screamed at the sight of swarming insects and swooned when one got on her. I could not imagine myself touching insects not to mention interacting with them for the entire duration of my WISEST experience. However, things have a way of arranging themselves that allowed me to overcome this fear!

Initially when my supervisors spontaneously stopped what they were doing or saying to catch fluttering insects I could not understand their fondness for these little beasts. Although, I still cannot claim that I fully grasp their infatuation for the insect world, I can definitely say that I've learned to appreciate their love and dedication for it. Seeing them so engorged in their task is truly inspirational, especially when they've trained themselves to catch flying insects with their bare hands. Although modestly claimed as a mere technique, I definitely believe this can become a new form of martial arts! (~_*)

Mercedes Olinyk

WISEST Supervisor: Dr. Debra Davidson
Sponsor: Alberta Agricultural Research Institute

Throughout my six weeks in at the University of Alberta I had the joy of working with my supervisors Dr. Debra Davidson and Dr. Naomi Krogman, along with Norah MacKendrick MSc and Colette Fluet MSc, their grad students. I was in the department of Rural Economy and I dealt with Natural Resource Management in Alberta. Coming into this program I had no idea of the many areas that resource management involved. I was in amazement when I first began my research.

In the beginning, most of my time was spent on the computer researching government websites and doing searches to find helpful information for our project. I found information on Integrated and Sustainable Resource Management plus environmental issues. I also learned a great deal about the petroleum industries and forestry. It was interesting to learn that those worlds of industry were so different and complex.

Petroleum (oil and gas) and Forestry industries have to work together to plan their futures. It's a busy world out there and the economy is rapidly changing, all while affecting our environment. Pipelines and wells are constantly being built, while tearing up our forest land. Roads for transportation have to be built by forestry and oil and gas to access their resources also while disturbing our other natural resources. Land recovery times are also decreasing more and more.

I learned that treaties with First Nations people and multiple resource plans are being made to maintain a healthy environment. Sustainable resource development is another great part of planning. I discovered that our province is so powerful and rich in resources but needs to be aware of the growth rate of our economy and the depletion of our resources. Harvest rates and development are rising and environmentalists need to be aware of that.

The people that I have met in the WISEST program were amazing and I have learned so much from everyone. It was great to be in a program where everyone shares the same basic interests in



science and ambition as you. The friendships that I have made here are endless. The professors and grad students were also incredible people to work with. They were patient with me and very welcoming. Having juice, or just spending time with grad students and other professors was the most interesting. To be able to talk to someone else about their studies was great. The field trips and the group outings which Celia, Grace, and Tara organized for us all were so much fun. They were some of the best parts of the 6 weeks.

The overall University Experience was excellent and exciting. I have so many options now as to what I might choose to study after high school. The choices for University are so vast and incredible, and the contacts that I have made are extremely valuable. This rewarding experience is one that I will never forget and is probably the one that I will come of most value in the future because I know so much already about the U of A. I got to live the university experience for six weeks and know what to expect for when I return.

“Sustainable resource development is another great part of planning. I discovered that our province is so powerful and rich in resources but needs to be aware of the growth rate of our economy and the depletion of our resources.”

Erin Olovson-Cleveland
WISEST Supervisor: Dr. Al Meldrum
Sponsor: NSERC - PromoScience Research

I Think I Broke Something... Again

My first few days in the WISEST program were disappointing and disheartening. I didn't know anything about the project on which I had been placed, I didn't understand any of the reading material I had been given, I had basically given up in the subject at school (Physics), and I managed to break things that I had been explicitly told were "expensive", "essential", and "the last on the planet".

Happily for me, two of the things that I thought I had broken were easily diagnosed and repaired. A laser that started making terrifying electrical noises fifteen minutes after the laser guy had left for Idaho was just finicky about when you turned it on. The microscope was just old and collapsed "all the time". But these two pieces of equipment were merely expensive. We had other microscopes and we had other lasers—they certainly weren't the last ones on Earth. The work could have gone on without them. Unfortunately, the work couldn't go on without any samples.

If the point of your research is to look at thin specimens under a microscope, it is not good to shatter the last of these specimens as you are thinning them. Polishing samples for transmission electron microscopy (TEM), was one of my two projects over the summer. The polishing consists of attaching a tiny sample to a not-so-ergonomic holder and pressing this holder to a spinning



grinding wheel for as long as it takes to thin the sample to about a few hundred nanometers thick. Depending on who is doing the polishing, this can take anywhere from three hours (my supervisor), to eight days (me on my first sample— until I broke it). The work is delicate, tedious, and very boring. Every few minutes you get to look at the sample under a microscope and see how it is thinning to determine your next course of action, but since I lacked experience in the visual recognition of problematic issues, I shattered both my samples, which was terribly upsetting and wonderfully liberating (but no, I did not do it on purpose!).

As my supervisor fretted about his research, he assigned me to another task. These samples he'd had for a few years and never really got around to looking at, so there was not nearly the pressure that I had felt with the TEM samples. My new project was to research the photoluminescent properties of magnesium oxide (MgO), but once again things did not go as planned.

Photoluminescence involves shooting a laser beam at a sample and recording how the sample lights up. Besides the fact that the computer died and I nearly broke the laser the first time I used it alone, things were going pretty well. I was even getting some data that confused and intrigued my supervisor (naturally I thought I was on the brink of a scientific discovery). Of course, it turned out that the tape that was holding the sample was luminescing more than the sample itself. So once again, my data was rendered useless (but at least I could clean these samples and try again).

After that, my work settled down. I felt comfortable in the lab (basically because there was nothing left for me to mess up), and I started to have fun. I have actually managed to polish three TEM samples in a row without breaking a single one and I've gotten some interesting data on the photoluminescence of MgO and how it changes as you implant it with iron ions and heat it in a furnace. The photoluminescence research is really interesting since no one's been looking at iron implanted MgO for about 20 years, and very few people were looking at it even then.

Thanks to the WISEST program and the guys in my lab (Dr Meldrum, Colm, Aaron, and Ken) for making my summer experience so much fun. Also many thanks to all the residents of St. John's who made life in Edmonton an experience I won't forget. And lastly, a special shout out to Celia, without whose help I would have never gotten here. Thanks everyone!

Melissa Paquette

WISEST Supervisor: Dr. Walied Moussa

Sponsor: Faculty of Engineering, University of Alberta

Summertime in the City

The WISEST Summer Research Program has provided me with an informative, interesting, and influential experience.

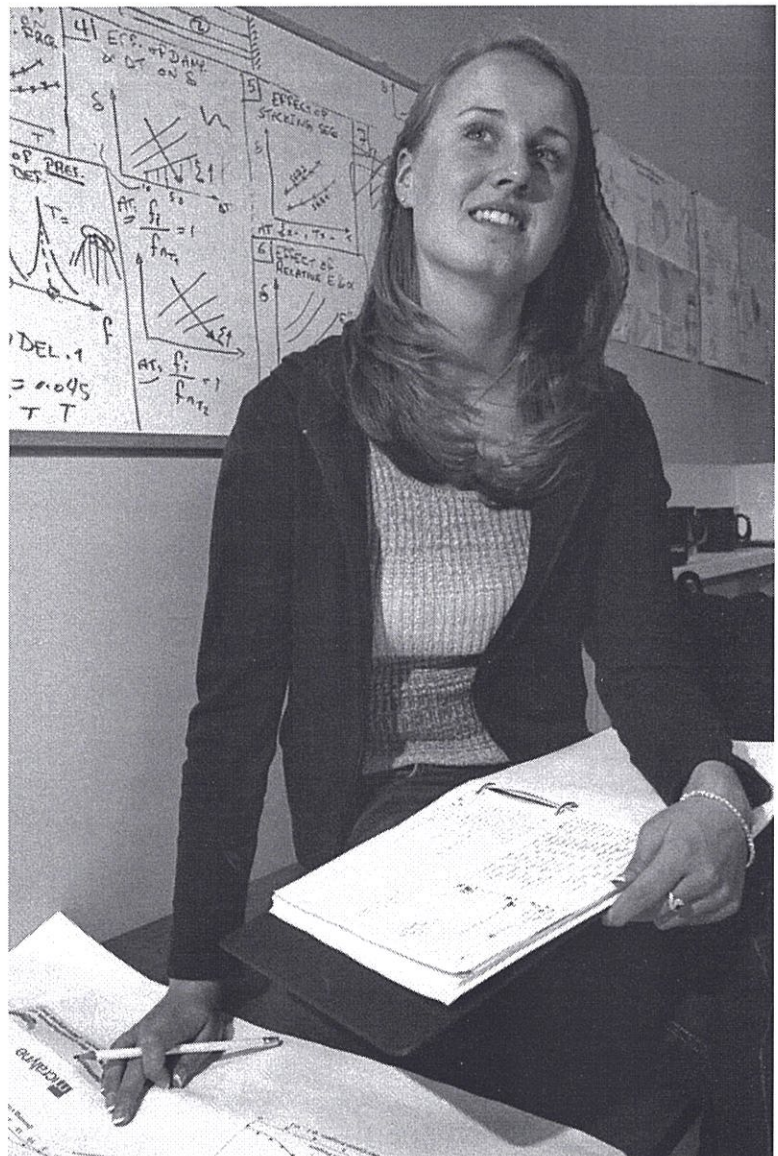
I was fortunate enough to work with Dr. Walied Moussa's research team, the Advanced Computational Group, developing a neural network. After only spending a few hours there, I thought, "I could sit here for days and still not understand what these people are talking about." Luckily though, after about a week or so, I started to understand my project better.

A neural network is a way of manipulating a computer's capabilities so it can make a decision similar to a human. It can learn from inputted data and correctly predict new results. Neural networks are important to engineers because it reduces the amount of testing needed to optimize a device as the neural network can predict results that fill in gaps in the experimental data. The significance of neural networks is not only limited to engineering, as stock market analysis, speech recognition programs, and medical diagnostics also take advantage of its capabilities.

Within our team, research is being conducted into optimizing a micro-electric pump, called a comb drive actuator. We investigated how the different parameters (e.g. voltage, number of fingers, gap between the fingers, etc.) affected its displacement. By assessing and optimizing the displacement, the most efficient pump can be produced. The comb drive is a component of various micro-electrical mechanical systems, or MEMS. For example, a lab-on-a-chip micro-device is being developed which can divide and analyze a single drop of blood similar as in a hospital lab, but instead as a fingernail-size disposable chip. As micro-electrical devices are on the leading edge of technology, research done to optimize them is very valuable and has numerous applications in our everyday life.

My job was to create a neural network that would learn from the experimental data and would be able to predict the displacement for any values. "AAAH!!, how am I supposed to do that?!!" I thought, after being told about my project, but after a lot of reading, asking questions, guessing, and some good luck, everything came together in the end. Most of my tasks involved organizing and coding the data into matrices and creating the code to generate graphs that demonstrate how the variables interact. I constructed more than 3500 lines of code that at the beginning of the summer I probably would have assumed was a foreign language! My work is now being used to assess how the parameters interact to produce a certain displacement.

Even though I was worried about my project at first, learning how to use the MATLAB program and build the code was really neat. Working in Mechanical Engineering has helped me to understand what engineering is really about and the diverse applications engineering has.



I met some awesome people during the six weeks and learned a lot about the University of Alberta, living in residence, and engineering. My WISEST experience was very well rounded and beneficial to me in various aspects. Being from rural Alberta, the opportunity to explore the U of A was great and I now know my way around campus. (How could I not after getting lost more times than I can count on my fingers?) With the assistance of the Margaret-Ann Armour Fund for Rural WISEST Students, I was lucky enough to stay at St. John's Institute on Whyte Avenue where I met some great people and was fed way too well! Experiencing what engineering was really about will help me to decide what I will enjoy studying after high school. In addition to my research work in engineering, the field trips to the Experimental Farm, Epsilon Chemicals, and the on-campus research tour of a genetic biology lab broadened my knowledge in other areas of research and development in science and engineering.

Spending my summer in the city was an experience I will never forget. I would like to thank Dr. Moussa's research team for a great time and WISEST and their sponsors for accepting me into the program!

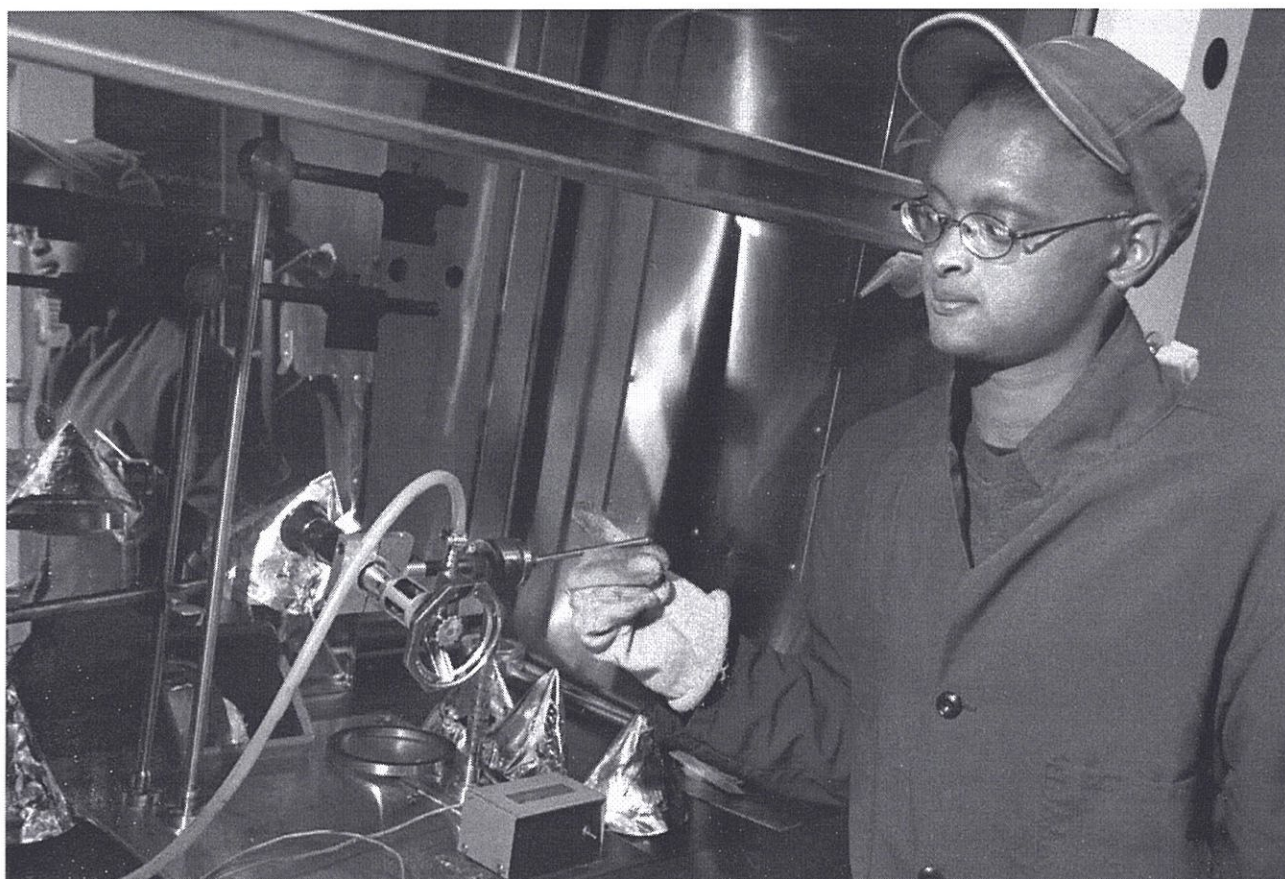
Amol Patil

WISEST Supervisors: Dr. Nancy Kerr & Dr. Betty Crown
Sponsor: Faculty of Agriculture, Forestry & Home Economics, U of A

Working in the WISEST Summer Research Program for six weeks in the Department of Human Ecology has profoundly affected the way I perceived research. With the capabilities of hands-on learning in the research labs, I was able to understand what research is really like. Many people just shrug and have no clue what Human Ecology is all about. The research I was mainly involved in was testing the flammability and strength of textiles. Human Ecology also involves the restoration and preservation of artifacts (eg. clothes), although I was never involved in this work. Human Ecology is an exciting field of research affecting our everyday lives, from fire fighters, to the military, to the people in the oil fields.

My main project involved testing the fire shelters. Fire shelters are designed to protect firefighters who are trapped in a firestorm. Therefore, my research primarily involved burning stuff up. People just call me the new pyro! The Cone Flammability Test is part of the continuous research involving the fire shelters. A propane flame is applied horizontally to the exterior of a cone-shaped specimen for 30 seconds. A failure constitutes observation of smoke or flames inside the cone, whether due to thermal decomposition or a breach in the material. Also, a key observation is a popping noise and a bright flash caused by the decomposition products collecting at the top of the cone and undergoing combustion.

Another project I was involved in was the Flame Resistance Test. This test is used to determine the flammability of various textiles. First, a material is heated to 105°C for 1 hour, and then it's cooled for at least 30 minutes in a dessicator. Next, the specimen is placed on a rack and then held over a flame. The propane flame is applied to the specimen at an angle of 30° for 12 seconds. If the length of the burned area of the specimen reaches past 100 mm, then it constitutes a failure. Some treated cotton, some rainwear, Nomex, and Kevlar are materials, which passed. Materials such as cotton, nylon, and polyester fail because they usually melt. Also, some lamination can also cause a material to fail since it can easily catch fire.



The Instrumented Mannequin Test is used to simulate 4-second flash fires, which are experienced by people working in the oil fields, fire fighting, and the military. A dummy, more affectionately called Harry, is suited up with clothing like Kevlar and Nomex. Then, an intense flash fire blasts Harry for 4 seconds, wherein the temperature can reach up to 1000°C. Harry has 110 sensors all over his body, which measure the amount of 2nd degree and 3rd degree burns. The computer analyzes the data from the sensors and we can determine the flame- retardant capability of different clothing.

Finally, I was also involved in the testing of the strength of textiles. Fabrics are usually classified as being warped or filling. Warped is the length of the fabric's yarn, while filling is the width of the fabric's yarn. Once you cut out your specimens, then you mount them onto the Instron machine. The Instron measures the tensile strength of the fabric by pulling it apart. The strength (Newton) it takes to pull apart the specimen determines the tensile strength of the fabric.

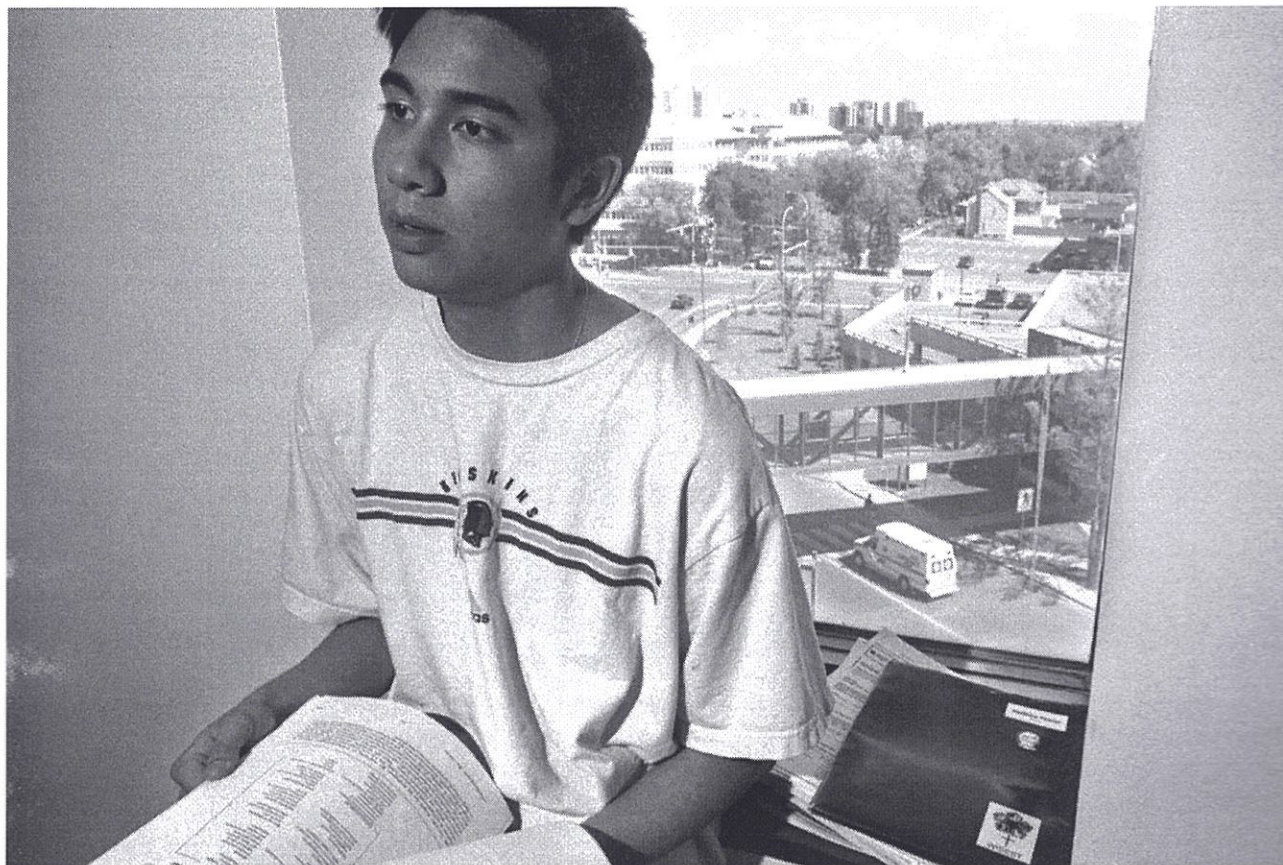
Overall, the WISEST Summer Research Program helped me learn a lot about the way research is conducted. I got to meet a lot of nice people and got to experience the relaxed settings of a research environment. I've learned a vast amount of things from testing the flammability of certain textiles to testing a fabric's tensile strength. Overall, the best part of my experience is the bragging rights I hold over my friends, since all I got to do this summer is burn stuff up!

**“With the capabilities of hands- on learning in the research labs,
I was able to understand what research is really like.”**

Matthew Penner

WISEST Supervisor: Dr. Linda Ogilvie

Sponsor: Alberta Heritage Foundation for Medical Research



For the first six weeks of this summer, as part of the WISEST summer research program, I worked in the Faculty of Nursing under the supervision of Dr. Linda Ogilvie, Elizabeth Burgess-Pinto, and Dr. Jo Lamba. At first, I thought I would be working with patients in a hospital, my definition of typical "nurse stuff." However, I quickly learned that not all nurses work in hospitals, like I thought, but that many are involved in research projects as well. I had the pleasure of helping with the New Canadian & Youth Study (NCCYS). NCCYS is a longitudinal survey of more than 4,000 immigrant and refugee children and their families in six Canadian cities. The six cities are Montreal, Toronto, Winnipeg, Edmonton, Calgary, and Vancouver. Planning for this study began in 1999 with an idea from CERIS, the Toronto branch of Metropolis. This survey is being conducted because very little research has been done on the health of immigrant and refugee children. This survey is intended to better understand the health and well-being of children and youth of immigrant and refugee families.

For my part in this study, I was given various tasks to complete. My first task was to read piles and piles of documents on the study and what has been done so far. Needless to say, this took quite a long time but I learned a lot from it.

My first job was to make profiles for the Mainland Chinese, Hong Kong Chinese, and Vietnamese immigrant groups. This basically involved researching books and the Internet to find various

statistics on each of these populations in Canada, the Prairies, and if possible, city specific. These statistics included language, ethnicity, and religion, demographic characteristics, family composition, and education and occupation. It took me quite a long time to complete the profiles but it was worth it. Not only did I contribute to the survey, but I also learned a great deal about these populations. On top of that, I also managed to learn valuable research skills on the way.

Next, I conducted a literary search in order to update the background information required for this study. I was constantly visiting the library looking for journals and books that dealt with racism, treatment of immigrants and refugees, and any articles and information I could gather specifically on the immigrant populations dealt with in the Prairie Region – Vietnamese, Kurdish, and Filipino – as well as the national groups – Mainland Chinese and Hong Kong Chinese. Although this took a lot of work, it was very interesting and I learned a lot about the University of Alberta's library system.

Much to my delight, I was also able to attend two interviewer-training sessions. I learned a lot about the complexity of the study and the interviewers I met were very kind, especially Anges Cheng. I had a great deal of fun.

I also had the opportunity to visit a TB clinic one afternoon and I found this extremely interesting. This is a possible career I am very interested in.

This survey was also very interesting to help out with because it is the first of its kind and all the data is essential new, so I got to be part of something very important. I am extremely glad that I had the opportunity to be a part of WISEST this year. I am sure that the skills I learned will be invaluable later on in life.

Kathryn Pon

WISEST Supervisor: Dr. Neil Adames
Sponsor: NSERC - PromoScience Research

I have always been interested in science; therefore the announcement in my school bulletin about a summer job in a research lab immediately sparked my attention. I thought it would be the perfect learning opportunity to gain experience so I decided to apply. I filled out all the forms, got all my references and marks, and sent out my application. I was absolutely ecstatic when I received a reply saying I was accepted. It turns out that I would be working in Neil Adames' laboratory in the Department of Biological Sciences.

I was really excited the first day and was happy that I actually found my way to the building without getting lost. I was first given some background information to read. The project I was going to be working on involved the fields of genetics and cell biology. We were to isolate, purify and examine these specific proteins from the mitotic-exit network, which controls exit from mitosis in the budding yeast, *Saccharomyces cerevisiae*.

The first step is to grow the yeast cultures which has something called a TAP tag attached to the targeted protein of interest. After that, the mixture of yeast cells and the media, which the cells were grown in, is spun in a centrifuge so that the yeast cells and media are separated into layers. The media is then poured out, leaving only the yeast cells in the tube. After that, the yeast cells are



then French pressed. This involves placing the cells into a metal cell with a tiny hole on one end and applying pressure with a piston on the other, pushing the cells out the hole. This ruptures the cell membrane, allowing the cell content to spill out. The mixture is spun again at extremely high speeds, and the middle layer, where all the protein should be, is collected. After dialyzing overnight to take out impurities and adjust the pH, the mixture is run through a column with IgG beads and the protein A part of the TAP tag is cut off. A second column of calmodulin beads will purify the tagged protein and any other proteins attached to it. The specific protein and other proteins interacting with it are then separated according to their molecular weight by sodium dodecyl sulfate polyacrylamide gel electrophoresis. To detect whether or not the protein chosen is on the gel, we transfer everything on the gel to a polyvinylidene difluoride membrane and use biotinylated calmodulin to spot the calmodulin binding site on the TAP tag attached to our specific protein.

When we successfully collect and separate our proteins of interest, our goal would be to identify these proteins that interact with the specific protein which we have attached the TAP tag to. To do this, trypsin would be used to cut the proteins. Trypsin cuts at specific sites on different proteins. Using the sites where the trypsin cuts and mass spectrometry, we would be able to determine the identity of the proteins, which had formed weak bonds with our tagged protein.

At first I had no idea what I was doing, but luckily I finally figured it out after working for approximately three weeks. Through my experiences, I realized that I love being in a lab environment. There is so much potential for discovery and so many possibilities of fields to look into. I also learned about the different university programs offered and have already decided to go into either pharmacology or medical microbiology. The WISEST Summer Research Program is a remarkable program and I am very honored to be given the chance to participate in it.

Nahid Ramji

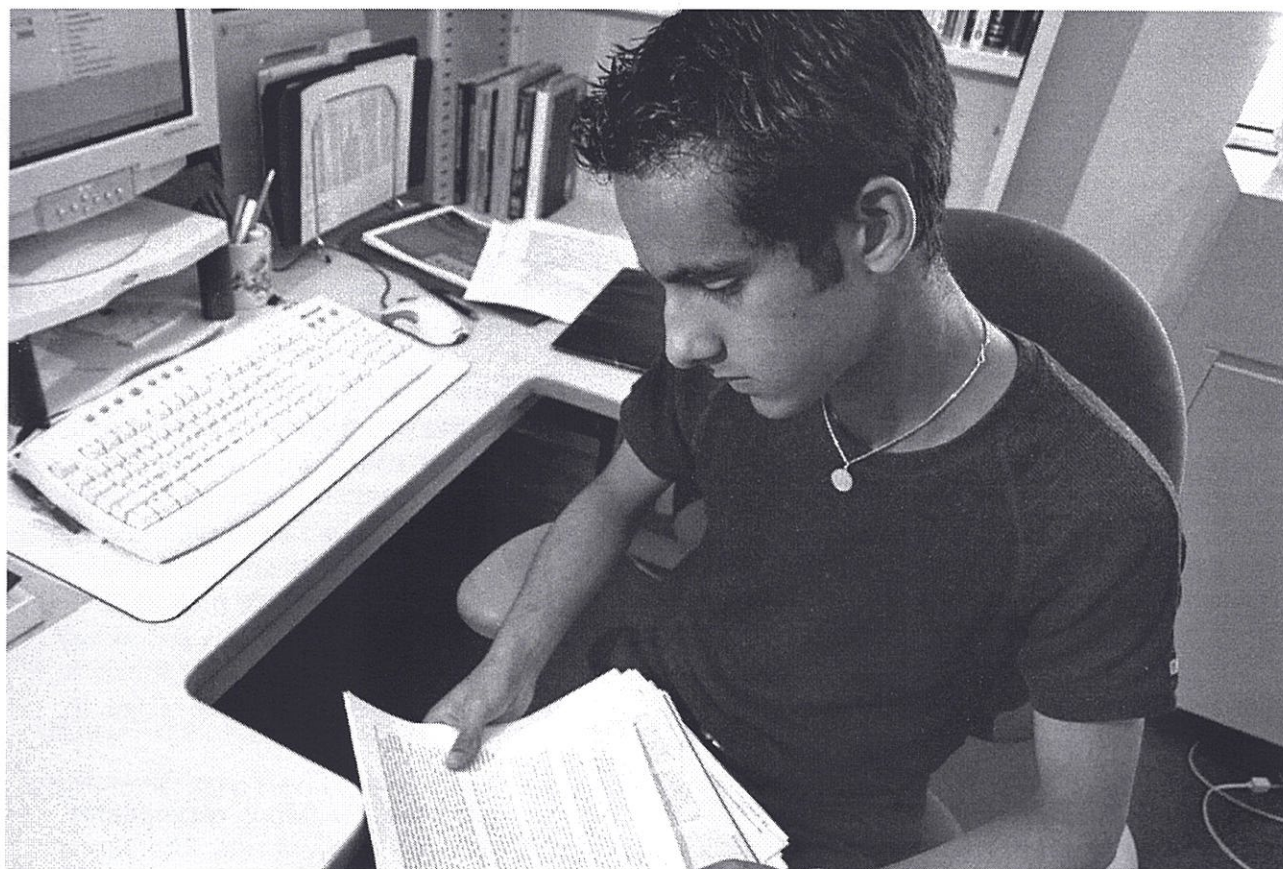
WISEST Supervisor: Dr. Janice Lander
Sponsor: Faculty of Nursing, University of Alberta

When I first read about the WISEST program in The Edmonton Journal a year ago, I knew that I had to get myself involved. Always provoked by Science, I knew that this would give me the knowledge to assist me throughout my post-secondary career and the rest of my life. I was right.

After speaking to my grade councilor about this great program, I waited anxiously for months for the application forms to arrive. The next month and a half was even more nerve-racking, waiting eagerly for my phone call of acceptance. After that, I just could not wait until the opening session.

The first day was exciting. Meeting my fellow WISEST students and the enthusiastic coordinators gave me quite a rush. I later found out that I would be working in the Centre of Knowledge Transfer with Belinda Weltman and Erica Olson, for Dr. Janice Lander in the Faculty of Nursing. After a long (and quite exhausting) walk, from ETLC to the Clinical Sciences Building, I was introduced to my project. The project would be concerning the topic of Knowledge Transfer; how scientific research is put into general practice.

The transfer and assimilation of knowledge from the "lab" to the "world" is a slow process, and examining the speed, quality and completeness of the uptake of research knowledge around backpack safety and its contribution to back pain was my job. By reading countless (and to the most part, repetitive and boring) scholarly journals regarding backpack safety and proper wear,



chiropractors, school boards, and newspapers were contacted for inquiries on any interventions or campaigns to promote proper backpack usage to students. After obtaining the necessary information on what is proper backpack usage, we went out to collect data on the way people currently carry their backpacks in Edmonton (at a fully expensed paid trip to Klondike Days!). Observing over 1,500 people and the way they carry backpacks (which was known to be safe or not by reading the scholarly journals), we input the data on a statistical package called SPSS, and compared age groups and genders and the method of wearing backpacks. From our observational findings, it can be hypothesized that knowledge on backpack safety was transferred in some sort of campaign. This was determined as more of the younger generation than the adults wore a backpack in a proper manner (that is, on two shoulders, above the waist, padded shoulder straps etc).

My participation over the past six weeks has provided me with great background on University lifestyle. In addition to my work for the Faculty of Nursing, the Small Group Discussions and the WISEST field trips helped me to narrow my choices for which type of program I want to enter in University. Moreover, WISEST helped me to broaden my mind, discovering about different career opportunities and research programs that are out there in the real world (like the different sectors of Oncology). I have discovered about many new programs that the University and the research sector have to offer me. I accustomed myself towards the University environment; the long walks from Clinical Sciences to SUB/ETLC helped me realize how HUGE Campus is.

By participating in the WISEST program was one of the best choices I made. The experience and knowledge that I gained will stay with me throughout my life, and I wish continued success for this program so it can offer to other students what it offered to me.

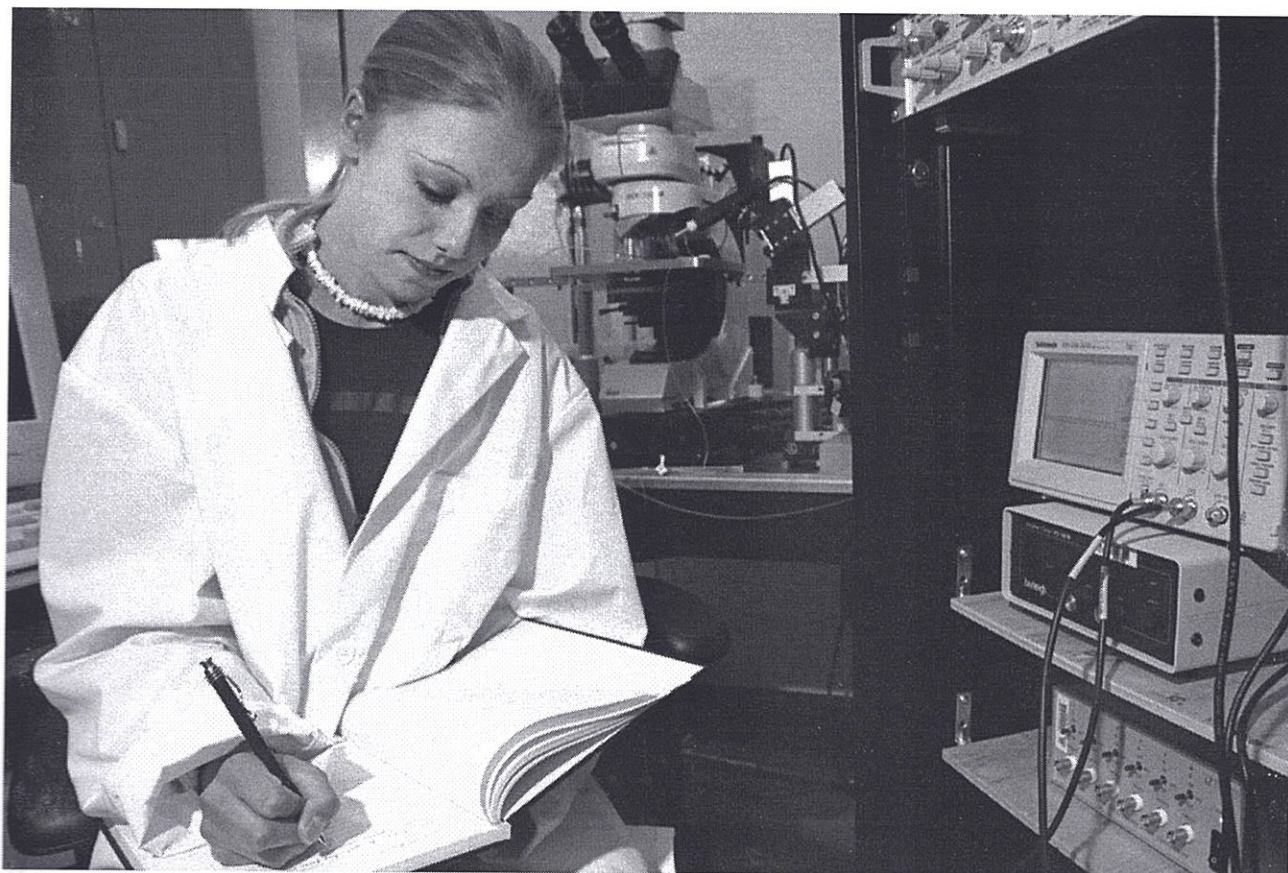
“Moreover, WISEST helped me to broaden my mind, discovering about different career opportunities and research programs that are out there in the real world.”

Marilyn Randolph
WISEST Supervisor: Dr. Declan Ali
Sponsor: Suncor Energy Foundation

This summer I spent my WISEST days working Biological Sciences in the Zoology department. I was working in Dr. Declan Ali's lab, visualizing proteins in embryonic zebrafish.

A lot of people don't quite understand what is meant by "visualizing". I know I didn't when I started. Basically, visualizing is using some means of isolating the desired protein in a way that can be easily seen qualitatively. I used immunohistochemistry to visualize the PKC H-300 protein. Immunohistochemistry involves binding a primary antibody to the protein, and later a secondary protein to the primary. We used the Cy3 secondary antibody, which fluoresces under a Texas Red filter. Therefore, using an imaging microscope we could take images directly from the slides. If PKC H-300 was present, staining would be clearly visible.

My project also focused on observing the PKC H-300 developmentally. Therefore, experiments were run on embryos from 24 hours old to 7 days old; meaning seven different sets. The images



taken were then observed for any differences or similarities in amount of protein visible, the positions of proteins, the sizes, and how the protein is dispersed. Part of my project was to decide which concentration of primary gave the clearest results.

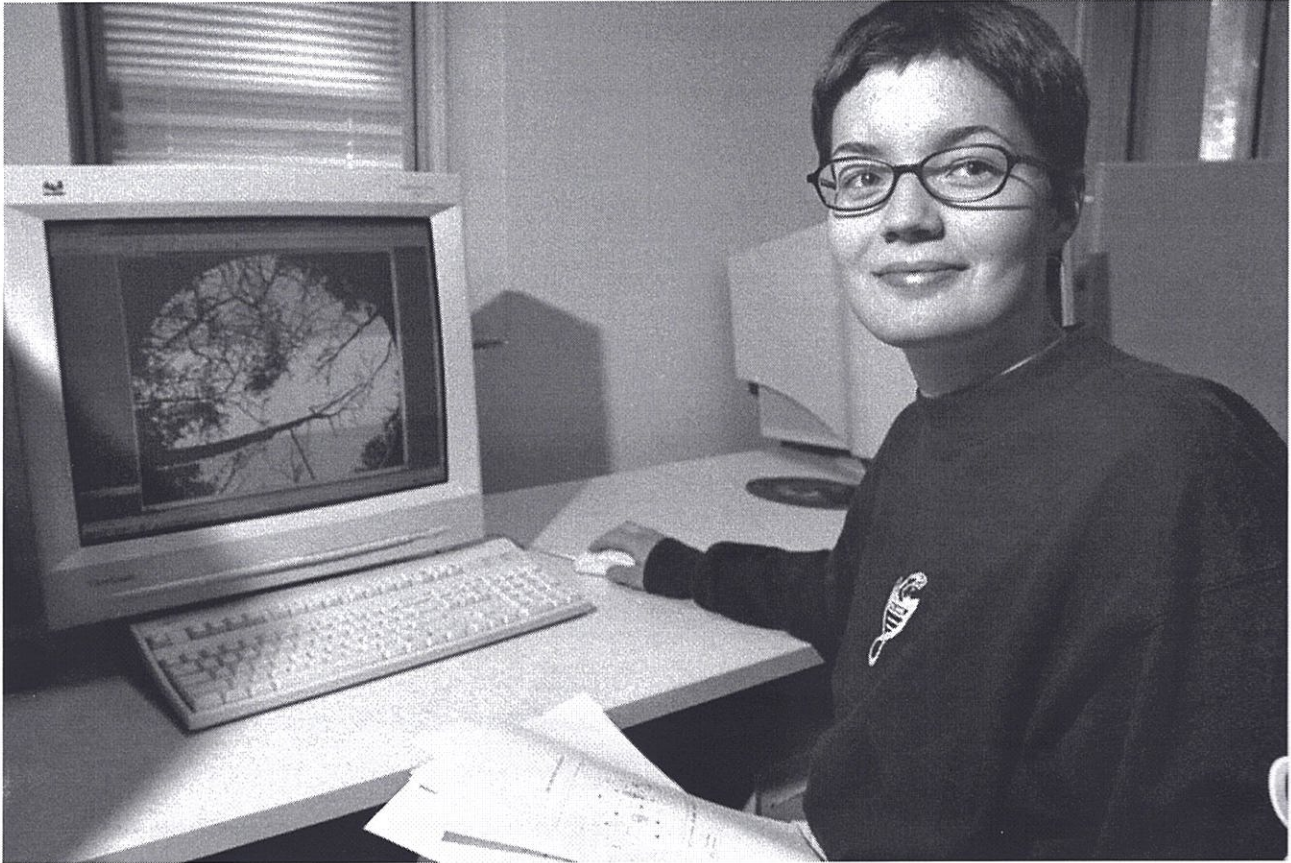
The hardest part about my project was the delicacy of it. Using embryos for experiments proved slightly difficult, as they were quite small and delicate. Before embryos could be used, they had to have their yolk sacs popped. Because they are so small, this had to be done under a microscope with the forceps, and I know I personally decapitated a few before I got the hang of it.

Throughout the WISEST program I got a better idea of how the University worked, as well as how biological research works. Through talking to others in my lab as well as other WISEST students, I also got a better understanding of other departments, careers, and courses available to me, which will allow me to make more informed decisions in the future. The people I worked with as well as others that I met in the program were friendly and helpful and made me feel more comfortable and able to settle in to my workplace. My lab workers helped me to understand my project by giving me overviews of the basic subject, since I didn't even know what a neuron or an axon was when I first started. I learned so much this summer and really enjoyed the experience. This unique opportunity gave me an early insight to the University life, and gave me a much better idea of what true research is.

“Through talking to others in my lab as well as other WISEST students, I also got a better understanding of other departments, careers, and courses available to me, which will allow me to make more informed decisions in the future.”

Amanda Scott

WISEST Supervisor: Dr. Arturo Sanchez-Azofeifa
Sponsor: Allard Foundation



This summer I worked for six weeks in the Department of Earth and Atmospheric Sciences in Dr. Arturo Sanchez's lab. When I first started, I had no more than a vague idea what that area was about, but I soon discovered that some pretty cool stuff was going on in my lab.

I was in the Earth Observation Systems Laboratory. Remotely sensed data (images created by satellites as different kinds of light are reflected off the earth to them) is used to characterize an area being studied, supplemented by field data like GPS measurements and identification from the ground. My first few days there were spent learning how remote sensing works and checking out some programs that are used to interpret the data. I think this is interesting because as I saw what people in other labs and the graduate students in the same lab as I were doing, I have realized that this technology can be used in so many different ways to gather information about the earth and the way land is changing and being used.

However, most of my time was spent on one specific project concerning the Costa Rican dry forest. You may have an image in your mind of the tropical rain forest when you think of Costa Rican vegetation, as I did before I started. Unlike the rain forest, which never loses its leaves, the dry forest has rain for most of the year but also has, yes, a dry season where the vegetation loses its leaves. The project involved, among other things, calculating the Leaf Area Index of several study sites. Leaf area index (LAI) is, basically, the area of all of the leaves on a tree divided by the

area that a tree covers. LAI affects the amount of light let in through the canopy, and consequently also the rate of photosynthetic activity and other biological processes, and as I found out, it is related to the age of the tree stand.

It is a good thing that I like computers, because my part of the research was centered around them: computer analysis of photos taken in Costa Rica of the forest canopy. In order to get data on the LAI per site I had to scan in photo negatives, run images through an analysis program, and do statistical calculations for each site and each age group of sites. While doing all of these analyses, I got to see how tree age and canopy structure affect the light that gets down to the forest, and the variance of these values between the wet and dry seasons.

In addition to learning a lot about one specific application of Earth Observations, I got to explore a field of science I barely knew existed or had even considered. Now I see possibilities for more areas of study in the future. As well I got the opportunity to hang out at the University all summer and meet people who showed me that if anyone is capable of doing something they love. The WISEST summer was a great experience for me and I hope that young women in the years to come will enjoy it just as much.

Tanis Searle

WISEST Supervisor: Dr. Sylvie Quideau
Sponsor: Alberta Agricultural Research Institute

Six months ago, I would never have imagined that I would spend my summer working at the University of Alberta. However, after applying with the WISEST Summer Research Program, that is exactly what I was doing. Most people my age might be starting their first job at the local grocery store or fast-food restaurant, but I am fortunate enough to actually have a head start at my future career in science.

When I first heard that I would be working at the Department of Renewable Resources, I was a little disappointed that I wouldn't be working in pharmacology or genetics like I had requested. However, after a couple of weeks, I realized I really enjoyed the department I was in. I worked with four other students, under my supervisor, Dr. Sylvie Quideau, in the Soil Biogeochemistry laboratory.

My project was to test six soil samples for carbon and nitrogen content, so scientists can eventually increase the amount of these gases stored in the soil. This would help to reduce carbon dioxide and nitrous oxide in the atmosphere, which contributes to the greenhouse effect. Three of the samples were a clay-rich Grey Luvisol soil, taken from agricultural plots at Breton, and the others were a Black Chernozem soil from Ellerslie. Each plot the samples were taken from was treated with phosphorus. We wanted to compare the amount of organic compounds in each type of soil.

To analyse the soil samples, I had to first physically fractionate it into its different parts; sand, floatables, silt and clay. The procedure to fractionate the soil was a very long and precise process involving sieving, centrifuging, flocculation, and sedimentation (with a lot of dishwashing in



between). I made several mistakes, including forgetting to weigh the clay and fine silt aliquots, and breaking several beakers, but I made it through the samples with my results intact.

In the weeks I was working at the Soil Sciences Laboratory, I did more than just separate soils. Not too long after I started working, I got an opportunity to gather soil samples in the field. I went with Dr. Quideau and two other students working with her to Breton and Ellerslie historical agricultural research plots. Using a corer, and plenty of elbow grease, we sampled soils up to fifteen centimetres in the ground.

Before I started on my own project analysing the phosphorus treated soil, I helped the other graduate and undergraduate students in the lab with their projects. I helped one researcher with her study on the soils produced in the canopy of the redwood forests in California. Another woman was busy analysing the contents of the forest floor of a forest near Peace River that had been harvested in many different ways, and I helped yet another graduate student with her analysis of organic carbon in soil samples from the same forest in Peace River.

Throughout the six weeks at the Soil Laboratory, I was rarely idle, often interested, and sometimes overworked, trying to finish my project in time. Still, working with the WISEST Summer Research Program in the Renewable Resources Department was an experience that will influence me through my entire professional lifetime.

“Most people my age might be starting their first job at the local grocery store or fast-food restaurant, but I am fortunate enough to actually have a head start at my future career in science.”

Bobbi Jo Starr

WISEST Supervisor: Ms. Kate Murie
Sponsor: NSERC - PromoScience Research

Over the past six weeks I have worked at one of several research sites for the R.A.N.A project (Researching Amphibian Numbers in Alberta) at the Biological Research Station, in Athabasca, Ab. My assigned project consisted of collecting detailed information of amphibian populations such as identifying the species, determining their weight, length, and sex. They were also examined for parasites and deformities. The information I collected is to go to a long-term study with the purpose of identifying an increase/or decline of amphibian populations of the area. In frog/toad populations there can be tons one



year and a big decline in the next year. The population fluctuates making it difficult to interpret data, but over a long period of time it can give valuable information in determining a true decline of amphibian populations. Meanook's research pond is relatively free from human impact and the data collected reflects the 'natural' changes in the environment such as the drop of water level resulting from drought. From 1997 to now there has been a large decline in the abundance of frogs and toads at Meanook, which corresponds, with the drop of water level and this year's drought.

The ponds where I researched at were fenced with plastic, which was at least 50 cm high; the bottoms of the fence were buried so nothing can push through. Pitfall traps were placed 10 feet from each other on both inside/outside of the fence. If I caught a frog on one side I released it on the other. Each trap was 12 inches deep and was made of two flowerpots put together. Inside each one I placed; a rock for the frog to sit on, a sponge keep moisture in or to soak up any excess moisture, and a long stick incase I caught a small mammal instead of a toad. In this case the mammal (shrew, mouse, etc.) could climb up the stick to get out. Shaded traps were also needed too..

My job doesn't sound hard but it did involve a lot of work, every morning I had to wake up early to check to see what species of frogs or toad were caught during the night. In this particular area I caught 5 species, the wood frog, boreal (western) toad which were the most common, the chorus frog and the Canadian toad. The chorus frog and the Canadian toad were much more rare in this area and I only caught them a few times over the summer. I carefully handled everything I caught, and inspected them for unusual deformities and/or parasites; measurements were also taken for weight and the length of the frog/toad. I really enjoyed what I did this summer at Meanook, and I must say I even grew an attachment to my little hopper friends!

Over all I have to say this has been a wonderful experience! The WISEST summer research program helped me get a better understanding of my future goals and interest. I even discovered a few more, made a few friends, and met a few more role models. I am really happy I got to do what I did and now I know that I'm headed for a world involving environmental and conservation

Linda Su

WISEST Supervisor: Dr. Brian Fleck

Sponsor: Alberta Summer Temporary Employment Program

A good portion of my summer, six weeks, was spent working through the WISEST Summer Research Program in the Mechanical Engineering Department under the supervision of Dr. Brian Fleck who specializes in fluids mechanics. There were several unique projects in process when I arrived; my main job was to work with anyone who required a hand with their project.

As the name fluid mechanics suggests, I worked mainly with the interaction of gases and liquids. One of the projects I helped with was designing a system of devices appropriate to test how well a ventilation system within a building works. For us, the most difficult portion of this project was modifying the computer program to meet the project's needs, turning on and off all the electronics at exact times. Tubes with one end connected to the main apparatus would collect air from two different locations within the ventilation system: the area immediately after the fan and the area before indoor air is mixed with outdoor air. A tracer gas is then released in the area after the fan. The ratio of the concentration obtained from both areas would reveal how well the ventilation system in the building is working.

Although I did not contribute much in the jet stream project, it was interesting to learn water currents' behaviors in turbulence by observing a special dye being ejected through the pump, and captured on a special digital camera while a bright strobe light (causes the dye to glow) goes off numerous times within a short time frame. The images from the camera are then sent to a computer program that examine the changes between the consecutive images and calculate the difference.



This project proved to me how much time and consideration must be put into designing a project ensuring it that it will work.

The third project that I was involved in was analyzing the flame speed of a combustion reaction. The combustion reaction takes place within a small container, which has glass windows, is connected to a pressure transducer that records all the pressure changes within the chamber and sends it to a computer. The data is then entered into an equation that relates pressure to the speed of the flame. This process is repeated with various concentrations of different fuel gases. It is interesting to observe how a small change in concentration can alter the pressure greatly.

More than one method of finding the velocity of flame is available. By taking pictures of the flame and using the $v=d/t$ formula, the velocity can very well be obtained. With the aid of two mirrors, a strong beam of light is focused onto the flame. When these focused rays pass through the flames, the light waves get refracted due to the difference in density in different parts of the flame and reflect off the second mirror creating a real image that can be captured on a film. This is the most interesting because by bending the light waves into traveling a certain way, the density of heat waves can now be seen and captured on a film!

Many valuable experiences were gained through the WISEST Summer Research Program; the Wednesday afternoon discussion with female role models who work in nontraditional areas was no exception. The discussion provided great insights to what the reality is like for real women in nontraditional workforce. It confirmed my goal of pursuing biomedical studies.

The WISEST Summer Research Program not only showed us the reality of working in nontraditional fields for young women by giving us hands-on experiences but also shed new lights on the endless possibilities of careers in sciences and engineering.

Juliet Van Vliet

WISEST Supervisor: Dr. Tom Etsell

Sponsor: Syncrude Canada Ltd.



In an era of technology, energy is coming in at higher and higher demands. The over use of non-renewable resources such as coal, oil and gasoline is causing environmental concerns. 85% of the energy used by humans today begins as a fossil fuel, and it looks as though this resource will not be usable forever. The world seems to be searching for an answer to this energy dilemma

I spent 6 weeks in the WISEST summer research program in the Department of Chemical and Materials Engineering trying to create Fuel Cells that could be available to the average consumer. Fuel Cells are a possible solution to the energy crisis the modern world is being faced with. Their efficiency sits anywhere from 50% to 80% and compared to fossil fuels at a whoppin' 17% efficiency, they are a **great** alternative. Although they are not pollution free, as some companies may boast, they cause very little air or noise pollution. Prospects that Fuel Cells are mankind's future energy source have put thousands of researchers all over the world to work on developing a Fuel Cell that will fit into our economic scene. I am proud to be a small part of this research.

There are five different types of Fuel Cell; Alkali, Molten Carbonate, Phosphoric acid, Proton Exchange Membrane, and Solid Oxide. My project concentrates on creating Solid Oxide Fuel Cells that could be accessible to the average consumers for cars. The materials commonly used for this type of Fuel Cell are ceramics, but ceramics are expensive and brittle. I was experimenting

with Stainless steel as the base or bipolar plate. Stainless steel is malleable, durable and inexpensive, ideal for our intended use. But making a 2" diameter piece of stainless steel sheet metal into a functioning Fuel Cell takes a little imagination, some creativity, and a whole lot of elbow grease.

The goal is to deposit a Yttrium-Zirconium oxide thin film onto the surface of the stainless steel plate, then grind away the other side of the plate to expose the deposited film. This will act as the electrolytes of the cell. The deposition has to be uniform in thickness and only 5-10 microns thick, so the surface has to be polished to within 1 micron perfection. I'm telling you, it's not easy. I tried polishing wheels, hand polishing lap pads, diamond paste, abrasives, diamond spray abrasives, and an alumina abrasive slurry. The sample results were quite varied so my supervisor and I designed a mechanical polisher using an electric sander as the motor. Using the machine, we will hopefully get better, more constant sample results.

Through this program, I got to experience what it's like to work in a lab environment. This has shown me career possibilities I would have never seen otherwise. I got to work with the Scanning Electron Microscope, and in the nanofab where I wore those funny white suits, which was SUPER cool! I had a bonus tour of my sponsor's (Syncrude) research labs and let's not forget the University farm tour! Most importantly, I had the chance to meet a lot of really great people. I am very grateful for the contacts I have acquired through this program.

Stephanie Wennerstrom

WISEST Supervisor: Dr. Josef Takats

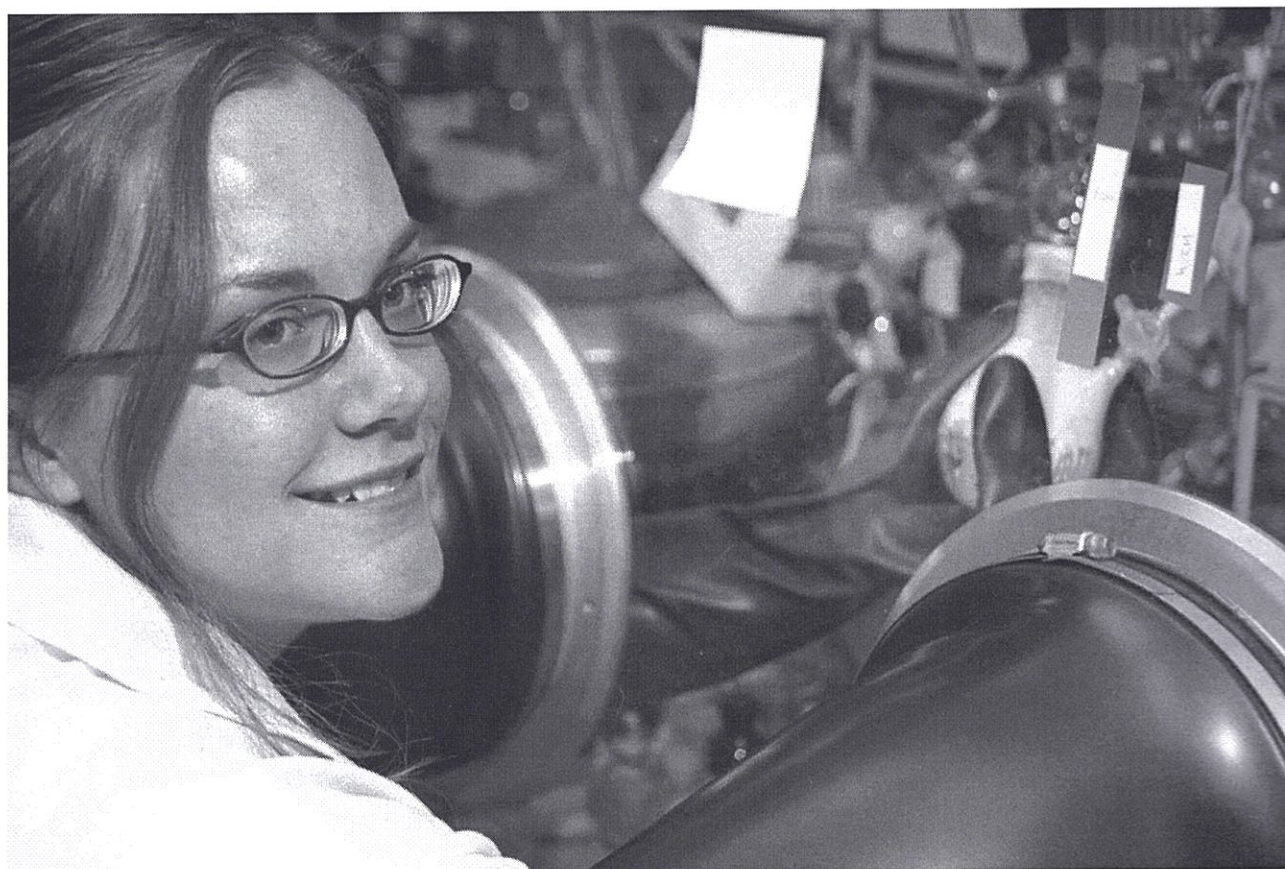
Sponsor: Merck Frosst Canada Ltd.

Through the WISEST Summer Research Program, I spent six weeks this summer working in the Department of Chemistry under the supervision of Dr. Josef Takats. I was in Dr. Takats' research group in the lab, experimenting with tin metal complexes. I worked with organic compounds attached to tin metal, which is called organometallic chemistry.

Dr. Takats' group is working on tin metal to attach chemical compounds called ligands. These ligands facilitate chemical reactions, and can also be replaced by other, perhaps more useful, compounds. My project involved making starting material for some of the reactions, and also doing my own chemistry that contributes to the general project. I worked with tin metal complexes, which have to be carefully handled under a nitrogen atmosphere, so it got pretty tricky.

I made starting material for some of the beginning reactions, which were nonetheless pretty important. Towards the middle of my six weeks, I began doing my own chemistry, and contributing more to the big project. I mainly used an apparatus called a manifold to do my chemistry. The manifold has two glass tubes with taps connected to a vacuum line, and a nitrogen gas line. The vacuum line is used to remove any gas from a sealed flask or tube. The nitrogen gas line is then used to create a positive pressure of nitrogen gas. We use nitrogen because it is a relatively inert gas, which means that it normally doesn't react with chemicals in our experiment. I also used a sublimation apparatus to purify solids from a reaction. This works exactly how the name says, it sublimates solids (from solid, to gas, then solid again) onto a finger, all under vacuum.

You may ask why someone would be interested in working with tin. The ideal goal of the project is to not only attach a ligand to a tin atom, it is to attach a *hydride* ligand to a tin atom. A hydrogen



proton attached to tin could act as a catalyst to speed up the polymerization reaction of ethylene, to make polyethylene – in a word: plastic. It would be a huge breakthrough, and I would be part of it!

Some of the experiments that I have done are really exciting. Not that there are any spectacular color changes, or explosions, or anything like that. It's that the reactions have never been done before, so I was really happy to be the first to try them out.

The WISEST Program has definitely made a summer job fun. Social activities were organized to bring the participants together. The off-campus research tours were very informative and really fun. But most of all, the program gave me a real look at real jobs in real fields. I know now whether or not I want to work in a lab setting in science, and I truly believe that the program gave me a huge head start into the real world. I got to meet professors, students, and women in industry who gave some excellent advice about anything and everything related to jobs, school, and life. I will definitely pass along this knowledge, but I truly wish that everyone could have this same experience first-hand.

The WISEST Summer Research Program is undoubtedly the coolest summer job anyone could ask for.

**“But most of all, the program gave me
a real look at real jobs in real fields.”**

Chantel Williams

WISEST Supervisor: Dr. Stan Boutin
Sponsor: Weyerhaeuser

During my six weeks as part of the WISEST summer research program I worked in the Zoology wing of the Biological Sciences building as a member of Dr. Stan Boutin's research team. More specifically I investigated the effects of seismic lines on Ovenbirds (a common forest bird). When in the exploration stage for oil and gas it is common practice for companies to use trucks that emit seismic waves. It is the reflection and refraction of these waves that determines the composition of various layers below the surface. Seismic lines are the bulldozed paths created to allow the trucks easy access to otherwise inaccessible areas.

To find how the Ovenbird's react to these clearings their everyday environment, a number different techniques are used. One of these techniques is telemetry. It involves a tracking technique for birds in which twelve were fitted with a radio transmitter that has a range of about 800 m. Each bird was then located approximately six times a day using a handheld receiver. Exact locations were found by approaching each individual bird until it was seen. Locations in regard to the seismic line and other information about the bird were recorded.

My job involved talking the locations and data from the papers and entering them into the computer so they could be analyzed. I used a program called Geographic Information System (GIS) in which I entered my data and was shown all the different ways to analyze it. Trying to



analyze the information was both interesting and frustrating at the same time. When you think you've found a correlation one just has to be a rebel.

Another method used to investigate the effects was to measure the biomass of Ovenbird food in the forest and within the bird's territories. Food was collected in pitfall traps, which are holes in the ground that catch beetles and other insects unsuspectingly. Contents of traps are dumped into cheesecloth and stored in antifreeze until they can be sorted. That is where I came in. In the Earth Sciences building I sorted pitfall traps into beetles, spiders, ants, and other. There were many other people sorting insects around me working on their own beetle related experiments. You would be surprised at how much beetles can tell us about the environment.

Through out my time spent in the WISEST program I learned a lot from my lab about seismic lines, bird habits, beetle research, and how to uses the computer program GIS. Furthermore, from talking with people who work in research labs I learned more about the process and discovered a real interest. The experience has given me a better understanding of the University process and a greater knowledge of the many different careers available to me in the sciences. Without a doubt the WISEST summer research program was the best summer job I could have had.

Vanessa Wolan

WISEST Supervisor: Dr. John Volpe

Sponsor: Alberta Research Council

For my six-week period in the WISEST Summer Research Program, I have been working in a lab run by Dr. John Volpe. It is an ecology lab that focuses its research on the invasion biology of different species of fish. They look at such things as the effect of invasions by alien fish species on the native resident species of fish. The research involved with this can vary from population distribution, food webs, effects of temperature on the ability for these fish to compete, looking at what these fish are competing for and what is allowing them to survive where they are. One of the many things that I have learned about working in a lab like this is that in the summer it is not likely that you will find any members of the research team working in the lab. They are normally out in the field carrying out their research and collecting data. When your dealing with fish, working in the field pretty much means your working in or around, oceans, lakes and streams, what a great way to spend a summer of work.

The project that I am working on is based in a lab environment. It deals with a type of fish whose common name is Black Convict Cichlid (*Chichlasoma nigrofasciatum*). I am looking at the effect that varying amounts of residency time has on the male members of this species' ability to defend its territory. In this experiment a series of 30-gallon fish tanks are divided into two sections. On one side of a fish tank is a small fish and on the other a larger one. The smaller fish will be in the tank longer than the larger fish so that it establishes a territory. They are introduced to each other, and will eventually fight over the territory. There is a chance that the larger fish may not win the territory that has been established and defended by the smaller fish. This is why we are looking at this, to see if the amount of time the fish spends in the territory is in fact the reason that they are able to defend it so well, and tell us why the smaller fish may be winning or losing.

This project is also in collaboration with Dr. Peter Hurd in the Department of Psychology. He will be looking at the data that I collect from this experiment and will be analyzing it to see what kind of



aggressive mechanisms the smaller fish may use to intimidate a larger fish from stealing its territory. Dr. Volpe will be using this data as a model so he can apply it to the situation between Atlantic and Pacific Salmon, where escaped aquaculture Atlantic salmon are invading streams that Pacific salmon are normally found in. It may be useful in predicting where the territory invasions are occurring, and in the prediction of where large and small populations, of either type of fish, can be found. What I found to be very interesting about my project is how it can be applied to a much larger scale problem than the one presented in the lab.

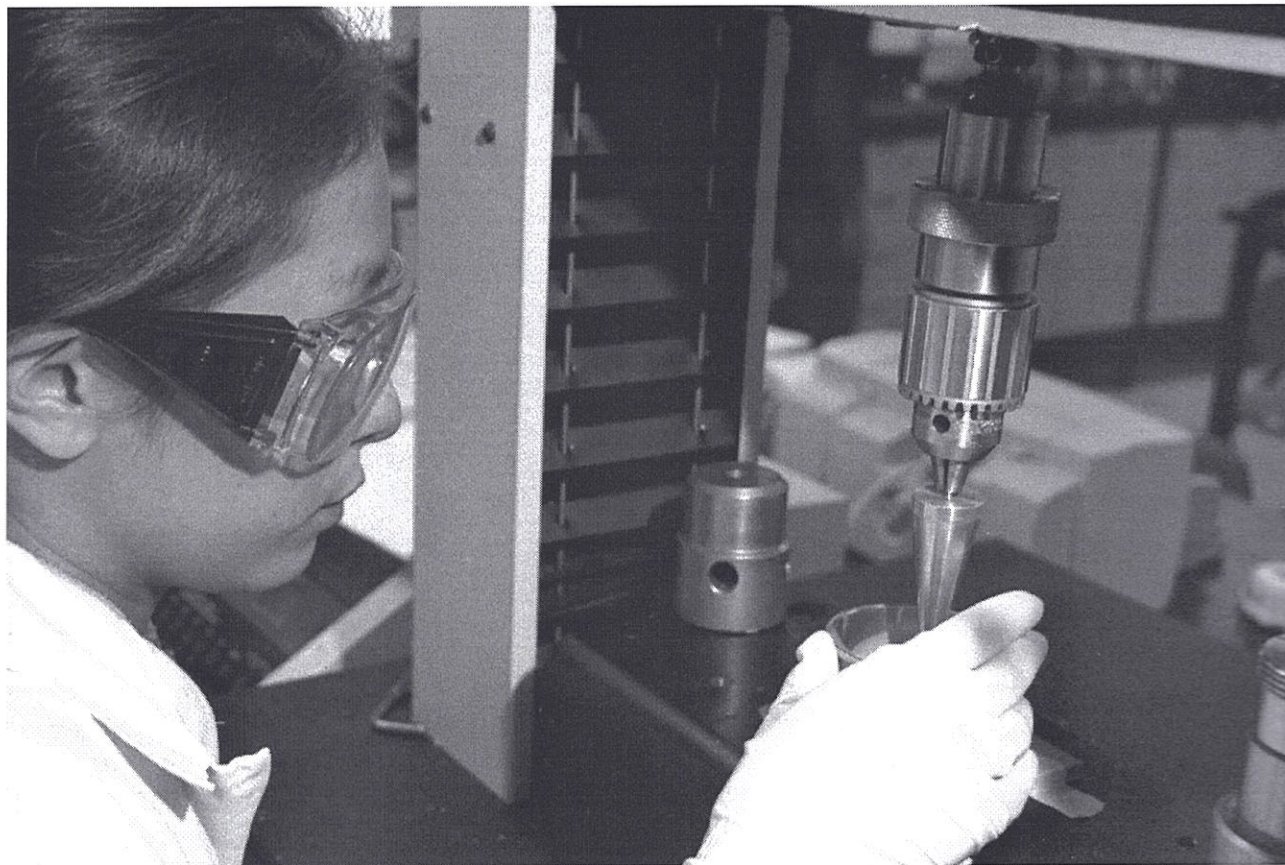
During my time in the lab I was able to go out into the field and see what some of the other members in the lab were working on. I valued this opportunity because being there gave me a better feel for what ecology is about. When your working in the field there is a totally different way of going about things and it gives you a much bigger picture of how everything is tied together. It definitely changed my perspective on what kind of work actually goes on in the field and how it relates to the things that take place in the lab.

Before my experience in this lab I would have never thought that working in ecology and with fish could be so interesting. It has allowed me to gain a new way of looking at scientific research that I couldn't have formulated with out this experience. I have enjoyed working with this lab through my summer. WISEST is something that I would recommend to anyone that is even remotely considering a career in science. Not only do you see what science is all about but also you get to meet great people that enjoy what they do and tell you so much about what to expect as well as how things work in University. This program made me aware of all the different professions that are out there, whether it was from my experience in the lab or just from talking to other students in the program about their experiences. I am glad that I was able to participate in WISEST and hope that everyone had as much fun as I did in the program.

Liana Wong

WISEST Supervisor: Dr. Suresh Narine

Sponsor: Alberta Summer Temporary Employment Program



This summer, I spent six weeks working in an Agri-food Materials Science lab as a result of the WISEST summer research program. I gained valuable experience working in Dr. Suresh Narine's lab, under the guidance of Baljit Ghotra, a Master's student at the University of Alberta. When I was first told that I was placed in a Food Sciences lab, I thought that I would be dealing with the testing of food products. Instead, I learned a great deal about the effect of processing conditions on fats and oils, which in turn contribute to some of the properties of foods.

My project was to alter the processing conditions of fats such as lard and cottonseed in a soybean oil base, and then test the resulting samples. I ran many experiments where the fat sample was cooled at a faster rate than the previous experiments. Then, I maintained that same cooling rate while altering the concentrations of solid fat in the soybean oil. After preparing the sample, I ran some tests at zero hours and then again at forty-eight hours. One of the machines I used was the Differential Scanning Calorimeter, where you place a tiny amount of sample into an expensive, teeny weeny metal pan, which is inserted into the machine. The result? A reading of the melting and crystallization points using heat flow readings. Another piece of equipment that I frequently used was the Instron machine. Instron tests the sample for hardness by producing a force versus displacement graph which can then be analyzed and compared to the hardness of other samples. Our lab is also home to a new microscope which has an attached Linkam device. The microscope

allows us to see the crystallization of a fat and the Linkam enables us to take pictures during the crystallization process. One other machine that I often used was the Nuclear Magnetic Resonance Analyzer. When some sample is placed into an NMR tube and then inserted into this sensitive machine, the sample's solid fat content can be measured. The forementioned machines are very important in the analysis and comparison of differing fat samples.

In addition to learning to use advanced pieces of equipment, I gained many valuable lab skills. Not only did I have to run the machines, I also had to deal with the results. The importance of keeping organized and arranging data in a logical manner was brought to my attention. I also learned to work with others, including another WISEST participant, Jia Hu, as well as other members of Dr. Narine's lab.

The unique opportunity that I was given to observe life as a researcher was what confirmed my decision to participate in the WISEST program. I was fortunate enough to see what life is like for a graduate student, a lab technician, or a professor. I have learned about certain areas of the research process, from designing a procedure to analyzing and making sense of results. Through the WISEST summer research program, my eyes have been opened to the numerous careers and research opportunities available to me in the science sector.

Rachel Wong

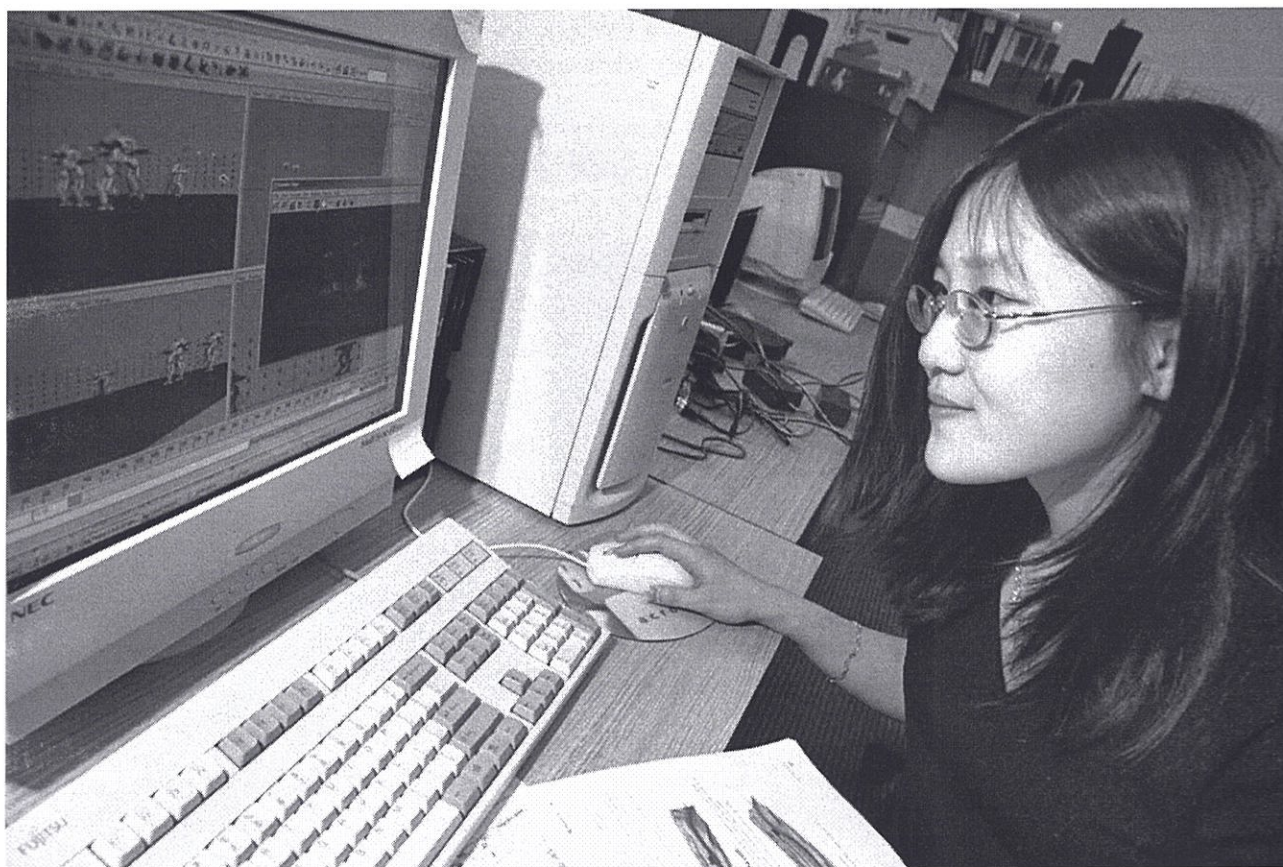
WISEST Supervisor: Dr. Herb Yang

Sponsor: Canadian Information Processing Society (CIPS)

I applied to the WISEST program in the hopes that I may discover many new and wonderful things, as well as meet some very interesting people. I wanted to have a taste of the 'real world'. I was overjoyed when I had been accepted to the WISEST program. As I picked up the phone and heard someone telling me that I had a chance to be able to take part in WISEST, my mind raced to the many possibilities on what type job I could be performing. I pictured myself in a white lab coat holding a graduated cylinder over a beaker, but I soon found that this would not be the case. Instead, I would be doing something completely opposite to what I had expected: working with Dr. Herb Yang in the department of Computing Science. "Computing Science?" I thought to myself, "How can you do researching and experimenting on a computer?" Soon my original question was quickly forgotten and instead, I began to worry whether or not I would truly be an asset in Dr. Herb Yang's project.

During my six weeks of working in the WISEST summer research program, before I could even proceed to help in Dr. Yang's research, I began to learn a program called Maya, the "powerful program". As I struggled to learn how to use this program, I had to compress my learning period from what would take a few years to learn, into one week. Learning only just its basic functions, I was able to make 3-D objects and animation sequences; and I totally believe that it was worth the entire struggle to experience the joy of making an object move from my own doing. In addition, I found that the lab was very relaxed and there was not a specific work schedule that one must stick to.

I was told that the purpose of this project was to determine if multiply overlapping images can be combined to generate an image of a different camera viewpoint. Although I had some minor



difficulties in handling the program, I was given a file to work with. My job was to place 5 levels of 72 cameras in a circular shape around animated object. Each camera points to the centre of these objects. In addition to this, I was to render each and every single one of these cameras. Rendering is similar to the concept of a cartoon where there is a picture in several pages. This is slightly modified and when it is flipped it appears to move. An estimate on how long it takes to render one camera is about five hours for a 20 second sequence.

As weeks past, my original question was soon answered and I realized that computers could be used for research purposes. I was able to see how robots could be used to study ants' living habits; by the way they build their home. I also saw a 3-D cave and, much to my amazement, a computer that, if you position yourself correctly, you could actually see a 3-D image pop out like a hologram.

I would have to say that after six weeks of being involved in the WISEST, I have learned a great deal of things and will benefit greatly from this experience. I hope to use this knowledge that I have obtained to my advantage for future usage. This entire experience has been absolutely mind-blowing and I am very glad that I did not pass up this most wonderful of opportunities.

“Computing Science?” I thought to myself, “How can you do researching and experimenting on a computer?”...As weeks past, my original question was soon answered and I realized that computers could be used for research purposes.

Sarah Wong

WISEST Supervisor: Dr. Dave Pilgrim

Sponsor: Alberta Summer Temporary Employment Program

For the six-week duration of the WISEST Summer Research Program, I was a member of Dr. Dave Pilgrim's Genetics lab. Supervised by graduate student Serene Wohlgemuth, I was given my own project working with the zebrafish *unc-45* gene. Because the absence of the *unc-45* gene in *C. elegans* worm tissues has indicated that this gene plays a role in coordination, the study will eventually be applied to human genetics. The objective of my entire project was to express and purify the zebrafish UNC-45 protein in *E. coli* for antibody production.

A typical day consisted of working with centrifuges, pipettes, *Eppendorf* tubes, and many different substances. Because most of my direct results were not visual, I found the process most interesting. Every single step seemed to fit logically into the overall formula. After cutting both the gene and a plasmid with the same restriction enzyme, they were *ligated* together, and *transformed* into bacteria media to be amplified (sub-cloning). Another type of bacteria was used to express the protein; then I only had to purify it. During these first two steps, I encountered nothing major to slow the process. However, while working on the last step of purification, all my samples of the expressed protein were lost due to a machine flaw and "spill". I had been told that it usually takes years to obtain results for some projects because things simply did not work; therefore, you either had to restart everything or backtrack to improve procedures. After my mishap, I had realized that research involved tedious repetition.



Before actually walking into the lab, I had no idea what to expect. Research up until this point had been basically reading pages of material, rewording, summarizing, and presenting already finalized information. Hearing only a brief introduction to my project, I realized that the next six weeks would swell with new things to be learned and experience. Surrounded by various machines and racks of different looking containers, I figured that the first step would be to become familiar with the locations and names of the equipment. Anyone who is anything like me would assume the word "Merlin" referred to a wizard wearing a robe and pointed hat. I soon realized that it had nothing to do with that but a group of solutions used in a process called *Minipreps*. Their purpose is to remove the plasmids from bacteria cells that were tools used to multiply the quantity of DNA. Unlike school, things were not only limited to phrases like "the liquid stuff" and "the narrower tube".

Due to the "short" length of this program, I will not have the opportunity to directly see my results being applied to further research. The general idea would be to inject the purified protein into rabbits where antibodies will be produced against these "foreign" proteins. By collecting the antibodies and reacting them with a glow-in-the-dark antibody, the next aim would be to *immunostain* the antibodies with zebrafish tissues. This will help determine UNC-45 localization, and its presence during development.

This program has not only taught me about the wide range of genetic projects and research techniques, but also the qualities essential for research. Success may come in the form of luck, but it all comes down to flexibility and patience. I have discovered more about my own strengths and weaknesses through the difficulties that I encountered. Textbooks will no longer be only words because I have seen how they can be applied to life. The WISEST program has opened a window to the world of science enabling me to become more aware of my interests and options for the future.

Jane Xu

WISEST Supervisor: Dr. Dave Pilgrim
Sponsor: Alberta Ministry of Innovation and Science

For the six weeks of WISEST Summer Research Program, I committed my time to the department of Genetics within the field of Biological Science. I was placed in Dr. Pilgrim's lab and my job was to help a graduate student with his research on *Caenorhabditis briggsae*, a tiny roundworm.

The graduate student is working to identify the mutated genetic pathways of the worm. The main objective of his studies is to identify the specific gene in *C. briggsae*'s genetic pathway that determines the worms' sex. Intersex worms, which are worms that bear the characteristics of both the female and the male, are the ones that we want to look at. The worms that are in stock, or what we buy, are the natural specie that has the normal genetic pathway (we call them wild type worms). In order to get the intersex mutation of worms that we want, we have to go through a lengthy process of mutating the worms and screening them to find the intersex worms resulted from mutagenesis.

The protocol for mutagenizing worms involves the use of the chemical ENU. ENU is absorbed into the worms and it alters the genetic pathways in the worms' eggs. The randomly altered genetic pathway results in different mutations of the succeeding generations of worms. For example, the mutations can be chubby, roller, short, uncoordinated, and intersex, or they can be normal looking



yet still carry the mutated gene. The mutated worms usually occupies hundreds of petri dishes, so an exceedingly boring and tiring day would be one where we have to look through all of those plates under the microscope to single out any of the mutations that we find!

There are three experiments that I did with the mutated worms. The main experiment is of course with the intersex mutation. To study the intersex worms' genes, DNA is taken from an intersex strain culture. To do that, the cells of the worms are firstly being broken up, and then a solution called TRIZOL is added to the cells to isolate the DNA from the cells. The DNA sample goes through PCR (a technique by which a small fragment of DNA can be rapidly cloned, or duplicated) to be amplified in its numbers. And hopefully later, a DNA sequence can be mapped out and compared with the normal sequence to figure out which gene is being mutated.

Other mutations are also being analyzed to study the properties of the mutated genes. The second experiment is done with the chubby mutations. Different chubby worms are crossed with wild type males and later with heterozygous males to see if their genes are allelic. If the result is allelic, then the mutation is on different genes. So then, if the result is not allelic, the mutation is on the same gene. The third experiment involves the analysis of brood sizes. Intersex mutation's brood size is compared with the wild type's brood size to see their relationships.

Dr. Pilgrim's lab, which is the one that I worked in, is a fairly large lab consisted of more than fifteen people. One thing that I am especially thankful for is how everyone is so patient with me. The graduated students are so willing to answer my questions, sometimes again and again, and they are happy to show me their own ongoing projects. The WISEST program was a great opportunity for me to discover which areas of science I am interested in, or even which areas I am not interested in. It was a real treat for me, a grade eleven student, to be working with graduate students in a university lab!

Stephanie Yan

WISEST Supervisor: Dr. Linda Reha-Krantz

Sponsor: Edmonton Glenora Rotary Club



I first heard about the WISEST Summer Research Program in grade 10- I knew it would be a great opportunity to discover what went on in a research lab and to get to know the university before even finishing high school. So, I was ecstatic when I got the phone call from Celia saying that I had been accepted. I soon received a letter saying that I would "use genetic techniques to identify mutants in yeast that affect DNA replication"- I was intrigued but also a bit worried for I had not learned that much about genetics in school. All I knew about yeast was that it was used in bread; little did I know that I would be studying and working with yeast for the next six weeks...

The first day was a bit intimidating as I met the other WISEST students and my supervisor, Dr. Linda Reha-Krantz. She took me to the large maze-like Biological Sciences building and told me about the project which had been set aside just for me. I furiously scribbled down everything she said so as not to forget anything. Hydroxyurea (HU) is a chemotherapy drug that is used to treat patients with cancer. Many patients, after having been healed by HU, relapse and develop resistance to HU- thus, this drug cannot be used anymore. My job was to discover these mechanisms of resistance. I would be using yeast, a primitive eukaryotic organism capable of rapid reproduction, to discover this.

However, before anything else, I had to fully understand what was going on every time a cell divided and exactly how hydroxyurea worked. DNA is replicated every time a cell divides, and

enzymes called polymerases help replicate the DNA and proofread it to ensure that no mistakes are made- mistakes would give rise to mutations. DNA is made up of nucleotides; hydroxyurea makes it so that there are less nucleotides available, so the DNA does not replicate, and therefore cells cannot divide and cancer cannot spread. We suspected that hydroxyurea resistance was related to a certain polymerase and we tested our hypothesis by using a strain of yeast that was actually sensitive to hydroxyurea called LYHUS (stands for Lei Yeast Hydroxyurea Sensitive).

This LYHUS had a mutation on a certain polymerase gene, and we were wondering if this was the cause of the hydroxyurea sensitivity. If it was, then patients with resistance to hydroxyurea could be made sensitive to it once again with this mutation. In order to find this out, I carried out a series of experiments that involved mating two yeast strains so that their offspring would have certain characteristics. A URA⁺ marker had been placed on this mutated gene, so if this URA⁺ marker appeared wherever the hydroxyurea sensitivity appeared, this mutation would be the cause of the sensitivity. This experiment is still continuing, but this illustrates how research is an ongoing process. Along the way, I learned how to plate, titer, make media, do serial dilutions, use the sterile technique, and how to use the centrifuge, microfuge and autoclave.

Of course, I could not have done any of this if it were not for the support and kindness of the entire lab. I would like to thank Dr. Linda Reha-Krantz, Kelly, Lei, Beth, Melanie, Aly and Mehreen. I owe Mehreen, a WISEST student from last year, a huge thank-you, for she helped so much through her patience and knowledge. Of course, I would also like to thank Grace, Celia and Tara. Celia deserves a huge thank-you; her genuine kindness and enthusiasm made the WISEST experience even better. Six weeks have just flown by, and I have enjoyed every bit of it- I made a lot of new friends, and learned a lot about genetics and research. Thank you WISEST for giving me this experience!

Emily Yeung

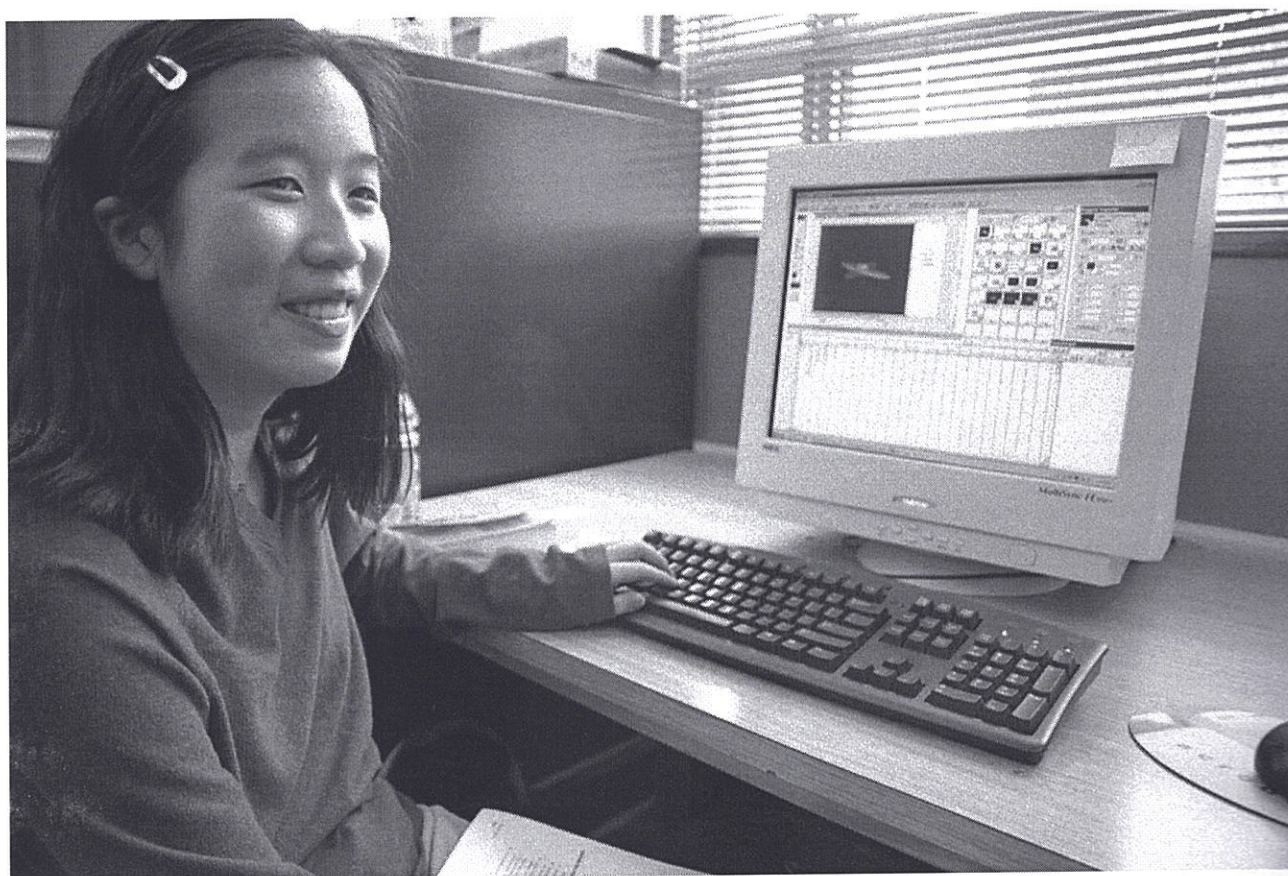
WISEST Supervisor: Dr. Sherif Ghali

Sponsor: Alberta Ministry of Innovation and Science

Being able to work in the Faculty of Computing Science has been both a challenging and a greatly rewarding experience for me. I have always been interested in working with computers especially after I took a Computing Science course through school. When I applied for WISEST I was wondering what kind of research opportunities could there be in Computing Science. When I received information that I was able to work in the Computing Science field, I was excited and was greatly looking forward to the opportunities that lay ahead.

During the six weeks in the Faculty of Computing Science, I worked under Dr. Sherif Ghali on Graphics Research. The main goal of my project was to make a program that would show how one method of creating three-dimensional graphics creates more accurate results than another method. I devoted two weeks to learning multiple programs, which I would eventually need to use. After learning the programs, I realized that the files I had to work with were not compatible with the program I was trying to build. I had to then search the Internet for a converter program that would enable me to produce an image for my program.

In doing research, I have learned many things. I learned that research is not just being in a lab doing experiments with chemicals or animals. Research requires a great deal of patience and persistence.



Particularly in my lab, I felt that some things were impossible to do but after many hours of searching and trials, I was finally able to get the results I wanted. There were many times which I felt that what I was attempting was not possible but in trials I was able to get closer and closer to the desired results. One of the most valuable lessons I learned out of all I have been through is that a job is not just a job. A job is one's life and one should enjoy it to the fullest capacity and should be able to look forward to the next day.

Since two other Computing Science students from WISEST were working in the same lab as me, I had the chance to get to meet them and learn about what projects they were working on also. I believe that the Computing Science students were lucky enough to have a graduate student who did more than he had to. He arranged many tours of other labs in our building as well as two tours outside of the Computing Science building. Some examples of tours we went on were the robotics lab, and someone doing research on different interfaces that people could interact with the computer environment. The tours out of our building included going to the Industrial Design building and to a gaming company on Whyte Avenue called BioWare. Having the opportunity to see all these different aspects of research has really opened my eyes to what is available to me as career options.

**“The time I spent at WISEST
has been priceless in helping me to decide
on what I should pursue in terms of my education in career path.”**

Marc Yu

WISEST Supervisor: Dr. Judith Spiers
Sponsor: Faculty of Nursing, University of Alberta

WISEST: My Summer Experience in 500 to 600 Words

It all started on a Saturday morning when a telephone call interrupted my sleep. Had it been anyone else I would have been extremely grouchy, but it was Celia, our student coordinator informing me that I had been accepted into the WISEST Summer Research Program. I was delighted to learn about my placement in the Faculty of Nursing under the supervision of Dr. Judith Spiers. All that effort put into those applications were not a waste after all!

I spent my summer at the International Institute for Qualitative Methodology at the University Extension Center. The institute consists of researchers and professors from different faculties carrying out their projects using qualitative methods. Dr. Spiers was working on a very extensive project about teenagers living with diabetes. The objective of the study was to explore daily experiences and challenges of a teenager as they deal with the disease. Qualitative studies deal with an exploration of the experiences that occur during someone's daily life.

This type of methodology was very new to me, and it took me a while to understand how it is used in research. During the summer, I worked on a number of areas in the project. I became quite familiar with the University library system and the John Scott Library from searching for dozens of



articles that could possibly benefit our research. I also had to transcribe numerous interviews of teenagers and their parents. These transcripts also had to be cleaned which meant filling in missing sections and correcting errors. Although this work was sometimes tedious, I knew that it was a crucial part of data collection.

Because this project is so vast, I had to narrow my focus on a specific area of study. I came to the topic of parental attitude and support and how it helps a teenager live with diabetes. It was very exciting to begin an analysis on the data collected. Qualitative inquiry is extremely complex as you do not know what your conclusion is going to look like. Upon analysis of the data, ideas and concepts begin to appear.

During the second last week of the program, the IIQM held a five day conference on Qualitative Inquiry at the Telus Center for Professional Development. Professionals from all around the world including Australia, Japan, Denmark, and the United States attended. It was truly remarkable to witness the sharing of thoughts and ideas during the sessions that I went to. The encouragement and expertise of all members of the institute made my research experience valuable and enjoyable. They did a tremendous job of making me feel comfortable in my new environment and were never too busy to address any of my questions or concerns even though they had a pile of work to do.

My perspective on the work force and post secondary education has changed drastically over the summer. WISEST not only exposed us to the world of research in non-traditional fields, but it was also gave us the opportunity to explore and become familiar with the campus and surrounding areas. Although we all worked at our respective labs in different buildings, there were many weekly social activities that helped us create friendships and learn about the scientific findings of others. The Wednesday sessions were also very helpful as it gave us an opportunity to decide what fields and careers we would possibly like to pursue in the future. And with a female to male ratio of approximately 9:1, how can a program not be good?

As the six weeks come to an end, I realize what a privilege it has been to work with a dedicated student coordinator and program coordinator, an experienced and supportive research team (Thank you Jude, Michael and everyone else at the IIQM), and over fifty unique students across Alberta and the Northwest Territories that will no doubt succeed in whatever path they may choose. Congratulations to each of you for (hopefully) succeeding in your research projects.

“WISEST not only exposed us to the world of research in non-traditional fields, but it was also gave us the opportunity to explore and become familiar with the campus and surrounding areas.”

