

# WISSEST

women in scholarship, engineering, science & technology



**JOURNAL OF STUDENT RESEARCH 2016**





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# WISEST



## **SUMMER RESEARCH PROGRAM 2016**

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

*Photo: Ana Catuneanu*

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# WISEST ENCOURAGES DIVERSITY

In 1982, WISEST was created by the University of Alberta to find the reasons why so few women were choosing careers in engineering and science and then to 'do' something to change that. Our vision is to **empower women in the sciences, engineering and technology**. We offer programs and networks that are designed to provide opportunities and hands-on experiences that promote and nurture interest in careers that are currently experiencing an underrepresentation of women.

Community outreach events hosted by WISEST are dedicated to building a stronger, more diverse workforce in science, engineering and technology. WISEST initiatives are funded through donations from corporations, individuals and the public sector.

**CHOICES** - a fabulous day of science, engineering & technology activities for 600 Grade 6 girls and their teachers.

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

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

**Tales from the Science Buffalo** - a series of interactive and hands-on classroom presentations for grade 6 students that honour Aboriginal Ways of Knowing and introduce careers in the sciences.

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

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

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



WISEST's vision is to **empower women in the sciences, engineering and technology**.

*Photo: Ana Catuneanu*

# THANK YOU TO THE WISEST COMMUNITY

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

We are grateful for all of the high school teachers throughout Alberta that support WISEST by publicizing information about our programs. It is often teachers who first spark their students' interest and enthusiasm in the science, engineering or technology fields.

We are also immensely thankful for the University of Alberta faculty and their research teams who volunteer to provide our students with a positive and meaningful experience. Their guidance and mentorship inspires and teaches WISEST students in a challenging research setting, helping them realize their full potential and a world full of possibilities.

The many learning sessions that WISEST incorporates into this program would not be possible without the support of volunteers from many different sectors. Throughout the program, numerous people from the science, engineering and technology communities share their experiences and wisdom with our students and help to broaden their awareness of diverse career options available to them. They do so by giving tours of research facilities, teaching students how to create research posters, giving tips on how to make effective presentations, and above all, by building the students' confidence to succeed in the science, engineering and technology fields. Volunteers are the backbone of WISEST and the key to the success of our programs.

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

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

Thank you from the WISEST Team.



WISEST Staff (left to right):

Dr. Denise Hemmings (Academic Co-Chair), Fervone Goings (WISEST Coordinator), Rosie Pollreis (Student Coordinator), and Michee Hamilton (Student Coordinator).

*Photo: Ana Catuneanu*

# 2016 PARTNERS AND CONTRIBUTORS



## WISEST Summer Research Program (SRP)

### Partners

Alberta Education

AWSN

Canada Summer Jobs

Edmonton Area Council: Beta Sigma Phi

Edmonton Glenora Rotary Club

NSERC PromoScience

Office of the Provost

Process Solutions Canada Ltd.

SPE Canadian Educational Trust Fund

Syncrude Canada Ltd.

University of Alberta

Faculty of Agricultural, Life & Environmental Sciences

Faculty of Medicine & Dentistry

Faculty of Nursing

Faculty of Science

Vice President of Research

Weyerhaeuser

### Contributors

The King's University

Lab Photography by Ana Catuneanu

## Heritage Youth Researcher Summer Program (HYRS)

### Partners

Alberta Innovates: Health Solutions

### Supporters

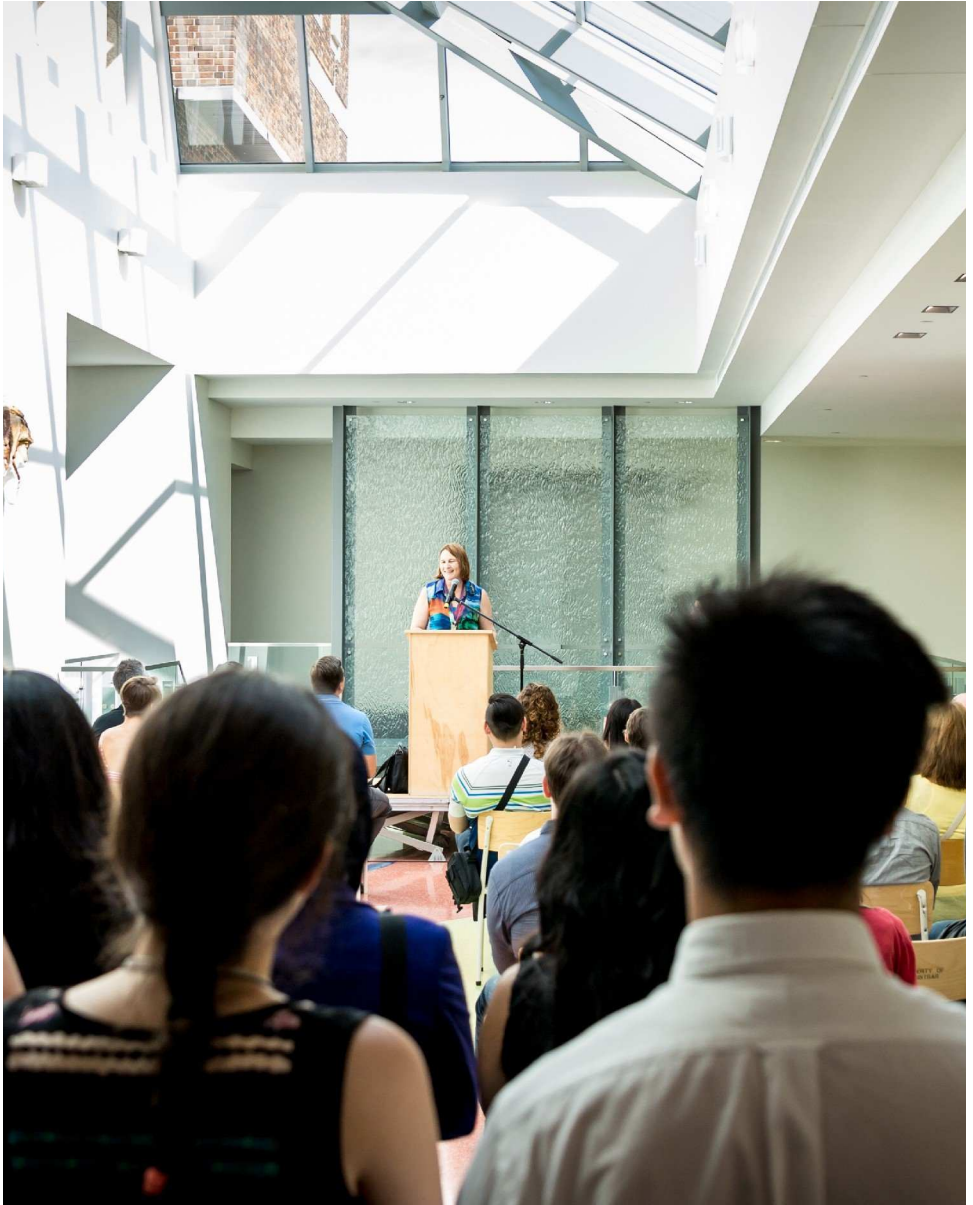
Ada's Team

Engineers Without Borders

UA-WiSE



# A WELCOME TO WISEST



*Photo: Ana Catuneanu*

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

# WISEST ORIENTATION

*By Eva Liu*

Orientation: an event that millions of people every year have to endure, classically filled with awkward games designed to relax the crowd, such as group bingo and in this case, get-to-know-each other musical chairs. The nervousness and barely contained excitement was ringing in the air on orientation day as the sixty-three WISEST (Women in Scholarship, Engineering, Science and Technology) and HYRS (Heritage Youth Researcher) students came face to face with each other for the very first time.

We were all eager to embark on a summer of science, discovery and research together. The excitement was only heightened as we listened to presentations from alumni and WISEST staff about the purpose behind the program, and our roles in it. Our first problem-solving task as a group was a scavenger hunt. It is a common game, but it was very helpful in getting to know the not-yet-familiar campus. It also gave us a sense of our group dynamic as we scrambled into different buildings completing the tasks.

After lunch we stood by a piece of paper with our Principal Investigator's name on it, waiting for them to pick us up. I could not help but be reminded of the feeling of being a small child, waiting for my parents to pick me up after school. Watching the number of my classmates dwindle and dwindle until it was only me with some other forgotten child alone with the teacher. But just like the excitement of going home after a day of school, there was the anticipation of going to the lab for the first time, meeting the professors and supervisors that we would be working closely with for the next six weeks. It is safe to say that orientation perfectly set the tone for a summer that was better than anything any of us could have hoped for.

*Photo: Ana Catuneanu*



# SOCIAL SCIENCE CHALLENGE

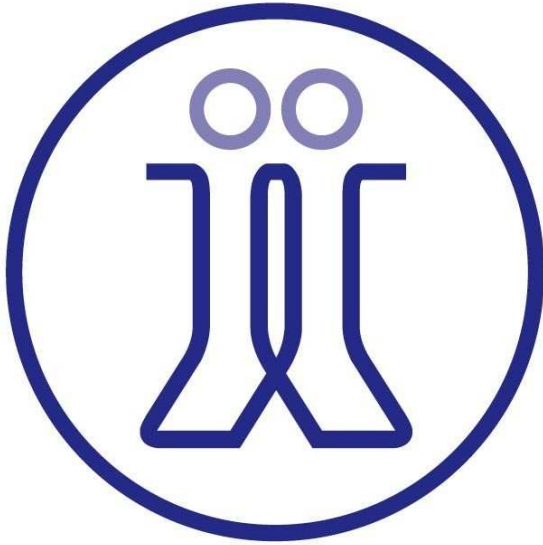
*By Rimsa Dahal*

As the first week of the WISEST Summer Research Program came to an end, we arrived at the Edmonton Clinic Health Academy to participate in the first event of the summer: the Social Science Challenge. We walked into a quiet room that was soon transformed by the energy we all brought in with our excitement and nervousness to meet each other and find out what our challenge was. After settling in our groups and fiddling with the materials in front of us, we were introduced to the challenge and asked to create an apparatus that would either lift a plastic cup filled with water or allow for the water in the cup to be poured into a different container. The device would be based on hydraulics principles using two syringes filled with water and connected with a tube. While the fundamentals of how a hydraulic system works was quickly grasped by us all, we soon realized that the challenge lay in the execution of the device that we were envisioning. To be successful, communication and cooperation was key for every group.

As we powered through every challenge, we slowly had a structure forming in front of us which only pushed every single person in the room to do their very best right until our devices were fully functioning. When we were out of time and full of excitement to see what everyone had created, not a single face in the room was left without wonder and appreciation of everyone's creations. It was the hard work and effort of every single student present in that room that made the Social Science Challenge a successful event. In those couple of hours, we were reminded what we loved about the WISEST Summer Research Program: our love for sciences and our desire to surround ourselves in an environment of support and inspiration.

*Photo: Ana Catuneanu*





# LEARNING OPPORTUNITIES

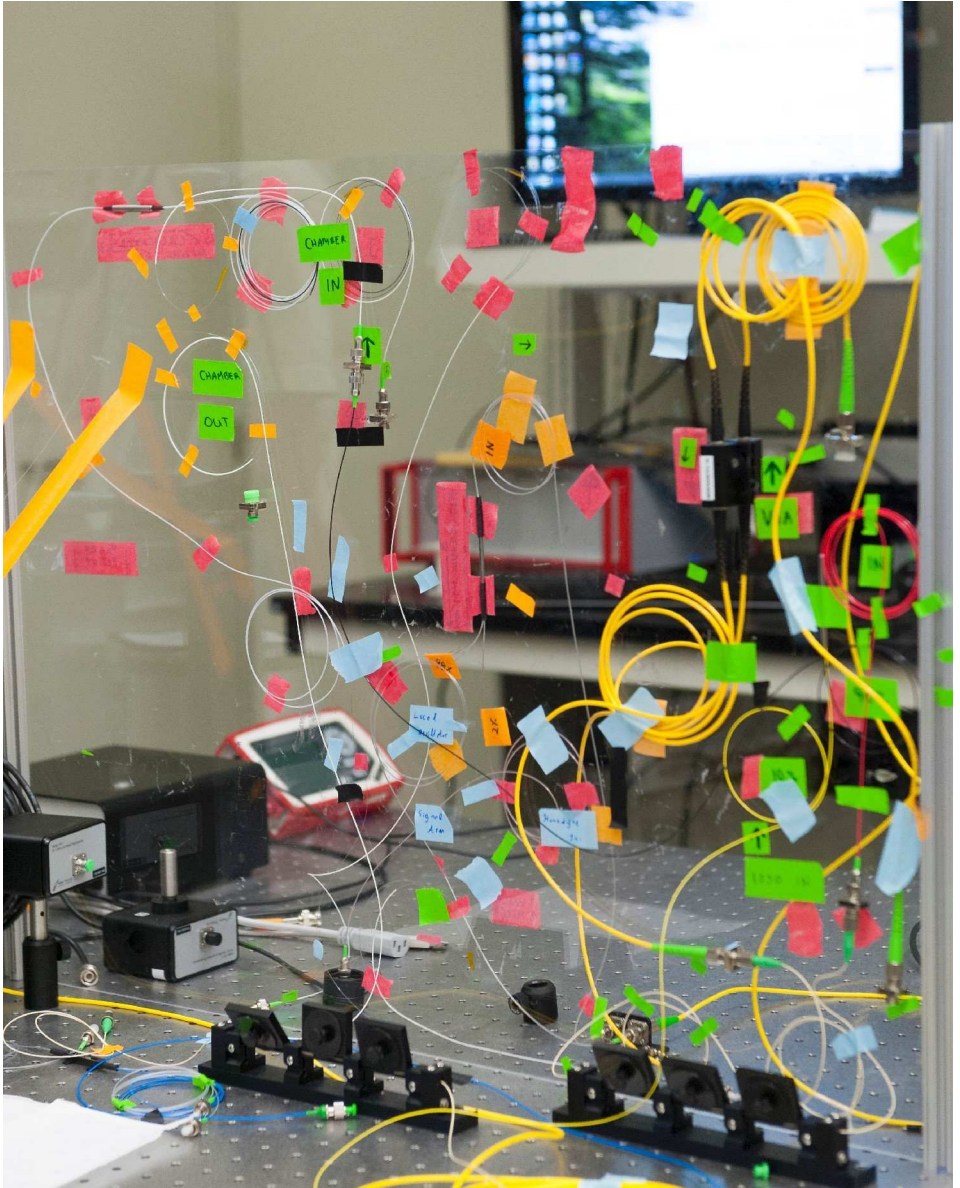


Photo: Ana Catuneanu

*The WISEST Summer Research Program is more than just a summer job. It is full of opportunities to help students learn and to grow as individuals.*

# WISEST 101/LIBRARY ORIENTATION

*By Urbah Syed*

The WISEST 101 and Library Orientation was our first professional development seminar as WISEST students. After being faced with the University of Alberta's large, intimidating campus, knowing that we would have to learn how to navigate it in time for our jobs, most of us didn't even think to orient ourselves in relation to the library and its innumerable, easy-to-access resources. Had this seminar not occurred, most of us would have faced a lot more stress in the program, especially the final few weeks in which we created our research posters.

During the seminar, all students were placed in one of two groups which rotated between a 101 session with WISEST alumni and the library orientation with Elizabeth Wallace. The 101 session was eagerly anticipated, as it was still very early in the program and most of us had at least one burning question about how to survive these six weeks. Each alumni introduced themselves, their current position in academia as well as the field they were assigned to during their time with WISEST. They talked at length not only about their WISEST experience, but also about any fears they had and how they overcame them. We listened with avid interest to their motivations and stories. Most of our burning questions were answered as a result of these inside perspectives on the WISEST program.

The bulk of the library orientation consisted of drier stuff than the 101 session, but Elizabeth Wallace was fully aware of this and expertly inserted jokes pertaining to students in academia which made us all chuckle. Her purpose was to familiarize us with the expansive online library at the U of A as well as its many resources and search tools. Were it not for her clear, deliberate explanations and walkthroughs, most of us would have been at a total loss when the time came to explore various articles or put citations on our research posters. The orientation was chock full of information, yet entertaining.

Overall, the seminar was a nice way to start off WISEST as it brought some much-needed clarity to our confused minds without being overwhelming or intimidating in any way.



# EXPLORING U OF A RESEARCH: METALLURGY



*By Kali Heatherington*

*Photo: Ana Catuneanu*

For the Exploring U of A Research Session I chose to go on the metallurgy tour. This tour took us to the Chemical and Materials Engineering Building where we learned about and were shown different welding projects being done at the university. Rebekah Bannister, a graduate student who works there, taught us all about the different types of welding and showed us what effects the different types of welding have on different metals. I learned a lot of things about welding that I didn't know before, such as welders rely heavily on sound to be able to weld properly because it is nearly impossible to see what you are doing with the masks on. We got to see a welding demonstration and it was very impressive to see her work the machine simply by sound. Welding is much more of a science than I previously believed it to be and all the machinery have very interesting concepts.

After going through the welding shop we were taken upstairs to see the 3D printer. We got to see the 3D printer while it was in use and also see some objects, like bowls and keychains, made by the 3D printer.

The Metallurgy tour was fascinating because I was able to see a different type of research being done at the university. I was exposed to an area of work I had never thought of before and was fascinated by it. The welding and 3D printing were interesting to see in action and gave a new perspective on what type of work a person can pursue.

# RESEARCH IN ACTION: GILEAD SCIENCES INC. TOUR



*By Natasha Danha*

*Photo: Ana Catuneanu*

Through the course of the WISEST Summer Research Program, one of the most memorable group outings was the Industry Tours. As student researchers, we were given the option to visit one of four industries to observe research in action. I had the privilege to tour Gilead Alberta, a biopharmaceutical company dedicated to research of medication in areas of unmet medical needs.

The tour began with background information on Gilead. A walking tour of the facility exposed us to the environments that industry researchers work in as we were educated on the various processes and machinery necessary to produce pharmaceuticals. While at Gilead Industries we were shown their approach to drug development which consists of discovery through medical chemistry, development by means of process chemistry, as well as commercialization of products after manufacturing. Currently, Gilead has a growing portfolio of products including treatments for HIV, liver diseases, and cancer.

As the tour concluded we were able to speak with the staff at Gilead in small groups. This allowed for conversations regarding academic backgrounds, which proved to be extremely varied amongst the staff. Some had pursued technical degrees, while others had a PhD in fields ranging from chemistry to engineering. The one thing that they all had in common was a love for research, which through the WISEST Summer Research Program has developed in each of us. This tour broadened our understanding of what research consists of and served as an eye-opening experience as to the many career choices available to us.

**~An afternoon of industry tours~**  
***Gilead Sciences Inc.***  
***Micralyne Inc.***  
***Quantiam Technologies Inc.***  
***TEC Edmonton***



# RESEARCH IN ACTION: MICRALYNE INC. TOUR

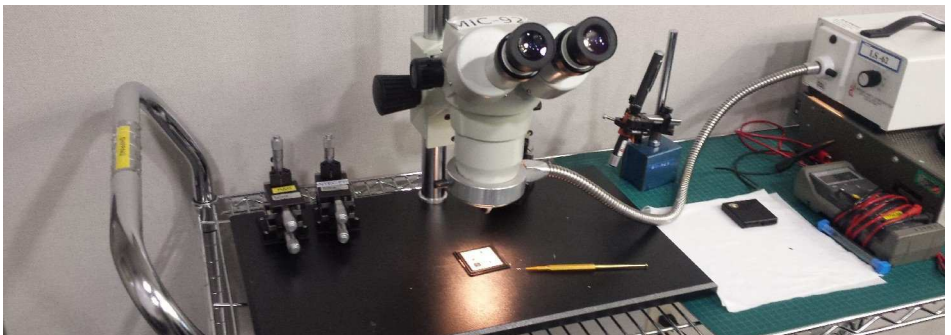
*By Sareena Butt*

WISEST provided us with many opportunities other than just our lab work. From Professional Development Seminars to Lunch 'n' Learn sessions, we were able to experience every aspect of university research, and future careers. One amazing opportunity was the industry tours. We were given the opportunity to choose one of four local industries. Gilead, TEC, Micralyne, and Quantiam.

A total of sixteen students, including me, chose to visit Micralyne, a microelectromechanical systems (MEMS) foundry. This company manufactures MEMS from silicon wafers. The tour began with a presentation where we learned the importance of MEM systems, and we discovered the large amounts that are actually used in everyday items, such as cell phones. Everything from consumer electronics, defense systems, and communication technologies use MEMS in some way. They even provided us with a demonstration of these systems. We were showed a small mirror, about the width of a few strands of hair, which could be used in a fiber optic line to alter the direction of a laser. We were also taught the processes involved in creating MEMS, including the preparation of the silicon wafer and the etching of the integrated circuit. After the presentation we were brought on a tour of the labs. We were able to see all of the equipment that the presenters talked about, the clean rooms in which they manufacture the systems. Three students even got the opportunity to put on clean suits, which prevents contamination and damage to the MEM systems. Those students were also able to enter an air shower, which blew air at a high velocity in order to remove all excess particles.

Overall, I found the Micralyne tour to be informative and enjoyable. It was interesting to see the impact a smaller local company can have. I am sure that all of the students that joined this tour left feeling that they learnt a lot about microelectromechanical systems.

*Photo: Ana Catuneanu*



# RESEARCH IN ACTION: QUANTIAM TECHNOLOGIES INC. TOUR

*By Jenny Lee*

The WISEST Summer Research Program gave us the opportunity to learn about what there is beyond university life. One of the highlights of this program was the Quantiam tour. During this tour, we learned about the work done by local industry to reduce greenhouse gas emissions and create a better environment for the next generation.

Quantiam Technology Inc. works towards devolving better coats for pipes and other surfaces to prevent wear and corrosion. This is used for oil and gas productions along with aerospace defense. By applying the coat, the efficiency and durability of the product improves, which in turn reduces energy consumption and greenhouse gas emissions.

When we arrived at Quantiam we were able to learn about the different roles in the industry and the types of equipment that were used. We toured around their warehouse and their lab area; getting a look at the different technology they have to test the strength and durability of their products. It was great seeing people from different fields, such as materials engineering, technicians etc. working together on a common goal. We had the opportunity to listen to the important women working in the industry talk about their experience and their journey that lead them to work for this company. At the end of the tour we got to ask the workers any questions that we had. They gave us some great advice about being a female in a workplace that is dominated by males.

Going to Quantiam was an overall great experience, being able to see both females and males working together to create a better future for the next generation. This tour gave us a perspective on what it is like in the workplace and an example of what we could do after university.

*Photo: Ana Catuneanu*



# RESEARCH IN ACTION: TEC EDMONTON TOUR

*By Rachel Callahan*

The moment I heard about the industry tours I had a little nerd out about getting to visit labs and companies that were directly focussed on furthering research in the sciences and technology. I chose the TEC Edmonton tour, TEC Edmonton is an innovative industry that focusses on building, promoting and supporting technology based companies in their research.

The tour started at the CanBiocin lab, where lactic acid bacteria are being developed for use in food safety, agriculture, and health; we were shown the different pieces of equipment needed to complete the process. We then went to Exciton, a company whose focus is on developing silver-based bandages that can be used to prevent infection and got to see the lab where production takes place. Next we visited Extraordinary Absorbents, here we got to visit their lab and learn about their approach to separating the different components of air. Lastly, we toured Delta Genomics, a company that is involved in researching livestock, as well as bio banking, genotyping, and sequencing for livestock industries. This tour was a great opportunity to see the diversity of research in the fields of science and technology.

In addition to seeing different areas of research in action, we also had the chance to meet many different experienced individuals who have devoted their lives to researching science and technology. We got to learn about each individual's educational background and the route they took from post-secondary school to their current jobs. This tour was a great opportunity to hear about other people's experiences in fields of science and technology, as well as seeing real life applications of these fields in an industry setting.

*Photo: Ana Catuneanu*



# PROFESSIONAL DEVELOPMENT

## Effective Presentations

*By Jenny Le*

Getting a message across to strangers can be a daunting task, making one susceptible to a lack of confidence. Through the Effective Presentations seminar, we were given the opportunity to learn public speaking. With just a week left until the Celebration of Research, we left the session armed with the power and confidence needed to present our research at the poster session.

With a powerful voice, Chris Pederson, our first speaker, discussed the importance of vocal variety and body language. Using the right words and gestures can create interest and convey a message in a way that will keep the listener's attention. Be loud, forceful, and don't be afraid to look someone in the eye. "Repeat your key points", says Ingrid Pederson. Prioritizing your topic will make your ideas clear, and ensure that you don't end up rambling. The O.R.E.O. method, introduced by Kim Hauer, gave us a guide on impromptu speaking.

The new skills we had acquired were put to the test. In groups of four, two of us were to argue for or against a predetermined topic, while the other two were to evaluate the arguments. My group took on an extra challenge by deliberately choosing to advocate for the belief that we each personally disagreed with to see if we could look at things from another perspective. A difficult but rewarding task, it helped us realize that stepping into someone else's shoes can make you understand others.

Dr. Stephens tied up the seminar by giving tips and tricks for presenting our posters. Through this interactive session, we learned that by controlling your image, being relentlessly pleasant, and using key points, we can effectively present ourselves as WISEST ambassadors. Not only will these skills be useful for our poster session, but they are skills we will use someday in our careers.



*Photo: Ana Catuneanu*

# WISEST NETWORKING FAIR



***"We learned how to talk to people and how to ask the right questions.... this rewarding experience has introduced me to a skill that I will be able to use throughout my life."***

*Photo: Ana Catuneanu*

*By Shirley Duia*

WISEST organized an amazing networking fair with engaging people to introduce students to the art of networking. The WISEST program has taught me many important skills that I can use moving into my professional life. Networking was one of the most important and enjoyable of those skills. At the WISEST networking fair, we met with a wide range of engaging people with interesting careers in the sciences. We learned how to talk to people and how to ask the right questions. We began in small groups with a couple speakers that gave interesting background on the areas where they worked. I was able to meet a graduate student in neuroscience with a background in kinesiology and a mechanical engineer. Later on, all the students were able to practice networking and approach any of the guests. There were many interesting people. I spoke with several engineers and students who were about to enter medicine. Conversing with all these intelligent people answered many of my questions about careers and university life.

I found that after this event I felt much more confident. The networking fair was a wonderful experience and helped ease all the students into the world of networking. With captivating speakers working in different areas, I was able to learn about different types of research and widened my range of options for studies in my future. This rewarding experience had introduced me to a skill that I will be able to use throughout my life. It has also helped me become more confident and able to ask questions. It was a very gratifying experience.

# LUNCH N' LEARNS

## UofA Q&A

*By Lexi Nash*

During the summer, the WISEST Summer Research Project participants had the chance to experience many learning opportunities over their lunch hour. Each week consisted of new activities and topics to be discussed with the students. On Friday July 15th we closed off the end of our second week by receiving an opportunity to ask current University of Alberta students questions pertaining to university life. We were split into four different groups and directed to our own classrooms with a small group of university students to answer our questions. The questions ranged from what courses one should take to achieve certain goals all the way to what the parties are like on campus.

This specific event offered some insight into what university is really like and what we should expect if we get accepted into the UofA in the future. One of the biggest fears most high school students share is the thought of university. Many students think that as soon as they graduate high school they have to have their entire life figured out for the next 60 years. This Q&A however, changed all of the apprehensive thoughts that most of us were feeling into excitement for the years to come. Being able to ask questions to someone experiencing university in person and getting answers at the same time made me less nervous about leaving high school and helped me to become more confident in my future.



## Designing a Research Poster

*By Delainey Linstrom-Humphries*

One of the most satisfying parts of research is being able to share your research with others but before any of us could do that we would need to learn how to design a research poster. On Friday July 22 Dr. Stephens gave my fellow WISEST students and I a lunch n' learn seminar on how we could all effectively communicate our research through a professional research poster. When all of us first came into the room we had no idea how much there was to put on a poster. Most of us had seen different examples of posters in our labs or through the University hallways, but had no clue how to make one of our own. Luckily for us we had no need to worry as Dr. Stephens covered all aspects of what our poster should include and what we could leave out. During the session she discussed everything from the 'must have' information to include on our poster such as an introduction, methods and results to what colours to avoid at all costs. By going through example posters as well as an overview of what information we should include in the different sections of a poster, the idea of making our own poster started to feel more realistic and manageable. After the lunch and learn was finished, we were all able to leave with the essential knowledge of how to create our own research posters so that we could share our summer research with our peers.

# LUNCH N' LEARNS

## The Art of Networking

*By Jessica Van Os*

Upon my entry into the WISEST (Women in Scholarship, Engineering, Science & Technology) program, I had no idea what the networking fair would encompass. I probably could have read up on it if I had felt particularly motivated that day; however it being an average day, I did not. Not only did I have no idea what networking was, but I had no idea that it involved talking to people. If someone would have kindly let me know that then I probably would have ran away in fear. Okay, so that is a bit of an exaggeration. Nonetheless, the idea of talking to strangers seemed somewhat intimidating. I mean come on; I prefer to be an antisocial teenager watching Netflix. Despite this, my view soon changed.

The session was set up well covering all the basics needed to know in order to avoid messing up first impressions, such as dressing well, asking the right questions, and being confident. Not only was the presentation very helpful and engaging, I often found myself laughing out loud. Now that could be due to my slightly immature sense of humor. Yet partly because the little things we had to learn seemed so simple yet necessary. My favorite part was definitely power posing. When the short video which we watched began, I was sitting there smirking. "You cannot be serious", I thought. After all, the concept sounded hilarious and insignificant to me. It turns out that there is actually scientific proof of confidence increase through power posing, a phrase I can still not say with a straight face. Overall, now when asked what networking is I can give an answer.



## Sharing the WISEST Experience

*By Eisha Ahmed*

As I walked into the room for the final WISEST *Lunch 'n Learn* session, I was greeted by a bittersweet aura which reminded me that we were drawing so close to say farewell. I cannot believe how far we have all come. While it feels like the last six weeks just flew by, I realized that I have accomplished more than what I had ever hoped from this summer. After a brief overview of the upcoming Celebration of Research, we were each asked to look back and reflect upon all that we gained from this summer and what, as the ambassadors, we will take back to the other students at school who are also interested in the fields of science and engineering. Looking back, it's amazing to think of how much I have grown as a person. It's not just the professional skills or navigating my way around university, but also the social and moral aspects of life that we will all take away with us this summer. As someone pointed out, we also learned the importance of asking questions, no matter how absurd they might sound, because that is exactly what helped us moved forward this summer. Someone else mentioned how making the research poster seemed a little scary at first but it actually turned out to be quite fun. Another person said that her favorite part was making new friends, and I quite agree. With this summer's invaluable lessons and experiences, I feel ready to face the world.

# WISEST: THE MALE PERSPECTIVE

*By Kevin Li*

It's understandable that from its name, WISEST (**Women** in Scholarship, Engineering, Science and Technology) it wouldn't be the first place you'd expect to see a male student. Even I was surprised to find out that I could apply for the program. However, it's incredibly important to note that WISEST aims to improve diversity in fields where certain gender representation is scarce. And while women are without a doubt more underrepresented in STEM fields, the program manages to kill two birds with one stone by tackling the issue from both sides.

Both me and the other boy in the program were placed in the field of nutrition, one that is typically female-dominated. While perhaps irrational, I admit that entering a new environment was a rather daunting thought. But luckily, any feeling of hesitancy was quickly dispelled by warm welcomes and a sense of community unified by a passion for the sciences. At no point was gender made a focal point, with the work that needed to be done taking the spotlight.

Hopefully in the future, many academic fields will adopt a mindset similar to the one I experienced this summer; one devoid of discriminatory prejudices with a mutual pursuit for knowledge and improvement. While perhaps not until long into the future, programs like WISEST are making sure it happens, one student at a time.

*Photo: Ana Catuneanu*

***"Hopefully in the future, many academic fields will adopt a mindset similar to the one I experienced this summer; one devoid of discriminatory prejudices with a mutual pursuit for knowledge and improvement."***





# LIVING AT THE KING'S UNIVERSITY



*By Rebecca Ferrao*

*Photo: Ana Catuneanu*

Residence: it can either be your worst nightmare or dream come true. I knew I would be staying in residence, an idea which invoked some alarming thoughts. Fast-forward six weeks, and we can all agree that our residence experience was a dream come true. During our stay at The King's University we were able to experience a snapshot of university dorm life, learn to be independent, and make unforgettable memories. There was never a dull moment in our dorm rooms. From hiding the other room's furniture, to ultimate Frisbee, movie nights, catching Pokémon and group dinners; we were always making the best of the moment. Edmonton offered so much to explore as well. We spent weekends going to festivals and fairs, shopping at West Edmonton Mall and exploring Whyte Ave. No matter what we did, we always ended up with inside jokes, crazy pictures and fond memories.

While it all seems like fun and games, there are daunting parts of living on your own. Our Resident Advisor Michée was always there making sure we had the best experience possible. She helped us adjust to dorm life, made sure we knew the bus schedule, introduced us to campus and gave us advice throughout the program. When we were frustrated or upset, we had nine other people who had our back, helping us through our problems with a little therapy and ice cream. From Canada losing an Olympic match to poster disasters and failed attempts to get onto the roof, we were always there for each other.

Looking back, I am truly glad I stayed in residence this summer. It was above and beyond what I imaged this summer to be. Not only did it better prepare us for university, but gave us new experiences and long-lasting friendships. We appreciate the generosity of sponsors who made it possible for us to stay in residence this summer; especially NSERC PromoScience and the MargaretAnn Armour Endowment Fund for Rural Students. On behalf of all the residence students, we extend our gratitude to The King's University and the WISEST team, especially Michée, for making this summer the best one yet.

# SPECIAL EVENTS



*Photo: Ana Catuneanu*

# CELEBRATION OF RESEARCH

August 16, 2016

During the afternoon of the final day of the program, students are able to share their successes with their friends, family, and members of the community. Visitors are invited to view students' work, to ask questions, and to learn more about this transformational experience. Representatives of sponsoring organizations are also invited to see just how much their contributions have impacted these young people.

Student researchers, Nadiya Shore (WISEST) and Dennis Rutar (HYRS) gave wonderful speeches to highlight some of their experiences. The WISEST team was extremely proud of the high calibre of work conducted by these 41 SRP students and 22 HYRS students.

*Photos: Ana Catuneanu*



# TEACHER APPRECIATION DAY

Alberta's high-school teachers in the math and science subjects are invited to attend the Teacher Appreciation Day, a special event to learn about innovative research that takes place on campus that will inspire them with new ideas of how they can incorporate the principles into the classroom curriculum. Throughout the day teachers have the opportunity to do the following:

- Visit and Learn about trail-blazing research and interact with University of Alberta Researchers.
- Engage and interact with all WISEST participants through Student Poster Presentations and discussion with experts in the fields of science, engineering, and technology.
- Explore new perspectives, techniques, and methods to integrate into classroom curriculum.
- See how WISEST students broaden their awareness of diverse careers through research experience at the University of Alberta

This summer, our theme was “**Inspiring the Intrepid**” and lunch presentations included:

- Tasmia Skeikh, 2016 SRP participant
- Dr. Robyn Braun, Ph. D Sociology of Science, Freelance Science Communicator/Writer
- Kerry Rose, Project Manager, Center for Mathematics, Science & Technology Education (CMASTE)

# RESEARCHER THANK YOU

On the morning of the last day of the Summer Research Program, the Summer Researchers' gathered with their PIs, supervisors, and lab mates in the PCL Lounge. This casual morning was characterized by breakfast treats, mingling around the Student Poster Presentations, and informal conversations as the Student Researchers “showed off” their work and got one more chance to say THANK YOU to all those involved in research and who supported them on their journey.

We estimate that for each Summer Student, there are 4 to 5 people on research teams and in the laboratories supporting them. We saw this reflected in our attendance at this popular annual event, as over 250 members of various research teams joined us.



# STUDENT REPORTS



*Photo:  
All student portraits (pg 33-74): Ana Catuneanu*

# Eisha Ahmed

**Supervisor:**  
**Dr. Abram Hindle**

**Department:**  
**Computing Science**

**Sponsor:**  
**Canada Summer  
Jobs**



“Nothing is worse than missing an opportunity that could have changed your life”. This piece of wisdom by Addison Montgomery is what persuaded me to apply for the WISEST Summer Research Program, and it has proved to be one of the greatest decisions I have ever made. From learning how to network effectively to gaining actual experience in a Research Lab, every aspect of this summer has been a learning experience and a thrilling adventure into the world of science and engineering. Not only did I gain useful experience and education, but my journey this summer also introduced me to precious friendships and memories that I will hold onto even after my time at WISEST is over.

Just as I was hoping for, I was placed in the Computer Science Department thanks to Dr. Abram Hindle who very kindly accepted me in his Research Lab along with two other WISEST and HIP students. Our project goal was to train the computer to get better at detecting programming errors in a computer code. We started by collecting sample errors from programmers’ codes on the internet. Once we had enough data, we fed it to Weka Machine Learning. The Weka used our sample data to learn to find programming errors in a code. The tricky component of machine learning was that we had to be careful not to feed biased data to the computer. In order to avoid bias, we collected some more sample errors to make sure we cover a variety of the types of mistakes a programmer might make. I was initially overwhelmed by the amount of programming that our project called for, but thanks to the supervision of Joshua Campbell, I was able to refresh my computer science knowledge and program some complex codes; I had never imagined to accomplish so much over a course of only six weeks.

Personally for me, the greatest element of these six weeks was the experience itself. Experience of working in an actual research lab, experience of meeting current university students, networking with professionals in science and engineering, learning to create a research poster, the tour at TEC Edmonton and the university greenhouse, and above all experiencing how life at university might look like. Thanks to the regular WISEST sessions at various different buildings, I think I actually improved my navigation skills in university.

Looking back, I cannot believe how far I have come and how much I have gained along the road. I would like to thank my Supervisor and Principal Investigator for their support and understanding, and my Sponsor, Canada Summer Jobs for making my experience possible. Special thanks to my High School teachers for their encouragement when I applied for this program, and to my lab partners for making this journey exciting and a memorable one. Finally, I cannot give enough credit to the WISEST student coordinators, Rosie and Michée, whose hard work and dedication truly made the program successful. WISEST truly was a life changing adventure which taught me that the sky’s not the limit for anyone with passion and diligence towards their goal.

# Alana Benoit



**Supervisor:**  
**Dr. Simon**  
**Landhäusser**

**Department:**  
**Renewable**  
**Resources**

**Sponsor: NSERC**  
**PromoScience**

When my biology teacher talked to me about applying for the WISEST Summer Research Program I was very interested in the opportunity to get a six week preview into what my future would look like. I perfected my application and with much anxiety and excitement, sent it off to the WISEST office to be reviewed. I never thought that I would have the opportunity to work in a university lab learning from students and professionals all while I am still in high school.

When I applied to WISEST, I expected to find the exact career which I would pursue. However, I was introduced to many interesting fields of science and wanted to explore as many of them as I could. It wasn't that I narrowed down the career that I wanted; it was that I broadened my understanding and knowledge of the paths I could pursue.

This summer I worked in Dr. Simon Landhäusser's lab, identifying plants and learning about factors that affect land restoration. I had always thought that plants were pretty simple, but studying them up close showed me unique and fascinating characteristics that I would have never looked into if it wasn't for my time in this lab. Everyone in my lab was so passionate about their work and was always eager to teach me about it. I didn't have my own research project because research in the field of land restoration is a long process. However I did help out with some of the grad students' studies and was able to see what research was like in this field. I focused on learning proper plant identification and its importance. Accurate plant identification is important to land restoration so that there is a record of what is in an area before an industrial operation, such as mining, so that the land can be properly restored after. On my second day in the lab Wajeeha, the undergrad student that I have been working with, taught me to identify plants using The Flora of Alberta along with a terminology book. And I have to say, there are many different terms used to describe plant characteristics so the terminology book made identifying much easier. She also taught me how to press and dry plants for mounting.

I have learned so much in these six weeks, but it wasn't just about plants, the WISEST sessions taught me about being a professional, the University, opportunities in the STEM fields, and allowed me to make connections with new friends and mentors. I have really enjoyed my WISEST experience and learned so much about academic life and the opportunities ahead of me. One of my favourite sessions was the Research in Action Industry Tours, where I toured Quantum Technologies. I met some very inspirational women who had great advice and very interesting jobs working with materials at the nano-scale. Both the Professional Development Seminars and Lunch N' Learns taught me skills and provided me with experiences that will benefit me in academics and my future career.

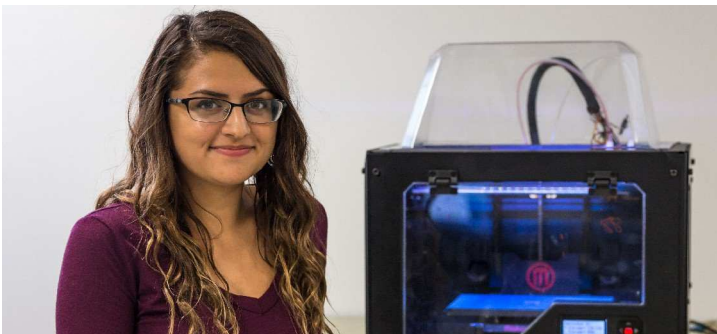
I would like to thank NSERC PromoScience for sponsoring my position. Also, I would like to thank everyone on the Landhäusser Research Team for making this an unforgettable experience by sharing their knowledge and passion for science and also making great memories both in the lab and the field. Lastly, thank you to WISEST for running this inspiring program and selecting me to participate in it. It has been a most memorable summer.

# Sareena Butt

**Supervisors:**  
**Dr. Leijun Li, Dr.**  
**Patricio Mendez**

**Department:**  
**Chemical and**  
**Materials**  
**Engineering**

**Sponsors:**  
**Canada Summer**  
**Jobs, Syncrude**  
**Canada Ltd.**



The moment my friend mentioned to me the WISEST program, I knew it was perfect for me. A paid summer internship in a department I could potentially place my future career in? Sign me up! Math and science have always been my best and favourite subjects, and the fact that this program was intended to promote diversity within fields was a huge bonus.

I was placed in the Canadian Center for Welding and Joining lab, under the supervision of Rebekah Bannister. Starting off in the lab was a little intimidating. Teagan, my lab partner and I were just high school students, surrounded by undergraduate and masters students, who all had a vast amount of knowledge about their lab while we had only completed our grade 11 courses. Luckily, my fears were put to rest when we discovered that everyone in the lab was very welcoming and understanding. No one expected us to have the knowledge of a PhD student. I remember on our second day in the lab, as the engineers tried different ways to (unsuccessfully) fix a broken thermocouple, a graduate student said to us that “science does not always work”. An engineer responded that “Science always works, you just need to science harder.”

Over the summer we had the opportunity to work on a 3D printer. For the first two weeks we struggled to fix a stubborn MakerBot Replicator 2X. Once we were finally able to get it running, we realized that the models that it was printing were inconsistent, and often unfinished. We then began an optimization trials study. In this, we chose six different settings, each with two or three ranges, and wrote out all possible combinations. With this, we got 144 combinations, which we would use to print both a simple cube, as well as a more complex keychain. In between these prints, we worked on designing an attachment that would allow a microscope objective lens to attach to a high speed camera. The high speed camera allows us to view welding processes in great detail. With the microscope attachment, we will be able to take videos of solidification and microstructure of welds and steels.

Working in the lab was not the only thing I got to do this summer. Every Monday and Friday, WISEST students got to partake in Professional Development Seminars, and Lunch ‘n’ Learn sessions. One of my personal favourites was the Social Science Challenge, where each group had to make a hydraulics system that would either lift a glass, or pour water from it.

To make the WISEST University experience even more valuable, I had the pleasure of staying in residence at The King’s University. Despite the hour long commute to and from the University of Alberta, I have no regrets choosing to stay in residence. It allowed me to experience living without family, instead with four other girls.

These past six weeks have been an incredible experience. I would like to thank the WISEST team, Rosie, Michée, and Fervone for running this program. As well as my supervisor, Rebekah Bannister, and my Principal Investigators, Dr. Leijun Li and Dr. Patricio Mendez, for allowing me to work in their lab. I highly recommend the WISEST program to any female interested in any of the STEM fields.



# Rachel Callahan



**Supervisor:**  
**Dr. Kajsa Duke**

**Department:**  
**Mechanical  
Engineering**

**Sponsors:**  
**Canada Summer  
Jobs, Weyerhaeuser**

My experience at the Women in Scholarship, Engineering, Science & Technology (WISEST) Summer Research program far exceeded any expectations I had for the program. When I first heard about the Summer Research Program I was excited to learn and gain experience, but also nervous to step out of my comfort zone and leave my home for the summer. Truthfully, I kept telling myself that if I did not fit in then it was only 6 weeks and I could handle it. But immediately after the program began, my nerves disappeared and I realized that I did not want the 6 weeks to end. Before coming to participate in the Summer Research Program, I was undecided of where to go to postsecondary school, what options were out there for careers, and how I would fit in at a university setting when I had been homeschooled, and then attended an online school for my entire life. Yet as it is coming to a close, my questions have been answered and I feel at ease with my plans for my future.

I learned more than I could have possibly imagined in the 6 weeks I worked with Dr. Kajsa Duke on various research projects. My primary focus was on Reverse Engineering a mechanism that they could then use in future models and designs. Basically this means that instead of using design plans to build a machine, you take a machine and rebuild it using Computer Aided Design (CAD) in order to obtain its design. With the help of my partner, Jess Van Os, we measured and sketched each piece and then used 3D CAD modelling software called SolidWorks to build the various pieces of the mechanism. After the pieces were made to match the model, we virtually assembled them to mimic the movements of the physical machine. In addition to working on my project, I also got to work alongside Jess on her project which focused on identifying the main pressure points that arise on the chest and hips of a patient who has undergone scoliosis surgery. During the surgery, the patient is laid face down on a Jackson Table that lifts the patient so to prevent their abdomen from pressing on the table; it is covered with pressure mats that monitor the position and magnitude of the pressure created throughout the surgery. I helped her convert the Force Sensor Array (FSA) raw data of the pressure created and convert them to Excel files to read and further analyze the data. These projects gave me a taste of realistic career options in the field of Mechanical Engineering and also helped me gain confidence with working alongside other students, undergraduates, and professors.

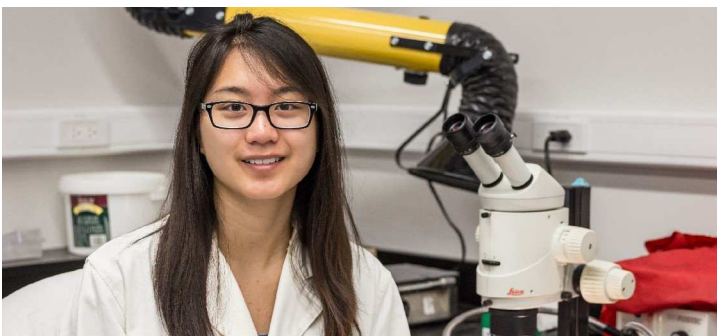
Alongside the actual research projects, there were many sessions and events hosted by the WISEST team. The events and sessions were awesome for connecting with other WISEST/HYRS students as well as meeting undergraduates, graduates, and professors and learning about their experiences through post-secondary school and their careers. Speaking to the many experienced people I met taught me that it is okay not to know exactly what you want in your academic future, and that switching career paths isn't as daunting as it seems. This program was an amazing opportunity to meet friends that also love engineering, science and technology as well as giving us a glimpse of what university has to offer. I would like to express my thanks to my sponsors, Weyerhaeuser, and Canada Summer Jobs, the amazing WISEST team who were always available. Lastly, I would like to thank my awesome lab partners, Jess Van Os, and Kyle Spellman as well as Dr. Duke, who made this summer unforgettable.

# Elizabeth Chao

**Supervisor:  
Dr. Heather  
Proctor**

**Department:  
Biological Sciences**

**Sponsors:  
Canada Summer  
Jobs, Faculty of  
Science**



When I first applied to the WISEST (Women in Scholarship, Engineering, Science and Technology) Summer Research Program, I could not even envision what my experience would be like. After completing the essay, asking teachers to write references, and getting a transcript of my grades, I doubted that I would be chosen, and already made plans to take physics 30 in summer school. I was caught off guard when I received the unexpected phone call from WISEST. Despite being nervous because of not knowing what to expect, I was actually very eager to start the program.

When I received the letter explaining my research program, I was excited to discover what my research was going to be. My project overview stated it was on “mesostigmatid soil mites”. The first thought that came to my mind was that I would be working with bugs. In fact, now I know that soil mites are not bugs, and are more closely related to spiders. Initially, I was a little disappointed because insects and spiders are my worst fear. After six weeks of doing research on these tiny soil organisms, I am glad I got to gain experience in the field of biological sciences.

For my project, I looked at two different orders of mites, Mesostigmata and Oribatida. The goal was to see whether or not these soil dwelling Acari are effective bioindicators of disturbances in the environment. I mainly worked with samples of preserved microfauna collected from different sites throughout Northern Alberta. These organisms look like grains of sand to the naked eye, being less than one millimetre in size. Using a dissecting microscope, I sorted for mesostigmatid mites in the samples. I used a tool which looked like a thin needle, a small pipette, and forceps to extract these mites to be slide-mounted and identified for my research. At first, the number of different organisms I was looking at in each sample was so abundant, I had no idea which ones I was supposed to remove from the samples. After looking through about a hundred samples, containing thousands of mites, I now understand mite entomology and how to recognize these fascinating organisms.

Thinking back on the experience I have gained, spending my summer being involved in this program was a great decision. This six week long experience taught me more than I could ever learn in classes at summer school. Instead of learning through listening to teachers all day, I learned by means of hands-on work, making mistakes, and being involved. Not only was my experience with science captivating, but also talking to University of Alberta students and alumni was extremely valuable to my overall experience. Previously, if anyone asked me what I wanted to pursue in university, I would have responded with “The Faculty of Science.” I was very uncertain, and my knowledge of the different possible opportunities was vague. I went from not knowing anything about the different fields of science to now having a clearer picture of my path for the future. Through the Professional Development seminars and the Lunch n’ Learn sessions, this program has opened my eyes to many other STEM (Science, Technology, Engineering and Mathematics) fields I am also interested in, not just science.

Lastly, I would like to thank my Principal Investigator, Dr. Heather Proctor, my Direct Supervisor, Matthew Meehan, and my sponsor, The Faculty of Science, for making this opportunity possible. WISEST has made this allowed me to gain new experiences, create new memories, and develop long-lasting friendships through this program.

# Rimsa Dahal



**Supervisor:**  
**Dr. Christopher**  
**Sturdy**

**Department:**  
**Psychology**

**Sponsors:**  
**Canada Summer**  
**Jobs, Beta Sigma**  
**Phi**

Most of us begin the new school year with an incomplete bucketlist from the previous summer to which we continue adding to during the school year. I was one of the students catching up with friends and making more plans for the upcoming school year and the following summer when our first class started and a former WISEST (Women in Scholarship, Engineering, Science and Technology) student came to share her own WISEST experience and encouraged us all to look into the program and apply. I found one of my top priorities for the summer of 2016 on my first day! WISEST helped me shape an exciting and rewarding summer and I am so grateful for having been part of the program this year.

During the six weeks of the WISEST Summer Research Program, I was working in the department of psychology in Dr. Sturdy's lab along with a fellow WISEST student, Shirley. My project's goal was to determine if black-capped chickadees (*Poecile atricapillus*) have any acoustic differences in their *chick-a-dee* call across seasons. After being trained to use SIGNAL bioacoustics software, I started the process of identifying and extracting different calls made by the black-capped chickadees in their recordings. I standardized the extracted *chick-a-dee* calls and broke down the calls to identify each composition. I ran a t-test for each individual to determine if the call compositions changed between two seasons. Acoustic analysis research on songbirds, such as the black-capped chickadee contribute to a better understanding of communication and learning in other animals. After familiarizing myself with all the calls and songs chickadees make, giving them supplements (which consists of worms or eggs) became an activity I looked forward to everyday. I discovered that chickadees were very expressive and bold birds and extremely hard not to love.

Surrounding all the learning and adventures within my lab placements, the weekly events and tours organized by WISEST made the summer even more extraordinary. We had the opportunity to engage in innovative events like the Social Science Challenge and to interact with professionals and researchers in many scientific fields. We spent an afternoon touring an industrial company and had multiple chances to get involved in events held by organizations such as UA-WiSE. The underrepresentation of women in the fields of science and technology is not something that should deter young girls from pursuing careers in those areas and Dr. Margaret Ann-Armour's lecture was one of the events that reminded us that we can be unstoppable if we believe in ourselves and work accordingly.

The WISEST Summer Program has been an experience of a lifetime. I had the chance to be involved in professional research, learning about more than just lab procedures. In the six weeks I spent on campus, I learned about university life, workplace environment, designing posters and networking. I met 60 other inspired and driven young individuals who motivated me and helped me build my confidence in embracing the world of research and discovery. I would like to thank my sponsor Beta Sigma Phi for making the summer position possible by funding my position. I have had an unforgettable summer in my lab and with the rest of the WISEST participants and I am looking forward to continue growing, sharing my WISEST experience and promoting female involvement in all professional fields.

# Natasha Danha



**Supervisor:**  
**Dr. Heather Bruce**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsors:**  
**Canada Summer  
Jobs, Faculty of  
Agriculture, Life, &  
Environmental  
Sciences**

Having been born in Zimbabwe, I grew up in a society where it is not expected of young girls to aspire to work in fields based in Science, Technology, Engineering and Mathematics. From a young age I became increasingly motivated to defy the societal restrictions that were placed on me. When my biology teacher introduced me to the Women in Scholarship, Engineering, Science, and Technology (WISEST) Summer Research Program, I was more than thrilled to finally get an opportunity to break the “glass ceiling” and enter what I grew up knowing to be a ‘men’s world’. The WISEST Summer Research Program has exceeded my expectations, and allowed me to have a very memorable summer.

In Dr. Heather Bruce’s lab, I was able to work alongside Mr. Bimol C. Roy as we investigated the relationship between age and toughness of steak in cattle. Our research was mainly centered around the properties and behavior of collagen, which is the principal component of intramuscular connective tissue (IMCT) in muscle. Data was collected following meat quality testing including pH, meat colour, and Warner Bratzler Shear Force. My daily routine in the lab consisted of completing hydrolysis and evaporation of the IMCT samples, as well as assisting with other projects in the lab. Using High Performance Liquid Chromatography, and Differential Scanning Calorimetry, we were then able to quantify the presence of collagen crosslinks. Generally, it is believed that the more heat soluble collagen crosslinks, the more tender the steak; however, our results showed that for semitendinosus muscles, there was a positive correlation between age and increased toughness of the steak. The opportunity to work in the same environment as graduate and master’s students allowed me to enhance my knowledge, as well as served as a healthy challenge as I continued to strive to present my best work. I was eager to go to work each day as I knew I would return as a better version of myself.

My experience in the WISEST Summer Research Program has not only offered me extensive knowledge, but valuable life skills as well. As a high school student there is added pressure to choose a career path and make life plans. Prior to entering the WISEST Summer Research Program, this process proved to be a daunting task. Weekly Professional Development Seminars and Lunch ‘n’ Learn Sessions allowed all student researchers to partake in activities centered around post-secondary education, networking, or enhancing fundamental skills. The University of Alberta Question and Answer session eased all my apprehensions concerning my post-secondary pathway, and provided insight and recommendations regarding the application process, course selection, as well as scholarships. Independent of the academic aspect of the gatherings, we had the opportunity to build a network, and form new friendships with like-minded individuals. The weekly sessions and seminars were instrumental in the effectiveness of the WISEST Summer Research Program as an opportunity for academic, professional and personal growth and development.

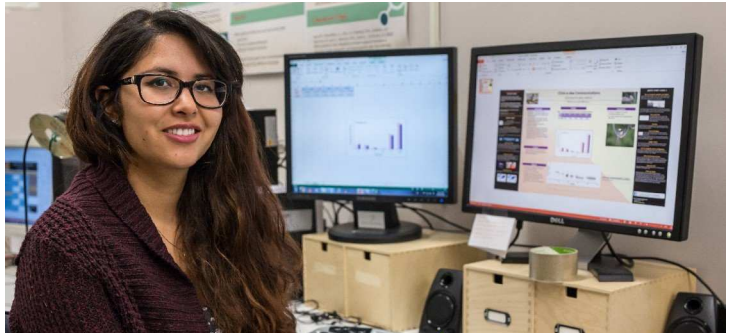
I would like to thank Dr. Heather Bruce as well as my direct supervisor, Mr. Bimol C. Roy, who always went above and beyond in ensuring I understood the technicalities of the research, was always available to provide assistance, and answered my seemingly infinite questions. As well, thank you to Chamali Das and the graduate students on our research team, who ensured there was never a dull moment in the lab. I am extremely grateful to the Faculty of Agriculture, Life and Environmental Sciences for providing sponsorship, and to WISEST for an unforgettable summer.

# Shirley Duia

**Supervisor:**  
**Dr. Christopher**  
**Sturdy**

**Department:**  
**Psychology**

**Sponsors:**  
**Canada Summer**  
**Jobs, Faculty of**  
**Science**



Upon receiving my acceptance from the WISEST program, I was overwhelmed. Excitement, joy, and intimidation flooded my senses. I was thrilled to be able to participate in such an amazing program and looked forward to meeting other students my age who had the same interests as me. However, when I read my project overview, I became worried. There was scientific terminology that I could not understand. My research seemed to be very intimidating. I was scared that I would not be able to do my job properly.

I was nervous when I first arrived at the orientation; however, once I met the WISEST supervisors and all the students I would be spending my summer with, my nerves changed to excitement. My direct supervisor, Kimberley Campbell, taught my partner and I exactly how to work with *chick-a-dee* calls. I worked with black-capped chickadee birds, which are a very common songbird in North America. My work consisted of using a program called SIGNAL to isolate calls from recordings of vocalizing birds. Songbirds experience vocal learning that is similar to the language learning process of humans. I used my data to study the *chick-a-dee* call composition differences between the sexes. Although I had not been interested in this type of research before, I found that I grew more intrigued in my project and learned many interesting facts about birds. My lab members were always friendly and ready to help so that my work was never intimidating. I have had many interesting conversations and picked up much information about not only my work, but also university life. I had never considered a career in research, but after this incredible experience, I find it becoming a compelling career path.

Throughout the WISEST program, I learned not only skills that applied to my research, but also things that I could use later on in my life. WISEST organized many engaging seminars that informed me on how to network, create posters and reports, and how to present properly. All these informative seminars were led by captivating speakers, who were able to simplify topics to help anyone understand. They also answered many of my questions to help me narrow my career choices. I have learned a wide range of skills, from writing a formal letter to reading a research paper. I also found that through this experience, I have become more confident. I am no longer intimidated by professors and graduate students; rather I find that I have become more outgoing after working with these people in a lab. I get much more out of talking to such individuals because WISEST has taught me the right questions to ask. This experience has rewarded me with knowledge that I could never learn from a classroom.

WISEST has been a once-in-a-lifetime experience that I will cherish. The hands-on research helped me learn things that I did not learn in school. I am much more comfortable in an atmosphere involving research. Not only did I learn many skills to help me in the future, but I also made friends and enjoyed my summer. The scientific research was a rewarding project; especially when I saw all that I had accomplished summed up on a research poster. I look forward to my future as a university student. My experience was enhanced by my amazing supervisor, Kimberley Campbell, and my principal investigator, Dr. Christopher Sturdy. I also appreciate the help from the Faculty of Science at the University of Alberta; without their contributions this program would not have been a possibility. The memories that I made at WISEST will stay with me and guide my future.

# Claire Duong



**Supervisor:**  
**Dr. Csaba Szepesvári**

**Department:**  
**Computing Science**

**Sponsor:**  
**NSERC**  
**PromoScience**

As Socrates once stated, “Wisest is she who knows she does not know”. Although I had entered the Department of Computing Sciences on that July morning knowing little to nothing about computers and programming, I left having learned more than I could have possibly expected from a mere six weeks, as well as gained friendships and connections that would last a lifetime.

Applying for WISEST was, simply put, an impulsive decision on my part. I applied mainly due to the fact that everyone in my school was, I liked science, and I knew I had nothing to lose. Furthermore, knowing myself, I was aware that if I were to not do anything productive during my summer, I would do nothing at all. Of course, being in my second year of high school, the worry of choosing a path to go to in regards of my future career was also extremely prevalent, and while I knew I wanted to pursue a career in the sciences, my exposure to those opportunities were limited to the school environment. Therefore, upon finding out about the WISEST program, I decided to apply.

This summer, I had the pleasure to work with Dr. Tor Lattimore on his research on finding a better algorithm to solve the multi-armed bandit problem. In the probability theory, the multi-armed bandit problem is essentially the problem in which the gambler has to decide, amongst a row of slot machines, which machines to play, how many times to play each machine, and which order to play them. When played, each machine provides a random reward. *ti-armed bandit*" (<https://en.wikipedia.org/wiki/Mul>) The objective of the gambler is to maximize the sum of rewards earned through a sequence of lever pulls. An upper confidence bound (UCB) algorithm is used to determine the expected reward of the bandit. The problem however, is the fact that the bonus within the UCB algorithm is too large, thereby creating a discrepancy in the overall rewards gained from the bandit, as the gambler will unknowingly play the poor arm multiple times, since the bonus will compensate for the eventual regret that the gambler will receive. To prevent this from happening, a smaller bonus should be determined.

Though I had spent most of my time in the computer lab trying to figure out how to use Javascript, my experience in the WISEST program was not merely just work. Every Mondays and Fridays, we were given the opportunity to attend Lunch n’ Learn sessions, as well as Professional Development Seminars. Amongst all the different activities that were offered, I particularly enjoyed the on-campus tours, in which we got to explore a research facility of our choice. I was privileged to have been able to visit the obstetrics lab, where we were able to watch as the valves dilated through a microscope upon pipetting a vasodilator into the solution, as well as learn more about the immunological effects of active and chronic infections with the Cytomegalovirus (CMV), which I had found fascinating.

Throughout the program, I was able to grow both as a student and as a person. Not only have I learned of a whole new division of science that I had never considered before, I have also realized the importance of being confident and presenting yourself through the various sessions that were provided. I would like to express my thanks, firstly, to NSERC PromoScience for generously funding my six weeks, and for giving me the honour to participate in such a project. I would also like to thank Dr. Lattimore and Dr. Csaba Szepesvári for their support and guidance while working on this research experiment, not to mention WISEST for providing me with this amazing opportunity. It will indeed be an experience that I will continue to cherish and gain from in the years to come.

# Rebecca Ferrao

**Supervisor:**  
**Dr. Mariusz**  
**Klobukowski**

**Department:**  
**Chemistry**

**Sponsor:**  
**Canada Summer**  
**Jobs**



As a child, I always dreamed of being a veterinarian. However, that career hit an unfortunate roadblock when I discovered that I was terrified of blood and needles. Despite this setback, I remained interested in the sciences, always fascinated by the idea of creating a cure or discovering a new galaxy. As I grew older, I found that I still could never truly answer the question “What do you want to do become when you are older?” When I learned about the WISEST Summer Research Program, I was intrigued. I had no idea what to expect from it, or if I would even be accepted or not. Nevertheless, I applied to WISEST hoping to find my passion this summer.

I was placed in Dr. Mariusz Klobukowski’s computational chemistry lab under the supervision of Shakiba Azimi. My project involved modelling molecular systems to detect heavy metal ions in aqueous environments. Mercury is one heavy metal that has adverse health effects on the human body. The end goal of our project was to create a system that would fluoresce when it detected the presence of mercury ions within a crown ether (a molecule that captures cations). Mercury is known to bond easily with sulfur; so we substituted sulfur for oxygen in the crown ether and performed calculations on it. This allowed us to determine the sulfur substitution that would allow the crown ether to be selective in detecting mercury over other heavy metals. My project not only introduced me to a different side of chemistry, but it also taught me that failure is not necessarily a bad thing. Even when we encountered problems, there were solutions to be found.

Working in the lab was only part of the WISEST experience. We participated in weekly professional development sessions, toured other university labs and visited industries. While our daily work exposed us to the scientific field and lab work; our other activities allowed us to gain a more profound understanding of how science melds into the real world. We learned valuable leadership skills that will accompany us now and as we move into the next stages of our lives. Experiencing university life has opened my eyes up to the hundreds of possibilities that my future contains. Even if I cannot yet say what I want to do with my life, I am better equipped to answer that question. Seeing the enthusiasm and passion of fellow WISEST researchers as well as university students is both motivating and inspiring. I now have an insightful understanding of what it means to do what you love.

WISEST has really been more than just a summer job; it is a once in a lifetime experience. None of it would have been possible without the generosity of our sponsors, the WISEST team and all of the professors who opened up their labs this summer. I would like to extend my gratitude to Canada Summer Jobs and the Margaret-Ann Armour Endowment Fund for sponsoring me this summer. Thank you to Fervone, Rosie and Michée for all the effort they put into running the WISEST Summer Research Program. Lastly, I would like to thank Dr. Mariusz Klobukowski for the opportunity to work in his lab, and Shakiba Azimi for all of her mentorship and advice throughout this program.

# Rebekah Hall



**Supervisor:**  
**Dr. Aman Ullah**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsors:**  
**Canada Summer  
Jobs, AWSN**

In the fifth grade, I decided I wanted to become an electrical engineer. Although one might interpret this as proving that I plan everything too much, I have always seen it as the first time that I truly identified science as my passion. For several years, my career goals have been centred around pursuing research, so the WISEST Summer Research Program was a dream come true. Although I was interested in this career path, I knew very little of it, or how to go about following such a path. What does it mean to be a PhD candidate? How do you get into graduate studies after your undergraduate degree? What is that transition like? How does research work on a day to day basis? These questions were all answered throughout the duration of this program.

I was placed in an organic chemistry lab, with a focus on manipulating lipids. The goal of my project was to synthesise an amphiphilic block copolymer. High-oleic soybean oil was converted into monomers for the hydrophobic end, and N-Isopropylacrylamide (NiPAM) was used as the monomer for the hydrophilic end. A major portion of the summer was spent developing the monomer from the oil, as well as purifying it. This was accomplished via two different methods, transesterification and direct hydrolysis. These two methods resulted in fatty acids, which were then monomerised. The next step was polymerisation. The NiPAM was polymerised, then precipitated out to separate it from the waste. This polymer was then used in the following reaction, the copolymerisation of the hydrophobic monomer with the hydrophilic polymer. This resulted in an amphiphilic block copolymer, which can self-assemble around hydrophobic drugs into a micelle, and improve the effectiveness of their delivery.

A key experience for me was the opportunity to tour a lab at the university. I chose to tour an obstetrics lab, because biology is the field I hope to pursue. We were able to visit two labs, one which focused on in vivo experiments, and the other on in vitro experiments. Seeing the different methods of experimentation was absolutely fascinating, particularly since they focused on such similar concepts. Although they studied an area I had never particularly thought about, I still found myself being extremely interested in their work, and even more interested in how they made these discoveries.

This is a specific example of what the WISEST program really did for me. More than getting me excited about one subject in particular, or giving me the opportunity to explore a subject I loved, the WISEST program was about learning more about the actual career and process of research. There are hundreds of textbooks I could read on the subjects I'm passionate about. But learning about the process of research, and research as a career is much more difficult to do through a textbook. The experience of being in a lab, and seeing how it works, not only while working on my own project, but also during the two different tours we went on, was really what has confirmed my desire to follow this path, and made the path clearer. I'm more excited than ever to continue along this journey and get back into a lab as soon as I possibly can.

This incredible experience wouldn't have been possible without the support of Dr. Aman Ullah and Dr. Muhammad Arshad, who guided me through the project. I would also like to thank my sponsors, Alberta Women's Science Network and Canada Summer Jobs for their financial support. This was an amazing experience that I am so grateful and fortunate to have had.



# Amelia Hall

**Supervisor:  
Dr. James  
Harynuk**

**Department:  
Agriculture, Food,  
and Nutritional  
Science**

**Sponsors:  
Canada Summer  
Jobs, Weyerhaeuser**



Growing up people always ask you "what do you want to be when you grow up?" My answer has never changed; from kindergarten on, it has always been "an engineer like my mom." Having the opportunity to participate in WISEST has expanded my knowledge about non-traditional roles and introduced me to a field of study that I can develop into a career. The WISEST Summer Research Program has broadened my learning and knowledge about career opportunities and given me so many cherished experiences. The summer research program has been a challenging experience that has pushed me to my full potential. WISEST has given me the ability to explore new things and learn in a different way than what I experience at high school.

My research project was bordered between chemistry, math, statistics and computer science. It was mostly computer based. I was working on developing an objective approach to estimate the backward elimination start number for performing an automated feature selection using the cluster resolution feature selection (CR-FS). Essentially, the code was trying to find a group of variables that we can use to build a mathematical model that can predict whether samples were important or insignificant.

When you apply to WISEST, you may think it is all work and no fun, but you would be mistaken. The program is prepared to teach you skills that most people learn their first year of university. Throughout the six-week program, there have been Lunch n' Learn or professional development sessions at least once a week. The Lunch n' Learn that really had an impact on me was the Social Science Challenge, the first week on the job. The challenge was to lift up a cup of water using a hydraulic system. It was interesting to see the different intelligent minds collaborate into making the task happen. At the end, it was amazing to find out the variety of different ways everyone thought of doing the same challenge. After that, the bonds between peers were created. Everyone now seemed comfortable and more confident around each other. Another topic focused on during the Professional Developments was conversation. Before getting sent to mingle with some professional adults in the field of science, engineering and technology, we were taught how to start a conversation and to not be afraid of talking. It teaches you how to behave in the real world. We took our new skills and immediately put them to use at the Networking Fair. The Networking Fair was a chance to talk to workers in fields you were interested in. I believe this event was the most useful for me. You get a chance to ask question to professionals, but also get to see that it is ok to change your mind if you don't like what you're doing. A lot of professionals didn't get to what they love now without changing your mind once or twice. And I think that really helped me see it's ok if you're not sure on what you want to be.

I have been honored to be accepted to WISEST Summer Research Program. It has granted me with the greatest experience and adventure of my life. I would like to thank my sponsor Weyerhaeuser for making this experience possible, as well as my supervisor and Principal Investigator for helping me and making me feel a part of their lab family. This summer will be one that I will never forget and I would like to thank all the WISEST staff and volunteers for organizing everything and making the experience possible.

# Kali Heatherington



**Supervisor:**  
**Dr. Peter Hurd**

**Department:**  
**Psychology**

**Sponsor:**  
**Canada Summer  
Jobs**

Thinking back on my time during the WISEST Summer Research Program I realized how lucky I was to have participated in this program. I applied for this program because I wanted to find out what type of career I wanted, and I achieved this and also did a bunch of fun stuff along the way. Going into the WISEST Summer Research Program I wasn't sure what I wanted to study in university, but I was hoping that working in a lab and participating in the Summer Research Program's various activities would help narrow down my choices.

I spent my summer working in the Psychology Department studying the behaviour of *Kribensis* cichlids. The *Kribensis* cichlids, or kribis, were raised in different environments to affect their sex. It has been shown that when certain fish are raised certain temperatures of water the number of males or females population can change. I spent a lot of my time running the kribis through different tests such as the plus maze, boldness, open field, and mirror aggression behavioural tests. These tests measure different behaviours such as anxiety, boldness and aggression. I took videos of all the fish going through the tests and scored the videos by tracking their movements in the testing apparatuses. We found out that in some cases there was behaviour difference between the fish raised in different temperatures. In addition to running this experiment I helped with feeding the fish, cleaning tanks and any other tasks to keep the fish healthy and alive. There were multiple different labs being run, so I also got to witness other people's experiments; which was very interesting.

Not including my work in the lab I also learned a lot from the other activities put together for the Summer Research Program. Some of the events I particularly enjoyed were the Industry Tour, the Networking Fair and Exploring U of A Research. On the Industry Tour I got to go visit Quantum. Quantum is a company where they design different materials for things like pipelines or bulletproof substances. For Exploring U of A Research I went on the Metallurgy tour where we got to learn more about welding and see where it is done at the University. I found both of these tours extremely interesting and they really opened my eyes to the type of work I could be doing in the future. Also, at Quantum they fed us ice cream so that was really fun. These tours really influenced my future plans. The Networking Fair was also very beneficial because it let me practice talking to people in a professional way I'm not used to. The activities put on by WISEST were very beneficial to me both academically and personally.

The WISEST Summer Research Program was an amazing experience that I would suggest to anyone with the smallest inclination to pursue something in the sciences. The knowledge and experience I gained from this summer was incomparable. Not only did I gain so much scientific knowledge, but I believe I became more confident in myself and my future decisions. One big thing that I learned was that it is completely all right to switch fields or majors during University; which is a helpful thing to know. So, I would like to thank the WISEST organization for having this wonderful program and Canada Summer Jobs for sponsoring me. I would also like to thank everyone from the Hurd lab for being so nice and helpful. The WISEST Summer Research Program was some of the most interesting and valuable weeks I've ever experienced and I'm very grateful I got to go through this experience.

# Taylor Huber

**Supervisor:**  
**Dr. Catherine Chan**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsors:**  
**Canada Summer  
Jobs, Beta Sigma  
Phi**

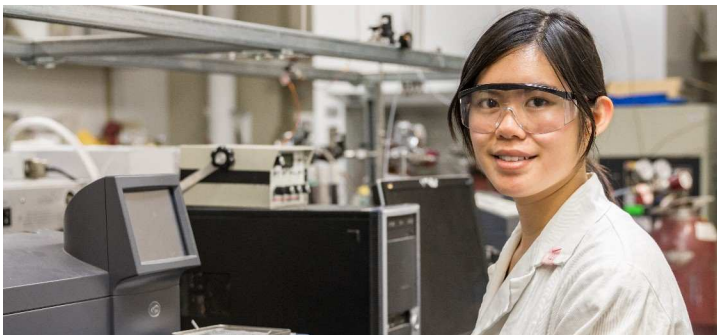


It's amazing how much I've learnt this summer. Thanks to the WISEST Summer Research Program, I now know how to take the right LRT train, how to drive in the big city without crashing, and surprisingly how to find my way around campus. I tell you, for a smaller-city girl, these are true milestones. Through the Professional Development Seminars, I have learned that it is ok to be a little unsure about the path you want to take in life, that there are so many options out there for people interested in scientific careers. The Lunch N' Learn sessions every Friday taught me skills that I plan to use in the future. Networking, writing a report, creating a research poster... We WISEST students are set! But most of all, I have gained invaluable experience working in a university level research lab.

Coming into this program, and knowing that I would be placed in a Nutrition lab, I was honestly a little confused. Didn't WISEST usually place young men in Nutrition research? Did I accidentally click the wrong button in the online registration when asked for my gender? I sincerely hoped that I would get the science lab experience I was looking for when I applied. As it turns out, my placing was intentional and I got just as much scientific work out of the program as all the other students, if not more than I expected. I spent my summer investigating the effects of cheese on lipid accumulation in the livers of pre-diabetic rats. With the help of my awesome supervisor, Zohre Hashemi, I created an Oil Red O solution that I used to stain liver slides. This bright red (and very staining as the poor counter found out) liquid was pipetted to cover the whole piece of liver tissue, but when rinsed out in running water, only coloured the fat globules. This meant that the lipids in the tissue were easy to identify when viewed under a fancy photo-taking microscope. I was so worried I was going to break the thing! We took around thirty pictures for each of the eight samples, and using a program called ImageJ, as well as good old Microsoft Excel, I quantified the percentage area of the tissue that was fat. ImageJ was an interesting program to use, as was GraphPad Prism, the program that analyzed our data. Coming into this program, I had little to no computer experience, and I'm happy to have gained those few extra skills. During the program, I also got to watch tissue collection from Sprague-Dawley rats a few times. This was fascinating as I am considering veterinary medicine as a career. Making diet for the rats was also something I greatly enjoyed about my experience. It was a kind of like baking! There were a few boring, albeit necessary, days spent reading past research, but the super interesting activities that occupied the majority of my time definitely made up for it.

Overall, I leave the WISEST Summer Research Program with new-found confidence, competitive pipette skills, great memories, and so many new friends. On the first day of WISEST, I remember seeing the huge line of excited high school students and thinking to myself, *how am I ever going to get to know all these people?!* Contrary to my earlier beliefs, I have talked to almost all of the WISEST students thanks to all of the social activities provided to us. Sharing similar passions to around sixty people your age really makes for lasting friendships! I want to thank WISEST for providing me with this opportunity, and for accepting the application essay I spent way too much time on. To Dr. Chan, Zohre and everyone in the lab, thank you for being so welcoming and open to my questions and inexperienced fumbling. Special thanks to Beta Sigma Phi and Canada Summer Jobs for providing the funding for this unforgettable experience.

# Serena Lam



**Supervisor:**  
**Dr. Rajender  
Gupta**

**Department:**  
**Chemical and  
Materials  
Engineering**

**Sponsor:**  
**Canada Summer  
Jobs, SPECET**

When I first heard about Women in Scholarships Engineering Sciences and Technology (WISEST) from my Physics teacher, I instantly knew that this program was for me. I hoped that through this research program, I could have a better idea of what I want to do after high school, and gain lab experience to help me prepare for university. After I found out that I got accepted into WISEST, I was extremely excited, but I was also worried that I would be unable to meet the expectations of my supervisor since I have only taken Grade 11 courses. However, my supervisor and Principal Investigator helped me a lot in understanding the concepts and procedures of the project, so it was easier for me to learn. I am very fortunate to be exposed to complex analytical machines that not many people get a chance to operate.

During my six week internship at the University of Alberta, I was placed in the Department of Chemical and Materials Engineering, and I was working with coke- formed from coal after treated under high temperatures. My research project involved measuring coke's weight loss in response to high temperatures, and determining the coke sample's surface area to study how these properties affect coke strength. Our objective was to determine which properties would create the strongest coke, so it could efficiently be used to make iron or steel without the need to constantly add new coke. I understand that weaker coke samples lose more weight, whereas stronger coke samples lose less weight. Through this research, I learned that precision is crucial. Everything has to be done correctly and carefully (following standard operating procedure), even the tiniest detail makes a huge difference. Before I entered into this lab, I've always thought that working in the lab would be challenging especially because I was still a high school student, however it turned out to be a tangible task for me.

WISEST is a great program that offers a once in a life time opportunity for Grade 11 students entering Grade 12. This program not only gave me experience in a lab, but there were also Professional Development Seminars and Lunch n' Learns that helped us become familiar with the campus, and learn lifelong skills. My favorite session was the Networking Fair, where I got to interact with different people in different professions. Through this session, I learned that many professionals did not know what they wanted to do when they first started, so it is alright to be uncertain. I am glad that I had the opportunity to be part of WISEST because I have become much more confident in my own abilities. It taught me to believe in myself and not to hold myself back if I had any questions. Over the past six weeks I learnt how to communicate with professors, create a research poster, and present my research to others.

I would like to thank WISEST for giving me this invaluable experience, and giving me the opportunity to make new friends that share the same interests as me. I would like to thank Dr. Deepak Pudasainee, Sania Tasnim Basher (MSc student), and Professor Rajender Gupta for letting me contribute to the lab and for understanding that there are many things that I still haven't learned yet. Also, they helped me prepare for the poster presentation by holding a practice session with the research team, they gave me advice on what I can improve on and things I did well. Lastly, I would like to thank Canada Summer Jobs and SPECET for sponsoring me, without them I wouldn't have been able to participate in this wonderful program.

# Jenny Le

**Supervisor:**  
**Dr. Jason Carey**

**Department:**  
**Mechanical  
Engineering**

**Sponsors:**  
**Canada Summer  
Jobs, Faculty of  
Medicine &  
Dentistry**



Surprisingly, I was never really interested in math or science when I was younger – mainly because I was not yet exposed to much hands-on experimentation or the creative side of science. It was only when I started high school that I genuinely became interested in math and science after taking courses that went beyond simple memorization and punching numbers into a calculator. When I stumbled upon the WISEST website one day, I knew that I wanted to be in the Summer Research Program. I had no idea what research was like before I entered the program, but I had high hopes that I would leave after six weeks with a better understanding of university research and of where my passions in science lie.

During my time at the University of Alberta, I was working in the Department of Mechanical Engineering under Dr. Jason Carey and my supervisor, Nathaniel Maeda. I developed a motion segment model of the lumbar spine by taking computed tomography (CT) scans and converting them into a solid model that I could run simulations on using the program Ansys. Using simulations to apply loads to the spine model, I was able to compare the range of motion that my model moved, in degrees, in comparison to another model commonly referred to in spine biomechanics. A better understanding of the biomechanical response when forces are applied to the spine can help orthotists effectively apply a brace for scoliosis patients.

Not only did I learn an endless wealth of information about spine biomechanics and computer software in the lab, I was also given the opportunity to tour various labs on campus to keep me busy while the time-consuming simulations were running. My supervisor arranged for me to see multiple engineering labs in action, ranging in areas from orthodontics to composites. Although it may seem like all of my time was spent with my research team, I was exposed to new knowledge through WISEST Professional Development Seminars and Lunch 'n' Learns. Through these sessions, I was able to expand my professional skills and gain confidence in pursuing a field that is underrepresented by women. I had the opportunity to meet other WISEST students at the Social Science Challenge, a friendly competition where we had to build a hydraulic system that could pick up and pour a cup of water. At the U of A Q&A, I had the chance to ask current undergraduate students questions about university life. As someone who is interested in a broad range of fields and is horribly indecisive, it was comforting to learn that it's totally normal to switch programs. The WISEST Summer Research Program was everything I had hoped for and more. I am no longer hesitant about the prospect of becoming a researcher after this summer experience. I would like to thank the University of Alberta Faculty of Medicine & Dentistry and Canada Summer Jobs for sponsoring my placement and WISEST for offering me this opportunity. I would also like to show my appreciation and gratitude to Dr. Jason Carey for allowing me to work in his lab and Nathaniel Maeda, my supervisor, for welcoming me in the lab and always being supportive. I would like to thank the others in the spine group, Jason Chan and Omar Sabbagh, for mentoring me and answering my endless amount of questions.

My love for research has only grown with this opportunity, and one day when I have a “eureka” moment and make a discovery that will change the world, I will remember that it all began with WISEST.

# Jenny Lee



**Supervisor:**  
**Dr. Csaba Szepesvari**

**Department:**  
**Computing Science**

**Sponsors:**  
**Canada Summer Jobs, Process Solutions**

Being in the Women In Scholarship, Engineering, Science, and Technology (WISEST) Summer Research Program has been a wonderful learning experience. I applied for this program to gain a greater understanding of how my interests can be applied to the real world. The WISEST program was perfect for me, it fueled my passion for engineering even more. From the Networking Fair to Industry Tours, I was shown the vast amount of options that there are in the engineering fields. The skills that I have learned from the program are skills that I would take with me in the years to come.

During the six weeks, I worked in the RLAI (Reinforcement Learning, Artificial Intelligence) lab under Dr. Csaba Szepesvari and Zach Goldthorpe. The purpose of this project was to create a website that could host RL challenges in a fun way. RL is a type of machine learning that is based off of the reward or regret that the computer environment outputs. I worked on designing the said environments that people will be testing their learning agents on. The learning agent sends an action to the environment and the environment returns with a reward and the state that the environment is in. The goal for the learning agent is to minimize the regret or maximize the reward.

Going into this project I had very little knowledge about writing a computer program but I have learned a lot from my supervisor and the High school Internship Program students working on the project with me. While there were times of difficulty such as, when the code didn't work the way I intended it to; it was all worth it in the end when we uploaded the programme to the website and everything ran smoothly.

The Summer Research Program goes way beyond the lab. Every Monday and Fridays we have Professional Development Seminars and Lunch & Learns that works towards improving skills that would be beneficial to us in the years to come. Amongst all the sessions that were offered, I particularly enjoyed the Networking Fair. It was a lot fun talking to different professionals, even if they were not in the field that I am interested in they still gave good advice on choosing a future career path. It was a wonderful experience learning how to talk to professionals. Another event that I really enjoyed was the talk given by Engineers Without Borders. Through that presentation I learned a lot about what the organization does, ways that I can get involved, and about engineering in general. Before the talk I had no idea that you could specialize in over 40 types of engineering.

WISEST has really helped me develop the skills that are needed in university and in the workplace, such as how to make a research poster and how to write professional reports. I learned much from this program and am grateful to have had the opportunity to participate in it. Walking out of WISEST I feel more confident and more prepared for university and beyond. Hence, I would like to express my thanks to the people who have made this summer so memorable. First I would like to thank the WISEST team for their hard work and organizing the events. I would also like to thank Dr. Csaba Szepesvari and Zach Goldthorpe for supporting me throughout the program, along with Process Solutions for their gracious contribution that made this learning experience possible.

# Kevin Li

**Supervisor:**  
**Dr. Catherine Chan**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsors:**  
**Canada Summer  
Jobs, Faculty of  
Science**



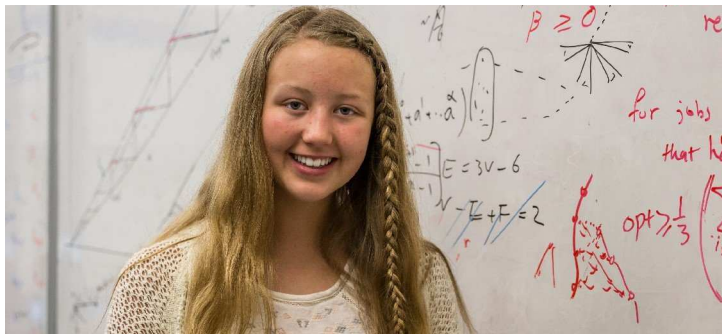
My WISEST application was inspired by word-of-mouth and the desire to fill up my impressively vacant summer. Not wanting to endure another month of schooling, it seemed like the perfect way to use my break productively and educationally. I tried my best to keep an open mind with no expectations for the program, but in spite of this, the summer research program exceeded any expectation I could have possibly had. The opportunities presented to me, whether it be through the exploration of scientific industries or the ability to network with role models of varying professions, have truly changed my perspective of research and has opened my eyes to the many paths available.

While working under Dr. Chan's lab, the purpose of my work was to investigate positive effects of the Pure Prairie Living Program, a lifestyle intervention, on the health of people with type II diabetes. My job was to find these benefits and to see if they were of any significance. When I first heard that I would be doing diabetes research, I was incredibly excited. Having family affected by the condition, I was happy that my work could directly benefit those I care for. However, upon hearing that it was primarily statistics-based, I was worried that I would feel disengaged, seeing only number after number for six weeks. However, my concerns were quickly and entirely reversed, and I soon found myself incredibly invested in the project, waiting in suspense for the appearance of a t-stat on excel. Through this experience, I learned that involvement in research doesn't have to involve white lab coats and microscopes, or clinical trials; it can also be through an analytical standpoint. Even after data collection, there are countless questions to be asked and (hopefully) answered. Through WISEST, my knowledge and understanding of research and its methodology has increased tremendously in ways I would have never expected.

One of the most valuable parts of WISEST was the Lunch 'n' Learn and Professional Development sessions hosted for students each week. I was able to develop and hone communication skills, and with the ability to present information effectively under my belt, I feel more prepared to tackle similar projects that may appear in the future. The industry tour and networking session gave me a chance to hear valuable advice from role models and a more in-depth look into various career paths that I perhaps never would have considered. My plans for the future seemingly veered towards the life sciences, with engineering a complete afterthought. However, after actual exposure to what the career holds, I am inspired to explore STEM fields more carefully in places I would have never before. I am grateful to have heard from people of very diverse experiences and perspectives, and am now sure of one thing: The path to success is often long-winded and different for every person.

I came into WISEST hoping for work experience in a field that I am passionate about, and came out with more than I could have imagined. Now, I can present myself professionally, run statistics in my sleep, and recite the typical usage, dosage, and frequency taken of over 20 prescription medications. Most importantly, I have learned that research, while oftentimes slow-paced and unexpected, is one of the most rewarding careers a person can pursue. I would like to thank Dr. Fatheema Subhan, Dr. Catherine Chan, and all members of Dr. Chan's lab for their guidance and aid throughout the summer. Of course, I am incredibly grateful for the sponsorship from University of Alberta Faculty of Science and Canada Summer Jobs. With their support, I was able to transform my summer into something truly special.

# Delainey Lindstrom-Humphries



**Supervisor:**  
**Dr. Ryan Hayward**

**Department:**  
**Computing Science**

**Sponsors:**  
**Canada Summer  
Jobs, Faculty of  
Science**

I have always had a passion for all of the different sciences including physics, biology and chemistry. Everytime there was a chance to experience something new I would jump on the opportunity to learn more about my favourite fields. The struggle that I face as a lover of science and a high school student is trying to determine what direction to head in such a vast world of science that is full of so many different fields for both university and the rest of my life in the real world. For me, science is my obvious career choice but I did not entirely know what working in science would mean, so when I heard about WISEST and the summer research program (SRP) I knew it was exactly the program I was looking for.

WISEST and the SRP support diversity in scholarship, science, engineering and technology where there is gender underrepresentation. When I got the call saying I was accepted into the SRP I was overjoyed. This was my opportunity to explore what having a career in scientific research is truly like and to meet people who share my passion for science. This excitement quickly turned into panic when I was told that my placement for the summer would be computing science, one of the only science fields that I have never been involved with. On the first day I was incredibly nervous to meet everyone and see where I would be spending the next six weeks, but I quickly realized that everyone else was just as nervous, so I was able to make friends quickly. I was very fortunate to be placed in a lab with two others girls who also knew nothing about computing science and when I met my lab supervisors I became super excited.

For my research project I was creating and analyzing a random search algorithm for a board game called hex. I was also analyzing how humans make decisions in hex and then related my findings to how we could improve a computer search algorithm to be similar to how a person chooses a move in hex. This will provide some assistance to the rest of the hex research team because knowing how humans make decisions can help them implement similar search strategies for their computer program, which they are trying to develop into the best hex player in the world. In order to conduct my research I had to learn how to code, something that went from impossible to manageable with the amazing help of my supervisors who taught me both the basics of using the coding language python and then more difficult python commands. Over six weeks I made and analyzed a survey about how humans make decisions in hex and compared these results with those from my randomized computer. My program also developed throughout the program from a simple board made out of underscores to a full graphical hex board that allowed the user to play against my randomized computer hex player.

As well as research the SRP provided me with an opportunity to gain new skills through many different lunch and learn sessions as well as professional development seminars. My favorite seminar was the social science challenge where I collaborated with my team to create a hydraulic press capable of lifting a cup full of water. Working with other students who loved science as much as I did made the task even better then I had anticipate.

I would like to thank my sponsors Canada Summer Jobs and the Faculty of Science for funding my WISEST opportunity as well as the entire WISEST team for an opportunity I will never forget.



# Eva (Jiayi) Liu

**Supervisor:**  
**Dr. Suzanne**  
**Kresta**

**Department:**  
**Chemical and**  
**Materials**  
**Engineering**

**Sponsors:**  
**Canada Summer**  
**Jobs, Syncrude**  
**Canada Ltd.**



I was eager to join the WISEST Summer Research Program (SRP) because I was looking for something to broaden my horizons. I have always heard about all these science based professions that a person could potentially have a career, yet I lacked the knowledge of what work in these fields would actually look like. This was an opportunity for me to burst outside of the bubble of schooling, and to expose myself to the advances that are made every day; things that I sometimes forget about in the midst of homework and tests. An opportunity to not only do all of this, but to also be able to actively participate in cutting edge research appealed to me right away, and as the program draws to an end, it is a chance that I am glad I took.

For the past six weeks, I worked in the Department of Chemical Engineering at the University of Alberta studying oil sands upgrading. We tested the effects of different mixing parameters on the settling rates of solids and water in bitumen froth (oil). The bitumen is mixed with Naphtha (a thinner hydrocarbon mixture) to decrease its viscosity. It is then blended with demulsifier to encourage the clumping together of the solid particles and water droplets. When these unwanted particles join, they settle faster into the bottom layers of the vessel, leaving the top layers more purified and available to be further processed in industry. I worked with the Karl Fischer water content analyser and microscope to observe the characteristics of the water droplets and solids during mixing, as well as help set up and run the experiments. I had my first experience with very expensive machinery that refused to work, plus learned how important cleaning up and paper towel were to a lab. I went into this program having no idea that the study of mixing even existed, it sounded to be like something limited to blenders and smoothies. But it was enlightening to see how a small detail that most of us take for granted can have such a profound effect on a multi-billion dollar industry. It affects everything to the cost efficiency of a company, to the environmental impacts of the waste disposal of oil and gas.

I learned about the patience and perseverance it takes to work in a lab. At first, the amount of repetition and general uncertainty in regards to conclusions surprised me. But I quickly realized that once the bigger picture is considered, every small detail observed becomes of significance, and the people in my lab were able to stay enthralled in the research because they were genuinely interested in creating the optimal conditions for bitumen clarification. I began to enjoy every small conclusions and possibility as being one-step closer to understanding the entire problem. But what made this program the enjoyment it was for me went beyond my research, I have met some inspiring, intelligent and kind fellow WISEST students whom I am certain I will remain friends with in years to come. I have also had the opportunity to interact with motivated people working in careers that I never have really considered but found interesting through the networking fair. I was also able to successfully navigate through said fair due to the Art of Networking session WISEST held the week before at the Friday Lunch n' Learn.

I would like to thank Dr. Suzanne Kresta, Colin Saraka, and Anna Xu for having an endless amount of patience and creating this uniquely provoking experience for me, their mentorship and advice were invaluable. I would also like to extend my gratitude to everyone at the WISEST office who worked so tirelessly behind the scenes to ensure that everything runs smoothly, as well as Syncrude and Canada Summer Jobs for their generous sponsorship.

# Helen Ma



**Supervisor:**  
**Dr. Maria**  
**Cutumisu**

**Department:**  
**Educational**  
**Psychology**

**Sponsors:**  
**Canada Summer**  
**Jobs, Alberta**  
**Education**

When I heard about the Women in Scholarship, Engineering, Science and Technology (WISEST) Summer Research Program from my teacher at school I was compelled, drawn in by this siren song of an opportunity. I have always been intrigued by science, and ongoing research, but I never even dreamed that I would be a part of it. I honestly never saw myself fitting in anywhere in a science field, however I simply couldn't resist the opportunity that WISEST presented. When was I ever going to get another opportunity to explore new fields, for only six-weeks? To expand my horizons and step out of my comfort zone? It was a perfect fit. And now that it has come to a close, a life changing experience.

I entered into the Program hoping to work in a field that I was at least some-what familiar with, perhaps biology or math, but I was really thrown for a loop when I was put into Educational Psychology. In my lab I worked with Dr. Maria Cutumisu, my project was to create a module, or changes, to the game Minecraft that targeted computational thinking skills. These games would hopefully be used in later research, to analyse exactly how useful computer games are at increasing knowledge acquisition. Initially I was at a loss as my project seemed to involve a large amount of computer programming, a subject I never even broached in school. I was stressed about how well I could do my job, and if I could contribute anything at all. Then I realised how much of research is about asking questions, wondering, and learning. I also came to depend on the more experienced people in my lab for support and guidance. For the six weeks I worked on reading research papers, and coding my module. I learned a lot, not only about my field, but about research in general, and about life at the university. WISEST really did push me out of my comfort zone, just as I wanted.

Not only was the research itself wonderful, but the WISEST organized activities were both eye opening and informative. I really enjoyed the Social Science Challenge, which allowed me to get to know my fellow WISEST researchers, the Exploring U of A Research, during which I was able to visit the U of A greenhouses and their unique plants, and the U of A Q&A, which was a lovely opportunity to get my questions about university life answered by real university students. WISEST did such an amazing job providing us students with a diverse spectrum of activities, and effectively showed us as many facets of university life and research as possible. There were so many amazing experiences this summer, that it would be impossible to fit them all onto this page. The best part were the real world applications of all the Lunch n' Learns, which slowly answered many of the questions I had about university that kept bubbling inside of me.

These past 6 weeks have been filled with ups, downs, and in-betweens, and that's what made it so amazing. I learned the responsibility of having a job, as well as the importance of asking questions. I learned about the nuances of university life, and about the diverse opportunities out there. WISEST has helped me change my view of the future, from an impending end to childhood, to a pathway to a million new opportunities. A humongous thank-you to my sponsor Alberta Education for giving me this amazing experience. Thank you as well to my supervisor, fellow researchers and the WISEST staff for opening my eyes and mind. I will never forget this summer.

# Ally MacInnis

**Supervisor:**  
**Dr. Michael Serpe**

**Department:**  
**Chemistry**

**Sponsor:**  
**NSERC**  
**PromoScience**



Coming from the far north, Yellowknife, I have always had a passion for science but never the means to explore it. So when I heard about WISEST's Summer Research program, I was overjoyed. WISEST allowed me to pursue my passions for chemistry while experiencing life as a independent student.

This summer I had the pleasure of working in Dr. Michael J. Serpe's analytical chemistry lab under the supervision of Yongfeng Gao. Here, I learned how to synthesize differently charged polymers, slow the rate of a drug delivery system and operate a thermal evaporator. In the future our drug delivery system will be used to shrink tumors in cancer patients. So it is extremely important that the drugs do not disperse too quickly. We used polymer layers to contain drugs and sandwich them in between two layers of gold. In order to plate the gold onto our slides we had to use the thermal evaporator. Not only did I learn the specifics of my project but also how to work with a team of professionals and how to operate in the lab setting.

In addition to working in my lab I got to attend several professional development seminars. In these sessions I learned how to make an effective presentation and how to network in a scholarly environment. These skills will not only benefit me this summer but throughout the rest of my life. I can now confidently walk into a room filled with professors and employers and start up a conversation. Furthermore, we had the opportunity to meet leaders in academic, business and industry sectors. Personally, I visited Gilead, a biopharmaceutical company. During this tour I got to see how advancements in a lab can be blown up on an industrial scale. This highlighted the fact that the scientific field is extremely vast and made me consider careers I did not even know existed.

Not living in Edmonton meant that I would be stay in residence. At first I was extremely nervous but I quickly adjusted to my new environment and created lasting friendships. I know that in a years time when I am back on my university journey I will do so with an newly acquired set of life skills including how to budget, how to live with roommates and how to cook for myself. Residency also gave me freedom to exploring the city of Edmonton.

I want to extend my heartfelt appreciation and gratitude to all those who provided me with this once-in-a-lifetime experience. To my fabulous sponsor the Natural Science and Engineering Research Council of Canada (NSERC PromoScience); and to the incredible WISEST team for organizing and running this summer program. I would also like to think everyone at the Kings University and my resident advisor Michée Hamilton for providing me with a safe and accommodating environment for the summer. Lastly, I would like to thank to Dr. Michael J. Serpe, Yongfeng Gao and the entire Serpe group for welcoming me into their family.

# Sarah Mah

**Supervisor:**  
**Rajender Gupta**

**Department:**  
**Chemical and  
Materials  
Engineering**

**Sponsor:**  
**Canada Summer  
Jobs**



The Women in Scholarship, Engineering, Sciences and Technology (WISEST) program has been an eye-opening experience to the endless opportunities of career options after high school. When I first heard of this program, I instantly knew that I wanted to apply for this program. WISEST not only allows Grade 11 students to gain first-hand experience in a research lab and apply the knowledge learnt but it also promotes women empowerment and gender equality. In WISEST, the past six weeks has been truly extraordinary as I have been exposed to new opportunities that opened me up to new career options. By working in a university research lab with analytical equipment, I was able to learn what it is like to be in university and more importantly, what it is like to work with a team of talented collaborative people.

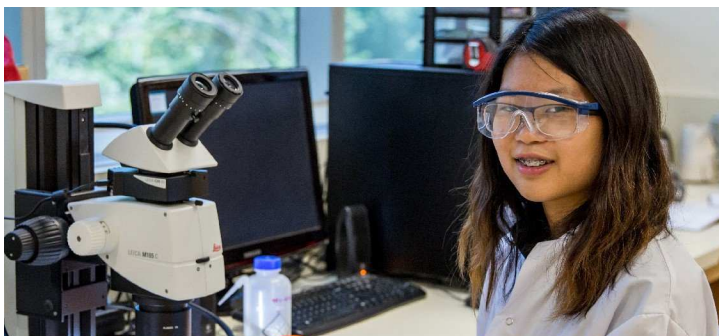
This year, I was placed in the Department of Chemical and Materials Engineering. The research took place in Professor Rajender Gupta's lab under the supervision of Dr. Deepak Pudasainee. My project focused primarily on improving the operational properties of the experimental Underground Coal Gasification (UCG) process. Although coal mining is still used today, it should be reduced due to the negative impacts on the environment and health. By improving the UCG process, we are able to increase the world's coal reserves, decrease greenhouse gases and indirectly reduce the number of workplace fatalities and injuries. During this project, I have learned about the experimental procedure of the UCG process and the different components of the setup. Even though, coal is one of the most heavily used resources, we often don't learn about the importance of coal and its negative impact on the environment. Learning about UCG has been truly incredible as I have gained knowledge on a topic that we don't learn about in high school.

Aside from working in the research lab, the WISEST team has provided us with Professional Development Seminars and Lunch 'n' Learn sessions. They have helped me to develop important networking and public speaking skills. One of my favorite seminars was the Networking Fair because I was able to speak with professionals to gain knowledge about their field and career paths. The fair allowed me to speak with women in careers who are often underrepresented. By listening to their personal experiences, I was able learn invaluable lessons on career options. Because of this session, I was able to step out of my comfort zone and meet new people while learning about the endless possibilities for my future career.

Throughout the past six weeks, I have grown as a learner and was able to reflect on the importance of being patient. Many of the experiments required countless hours of waiting but I realized that the gathering and analyzing of data was the most important part of the process. We also had the opportunity to present our posters to the research team as practice for the Celebration of Research. The saying "it's the journey and not the destination" rang very true to me in these last six weeks.

I would like to thank Canada Summer Jobs for making the WISEST program unforgettable and for sponsoring my position. I would also like to thank Professor Gupta, Dr. Deepak, Md Khan (PhD Candidate) and the other members of the research team for mentoring me and making this experience truly memorable. Lastly, thank you WISEST for providing us with the many different opportunities to learn new life skills. This overall experience has helped me grow as a learner and was an experience that was truly life altering.

# Jessica Mak



**Supervisor:**  
**Dr. Sylvie Quideau**

**Department:**  
**Renewable  
Resources**

**Sponsors:**  
**Canada Summer  
Jobs, Weyerhaeuser**

Before the Woman in Scholarship, Engineering, Science and Technology (WISEST) Summer Research Program, I had never had a job in my life. When I applied I was hesitant, deliberating on whether or not to apply for the program. I was worried I was going to make a fool out of myself, as any inexperienced and awkward teenager would. The encouragement I received from my family and friends, as well as the positive feedback many previous participants had about WISEST, convinced me to apply for the program. It was the best decision I have made so far.

I was placed in Renewable Resources in the Earth Sciences Department, under the supervision of Brittany McAdams and Preston Sorenson. I primarily researched soil, macrofauna and mesofauna, including oribatid mites and earthworms. I collected my own samples with the help of Brittany and ran tests such as pH, bulk density, and moisture content, to determine the properties of the soil samples. The main objective of my research was to test different methods to obtain both earthworm and oribatid mite species and abundance data. In addition, I tested two methods for the collection of earthworms in the field, hand sorting and mustard extraction. The latter method uses a solution of hot dry mustard that irritates the skin of the earthworm, causing them to burrow to the surface. I found that the mustard extraction was more effective on juvenile earthworms, most likely due to their smaller size and surface area, making them more sensitive to the irritant. Subsequently, I also did work with my other supervisor, Preston Sorenson. He taught me the basics of how to use the software, Quantum Geographic Information System (QGIS). The applicability of this program is vast, not only soil researchers use it, but many other occupations including civil engineers and architects.

From WISEST, I gained many new experiences, and improved my technical abilities, and skills in the lab, garnering a greater understanding of the importance and impact of soil on human life. I met many new people and pushed myself to interact with others to establish the fundamentals of networking. WISEST was not only an amazing experience job-wise, it also introduced a plethora of other fields and jobs through many of the Lunch n' Learn sessions. WISEST was truly an irreplaceable experience, as no other program could provide the amount of in-depth insight into fields I have never even heard of, to the teaching factor of very practical and applicable skills that any job would require. The program went well beyond my expectations, and fulfilled many aspects regarding both jobs in general, to university life, opportunities, and social etiquette and networking. The things I learned through hands-on experience could never possibly be taught or learnt through school.

All of this would not be possible the support of my sponsors including, Weyerhaeuser, the University of Alberta, as well as the WISEST program itself. I would also like to thank my supervisors, Brittany McAdams and Preston Sorenson, my principal investigator, Sylvie Quideau, and my lab mate and coworker, Sylyanne Foo. Lastly, I am also extremely grateful to the whole research group, they are one of the many reasons why I had such a fun and positive time during these compacted six weeks. Undoubtedly, my experience would not be the same without them, as they provided a very caring, understanding, and helpful environment and made me feel comfortable and accepted.

# Allegra Martel

**Supervisors:**  
**Dr. Cynthia**  
**Paszkowski,**  
**Dr. Arthur Whiting**

**Department:**  
**Biological Sciences**

**Sponsor:**  
**NSERC**  
**PromoScience**



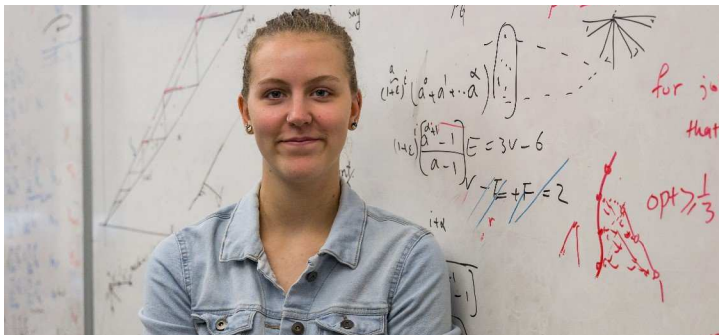
I probably rewrote my WISEST application essay fifteen times all the while driving my mom, my official essay editor, crazy. My essay had to be perfect. Getting into WISEST was something I was determined to do. I really wanted to gain first-hand lab experience, and once I'd gotten in I was ecstatic, but also incredibly nervous. Would my research team like me? Would I be able to fit into a lab environment? Would I mess up? The answer to all those questions is yes. Over the summer I realized that it isn't about perfection or getting it right all the time. What matters is learning, making mistakes, and becoming smarter because of them.

Learning is something I did a lot this summer. You really don't know the extent of your mental fortitude until you are directed to grind bugs into powder to prepare them for Stable Isotope Analysis (SIA). For a sample to be processed through SIA, it must be made into powder, which is how I found myself seated in the lab grinding up Western Tiger Salamander tissue and insects with my tiny scissors, all the while listening to music so I didn't have to hear the disturbing crunching noises that come with exoskeletons being broken. The purpose of this was to gain a better understanding of what Western Tiger Salamanders eat, by comparing the ratios of heavy carbon isotope to heavy nitrogen isotope that are measured through SIA, as every living thing has different isotope ratios depending on what they consume.

Working with the SIA samples was not the only project I assisted with, my main project was focused on Western Toads. Near Fox Creek, Alberta, Secure Energy Services operates a Class II industrial landfill, where non-hazardous hydrocarbon contaminated soil waste is processed. In June of 2013, Western Toads were observed in a surface-water collection pond at the Secure site, along with approximately 40 000 tadpoles. Their presence and successful reproduction prompted an investigation into the use of the facility by breeding toads. Automated recorders were set up at a variety of natural and artificially occurring wetlands in the surrounding area. I listened to multiple sonograms recorded in May of 2015, and identified all amphibian activity found in the records. Throughout the project I learned how to identify the calls of Western Toads, Boreal Chorus Frogs, Wood Frogs, and a few birds from memory. The sonogram information from the various sites I analysed was then compared so we could determine if these toads had a preferred breeding environment. The projects I worked on were all interesting and even though sometimes the repetition proved monotonous, identifying the calls was kind of like being a bird-call or frog-call detective. Making my research poster was my favourite part of the research process. It was extremely satisfying to put together all the data I had been working on and make conclusions based on what I'd found. One of the joys of research is seeing it all come together. All my hard work felt like it was worth it when I looked at my completed poster and was able to say "I did that!".

I would like to thank my research team for helping me along my research journey. Thanks goes out to Dr. Arthur Whiting who answered all my unending questions and patiently revised and offered advice for my poster. I would also like to extend my gratitude towards Dr. Cynthia Paszkowski who showed me that if you are going to do research, be passionate about it. Cindy would happily talk to me about birds and salamanders at any time. Her passion was incredibly inspiring. I would also like to thank NSERC PromoScience for sponsoring my position, and everyone at WISEST who made this such an incredible experience.

# Lexi Nash



**Supervisor:**  
**Dr. Ryan Hayward**

**Department:**  
**Computing  
Science**

**Sponsor:**  
**Canada Summer  
Jobs**

Before hearing about the WISEST Summer Research Program I thought I was just an average person from the small town of Slave Lake; but now that the program is coming to a close, I know that I am much more than that. Working with other people my age in the lab and building relationships with them was definitely the highlight of my summer. Being able to come into the lab every day and work on a project with some of my new friends always put a smile on my face. Over the course of the summer I worked alongside two other WISEST students Alyssa Wong and Delaney Lindstrom-Humphries as well as six High school Internship Program students. We worked on creating a computer program that can learn to play the board game hex perfectly, this can be accomplished using machine learning. Although I personally never got the chance to write a program that uses machine learning myself, I did get to see other programs that utilize it. I did however learn to write a program that can play hex randomly against a human, Even though the program is not intelligent, it is still a big step up from where I was at the beginning of this summer.

Having the chance to work in an environment that I have absolutely no experience in was a very good opportunity for me as I enjoy learning new things. Coming into this program with no background in computing science was a bit scary for me; I thought that I would be surrounded by professionals who had no concern for me or anything that I do. I walked into orientation on the first day feeling apprehensive about all of the possible things that could go wrong, but my nerves were soon calmed when I realized that I was surrounded by people who felt the exact same as me. Everyone there was looking for the same thing I was, an opportunity to learn something new and explore possible career options. Despite just working in the lab there were many WISEST events scheduled for us to attend, many of which were very informative and helpful. A lot of the events were about what we were doing in the WISEST program over the summer such as, Designing a Research Poster and The Art of Networking. Out of the 14 group sessions that were offered my two favourite were the Social Science Challenge, where we were given some cardboard, water, and syringes and told to create a hydraulic arm capable of lifting a plastic cup, and the Networking Fair. The Networking Fair gave us an opportunity to speak to professionals that work in the field that we are working in or are planning to pursue in our future. At first I was terrified to have to talk with professionals about anything but after it got started I felt much more at ease with the environment; it helped me to become more confident in myself and my work. Out of everything that I have learned this summer I think the thing that I will bring back to school and my personal life the most is to be more confident in myself.

After participating in the WISEST Summer Research Program I feel like a better person as a whole, I learned many new things and had a lot of fun while doing it. I know that it would not have been possible for me to be here without my sponsor Canada Summer Jobs. Without them I would have wasted my summer by staying in bed all day and watching TV instead of being a part of something. I would also like to recognize the whole of WISEST for presenting me with this amazing opportunity. Of course I never would have even known about the program if it was not for my amazing biology teacher Mrs. Kenyon, Thank you so much for letting me know about this program and making my summer great because of it.

# Paige Papley

**Supervisor:**  
**Dr. John Shaw**

**Department:**  
**Chemical and  
Materials  
Engineering**

**Sponsor:**  
**Canada Summer  
Jobs, SPECET**



This summer I had the pleasure of being a part of the Petroleum Thermodynamics research team, a chemical engineering lab, through the Women in Scholarship Engineering, Science, and Technology (WISEST) Summer Research Program. They investigate the phase behaviour of bitumen heavy metals and reservoir fluids, and I got to work with binary mixtures of aromatics and naphthenes with heavy n-alkanes while in the lab. I was instructed how to measure and calculate the densities of these compounds, along with the enthalpy. The purpose of the research I took part in is to help establish parameter values for future work in which the research team will try to modify predicted results from present equations of state. Without this information it is very difficult to design efficient and safe processes and process operations.

The entire research and lab work experience was extremely educational and enjoyable. I applied, hoping to gain some insight on what I wanted to take in university and possibly what I want to pursue as a career, but other than that I had no idea what to expect from a chemical engineering lab, I was happily surprised by the amount of new, and interesting topics that were shared. I now have experience working in a real lab with many graduate students and researchers who taught me so much about the research process and what life in the lab is like. Even though I may not have been able to select a career path after these six weeks, I have so much more information that I can use to later on make my decision. I am extremely satisfied with all of the knowledge I now possess in regards to research in a lab, and being a chemical engineer.

In addition to all of the information gained within the lab, I was also enriched by the Professional Development Sessions and the Lunch'n'Learn sessions. They helped me learn more about where science, technology, engineering and mathematics (STEM) education can take me and the opportunities within these fields. They also helped me gain new skills that will be useful in the future that are not subject specific, such as how to give an effective presentation and how to network. My favourite session was the Social Science Challenge. We were divided up into groups of four and told to construct a machine out of cardboard and tape that operated using hydraulics to lift a cup. I really liked this because it was one of the first opportunities to meet and talk to some of the other WISEST students, as well as the entire activity of building. I met a few people that I continued to see and talk to at most of the other sessions. The students had to put their minds to work and create something completely original. I loved seeing the finished products because every single group's was different, yet accomplished the same thing. I found it rewarding to see the results of combined minds and thought it was a good warm up to everything the WISEST Summer Research Program had to offer.

My entire experience would not have been the same without the wonderful people in my lab. Thank you Mildred Becerra, Sourabh Ahitan, Arunima Saxena, Amin Pourmohammadbagher and Dr. John Shaw for allowing me to come be a part of the lab and letting me experience research. Thank you Canada Summer Jobs and SPECET for providing the funding necessary for me to be able to take part in this incredible experience.



# Noor Rizvi



**Supervisor:**  
**Dr. Aman Ullah**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsors:**  
**Canada Summer  
Jobs, Faculty of  
Agriculture, Life, &  
Environmental  
Sciences**

Before summer started I applied to the Women in Scholarship, Engineering, Science and Technology (WISEST) summer research program. I was more than nervous about whether or not I would get in, however, around the beginning of June I'd gotten the call from the WISEST office stating that I had been accepted into the program. I was more than just excited, especially imagining what could possibly happen in the lab.

Entering my first day in the lab was a far different experience than what I had imagined. In my six weeks of research I was in the lipid chemistry labs of Dr. Aman Ullah. Not even orientation had properly given me a good idea of what it would be like to work in a research lab and that's why I think that working as a WISEST student researcher is such a great life experience. My six weeks of research was focused on making an amphiphilic block copolymer out of Canola Fatty Esters (CFEs) and Poly (*N*, *N'*-Dimethylacrylamide) (p-DMA). The making of CFEs was probably the most daunting task out of all the of the work I was set out to do. Approximately four or five weeks out of the six weeks of my summer research was composed entirely of trying to successfully make the CFEs. The reactions themselves didn't take very long, but to ensure a clean and pure product we had to purify the product after each consecutive reaction. This could take a time ranging between just a few hours to a few weeks. By the end we were successful in obtaining the purified CFEs and p-DMA.

But, this is not the only thing that I did during those six weeks. I attended a variety of amazing WISEST held events which gave me a perspective on the industry, got me closer to role models in nursing and engineering, as well as introducing me to research fields that I had no idea even existed. The WISEST event I found to be very interesting was the social science challenge, which was a competition to build the best hydraulic system you could out of cardboard, tape and other rudimentary objects. My group was one of the two who had won the competition and it was an extremely fun event, only second to the celebration of research. The celebration of research was the most fun part of my six weeks of research. There I presented on what I had learned to the general public and also MLAs and MPs. What made it most memorable was talking to everybody and going on my final adventures with my research fellows around the campus, taking photos and enjoying ourselves. Not to worry, these lasting friendships will come together once again.

WISEST was a once in a lifetime experience to get a first glance at future job prospects, especially in areas which are less traditional to gender-roles. The summer research program gave me insight to life at the university, the culture, the inner-workings and some of the work that goes on within the campus and abroad. I have learned so much throughout this and I cannot wait to return to the university for my undergrad. I would like to thank the Faculty of Agricultural, Life, Environmental Sciences and Canada Summer Jobs for funding. I would also like to thank Dr. Ullah, Dr. Muhammad Arshad and my research team for making this such a memorable experience. Last but not least, I would like to thank WISEST for affording me the experience of researching, networking and creating lasting friendships.

# Rayeann Saitz

**Supervisor:**  
**Dr. Aman Ullah**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsors:**  
**Canada Summer  
Jobs, Faculty of  
Medicine &  
Dentistry**



I heard about the Women in Scholarship, Engineering, Science and Technology (WISEST) Summer Research Program from my career counselor at my school. I was immediately interested in attending, everything that I read about the program intrigued me. I come from a very small school in a town you have probably never heard of before. There are not many opportunities to learn about different fields of science or figure out which one I am truly interested in. This program has opened up my eyes to the world of science!

For my project I was working on modifying lipids to create an amphiphilic copolymer for drug administration. I was working with another WISEST student to do all of my experiments. We had to create both the hydrophobic and hydrophilic part of our copolymer. The hydrophobic part of the copolymer was a monomer made from high oleic soybean oil. This process was very time consuming, since we were working on getting comfortable with lab equipment and practices as we were conducting our research. Once our hydrophobic monomer was produced we created the hydrophilic part of our copolymer, which was poly-NiPAM. When both of the components were made it was time to combine them to make the block copolymer. I was immersed in a real chemistry lab every day of my Summer Research Program experience, and I was surrounded by people that were all doing research using lipids. It was an amazing opportunity to be acquainted with lab practices and the way research is conducted.

While I really enjoyed the project I was working on, the weekly Lunch n' Learn sessions and the Professional Development seminars were one of the best parts of my experience. The first professional development seminar that took place was a social science challenge on the first Friday of our Summer Research Program experience. We were put into groups and told to make a hydraulics system that could either pick up a glass or pour water out of one. My group decided to design a system that could pour water and we successfully completed the task. It was great that a group of girls that had just met could work so well together to solve the problem at hand; we all had plenty of ideas that contributed to our end result. Although creating our system and watching it work was terrific, I would have to say that my favourite part of the seminar was seeing what everyone else had created and the different solutions everyone had for the same problem. I could tell that everyone in that room had a very bright mind yet they were all unique.

Overall, learning about research in different types of STEM fields and meeting many people with similar aspirations to me was wonderful. I support all that the WISEST program stands for, from encouraging diversity among the fields of STEM fields to allowing young students to be introduced to what life could be like after high school. I would like to send a special thank you to my supervisor, Dr. M. Arshad, for helping me with my research this summer. Also, to my principal investigator, Dr. Aman Ullah, for providing me an opportunity to work in his lab. My experience in the lab was fantastic, I never thought I could learn so much in just six weeks. Lastly, this experience would not have been possible if it hadn't been for my sponsors, the Faculty of Medicine and Dentistry and the Canada Summer Jobs program. I loved the WISEST program and I would definitely recommend anyone interested in STEM to apply for it.

# Jheel Shah



**Supervisor:**  
**Dr. Diana Mager**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsor:**  
**Canada Summer  
Jobs, Faculty of  
Nursing**

I knew from quite an early age that I wanted a career in the sciences but what I wanted to do exactly was an unknown. I would grasp any opportunity that offered more knowledge about the different careers paths and hands on experience. When I heard about the WISEST program I knew I had to apply because it was a golden opportunity to help define my future. The main thing I looked forward to was gaining the experience of actually what it was like to work in a lab.

I remember the first day of the program I was so scared because I feared that I might not be smart enough for my project or that I might mess up everything. I had no idea what to expect from my supervisors because nutritional research was something unknown to me. All my fears were eliminated as soon as I meet my supervisors and Principal Investigator. They were all so friendly, inviting and understanding.

My project was focused on celiac disease and the impact it has on the quality of life of people diagnosed with celiac disease. The gluten free diet must be followed as it is the only cure and if it isn't followed it could lead to severe health problems later in life. The study targeted the impact of celiac disease on children and adolescents compared to those who did not have celiac disease. The data had already been collected by the means of questionnaires and grocery receipts from the past month. The questionnaires were a way of understanding the emotional and physical impact of celiac disease whereas the receipts were collected to better understand the nutritional impact.

My job at the lab was to help input the data collected from the questionnaires according to the answers given by the participants. The receipts were collected to estimate the amount of folate, a micronutrient, is found in gluten-free foods. This nutrient is important especially for childbearing women. Another aspect looked at was the financial impact because gluten-free foods are more expensive compared to gluten-containing foods. For this we decided to visit three local grocery stores to collect the prices and nutritional information of gluten-free foods compared to gluten-containing foods. This did earn us a few suspicious looks from other customers and employees as we took pictures of food products.

Along with data collection and imputing we got to experience patient interaction. Throughout the six weeks we got to observe our supervisors conduct patient study days for another study based on the effect of vitamin D on chronic kidney disease and diabetes and also study days for a study on Prader-Willi Syndrome (PWS) and Non Alcoholic Fatty Liver Disease (NAFLD). This allowed me to understand more about how a patient information is collected and experience the interactions first hand. The highlight of my placement at the lab was the part when I got to be a part of the study on PWS and NAFLD being conducted. This allowed me to experience both the roles of the patient and understand more about the actual procedure from my supervisor.

The learning sessions and tours organized by the WISEST team added to the experience and made it even better. I got to visit research facilities on and off campus, meet and interact with some amazing people, make new friends and learn valuable skills. I would like to thank my supervisors, Principal Investigator, sponsors and WISEST for giving me the opportunity to gain this knowledge and unforgettable experience.

# Tasmia Sheikh

**Supervisor:**  
**Dr. Maya L**  
**Evenden**

**Department:**  
**Biological Sciences**

**Sponsors:**  
**Canada Summer**  
**Jobs, Rotary**  
**Glenora**



The word “research” was one that I didn’t quite grasp the meaning of until starting the WISEST (Women in Scholarship, Engineering, Science and Technology) Summer Research Program. Conducting experiments, developing methodologies, collecting results, analyzing results, doing research *for* your research – all these were things I had to learn and implement over the length of this program. There were days that were daunting, procedures that were tedious, and data that just wasn’t making any sense. But through it all, there was something that sparked in me; inspiration, curiosity and a humble craving for a future in research.

All my nerves and doubts disappeared once I was welcomed into Dr. Maya Evenden’s entomology lab. One of the interests of the lab is chemical ecology, and how it plays a role in controlling pest species. My supervisor, Ronald Batallas is conducting a mark-release-recapture (MRR) study on armyworms and cutworms, several moth pest species that affect canola and cereal crops in the Canadian Prairies. Monitoring these economic pests has been achieved through the use of sex pheromones – chemical volatiles produced by female moths to attract mates. However, pheromones are species-specific and attract only male moths, resulting in no depiction of the female population and inconvenience in terms of trap catches and lures. Feeding attractants, based on fermented sugars (acetic acid and 3-methyl-1-butanol) and floral compounds (phenyl acetaldehyde), is an alternative tool he is investigating to attract both sexes of multiple pests. In order to evaluate the efficiency of pheromone and feeding attractants, it is important to measure the attraction radius of these lures by marking insects, releasing them, and recapturing for inspection. My research looked into the use of colour oil-soluble dyes, an affordable, easily-incorporated method to internally mark moths. I reared the true armyworm larvae on five treatments of an artificial diet based on pinto beans and coloured dyes diluted in cottonseed oil (the dye solvent) from hatching until pupation, recorded as developmental time. Pupal weight was recorded and analyzed as a proxy for adult fitness. Through the use of a 1-way ANOVA (analysis of variance), we were able to determine that colour oil-soluble dyes show no unfavourable side-effects, proving to be a useful technique in MRR studies.

Through the course of the WISEST program, I participated in weekly Professional Development seminars and Lunch n’ Learns. I learned skills like networking, designing research posters, and giving effective presentations. The event that stuck out the most for me was our Research in Action Industry Tour, in which I toured four research-based companies working out of TEC Edmonton. It was so eye-opening to see the numerous opportunities for people passionate about science; a single company like Exciton Technologies (silver-based wound care materials research and development company) is run by people from all walks of life – chemists, microbiologists, engineers, and even business graduates. As I prepare for our Celebration of Research, I would like to extend my utmost gratitude and appreciation to Dr. Evenden, Ronald Batallas, and all those in the Evenden lab for their immense support these past six weeks. Not only were they always quick to come to my aid in everything from laboratory procedures to locating forceps, but they also created a friendly environment that allowed me to reach my full potential in this program. Thank you to Rotary Club of Edmonton Glenora for sponsoring me; this project would not have happened without your generosity. Finally, I would like to thank the WISEST team and our coordinators, Rosie and Michée, for all their hard work and commitment in making these past weeks the best six-weeks of my life.

# Nadiya Shore



**Supervisor:**  
**Dr. Diana Mager**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsors:**  
**Canada Summer  
Jobs, Beta Sigma  
Phi**

I, like many other 6 year olds, wanted to be an astronaut when I grew up. However, once I watched the Apollo 13 movie and saw Tom Hanks almost die in the hostile vacuum of space, I decided to admire the universe from a further and safer distance. My fascination with the cosmos soon developed into a love for astrophysics and then formed into an idea of what I wanted my career to be. This image was very far away and fuzzy, and I wasn't sure what it would require, or if I was even able to go down it. However, this road has been illuminated by the WISEST program, along with several other wonderful paths I would have never even considered.

During this program, I have had the chance to work in a Nutrition lab with Dr. Mager and her wonderful team. In those 6 weeks, I have been involved in several studies around the lab looking at liver disease, diabetes, body composition and several other subjects. I especially enjoyed the opportunity to work with the pediatric patients and be involved in the study process. The main study I was attached to was looking at the quality of the gluten-free diet for individuals with celiac disease, the inflammation of the small intestine in response to gluten, which leads to the malabsorption of nutrients. I focused on whether commercially available products contained an adequate amount of folate, which is an essential micronutrient, especially for pregnant individuals.

My lab may not have been in the field of my future career, but I obtained a vast amount of skills that would apply to any field I were to pursue. The fantastic women in my lab were there for me the whole way, providing endless support. They taught us about the science of their fields, how to operate computer programs, tips about university life, and about life in general. Just by being in the lab and interacting with the students, I was able to share in the discipline and creativity that is required for a strong research team.

The sessions set up by the WISEST team provided us with even more skills for our careers. We were taught how to write professional reports, create university-level posters, how to establish ourselves in a science community through connections, and about the countless other opportunities that are out there for us. From our labs and the sessions set up by program, we now have a vast array of tools available to us once we reach the world of postsecondary. I will return to high school with a new sense of confidence as well as a greater determination in my academic studies.

When applying to this program, it was with the intent to expand my scientific knowledge and give me the boost I needed to succeed. While that was achieved, I also learned a lesson about the science community: you need connections. To succeed in this field you must be intelligent and creative, but you also need to be able to create relationships. The networking sessions set up by the program encouraged the development of our future pursuits and connections.

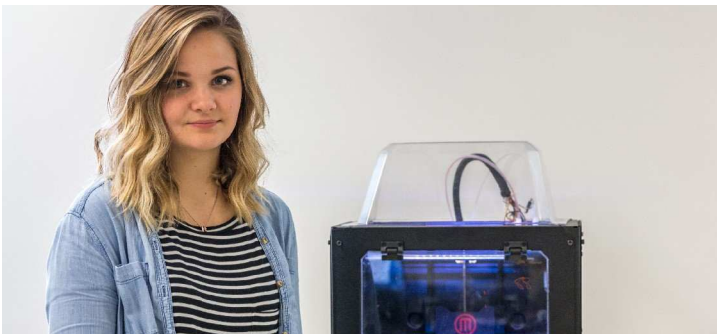
I want to thank everyone who enabled me these past weeks including Beta Sigma Phi for my funding, my lab for their support, and the WISEST ladies for their continuous investment in our success. I feel so grateful for the generosity, mentorship and fellowship given to me by the women in the program. My goal is to return the favour and pass on this support to other young aspiring individuals as I move through my career.

# Teagan Smith

**Supervisors:**  
**Dr. Leijun Li, Dr.**  
**Patricio Mendez**

**Department:**  
**Chemical and**  
**Materials**  
**Engineering**

**Sponsors:**  
**Canada Summer**  
**Jobs, Syncrude**  
**Canada Ltd.**



I came to the WISEST Summer Research Program in the beginning of July with very limited knowledge of Science, Technology, Engineering, and Math (STEM) fields, and no idea what I would be interested in pursuing as a career. I was somewhat apprehensive about starting this program without much more than eleventh-grade math and science courses, yet I was also excited for this great opportunity.

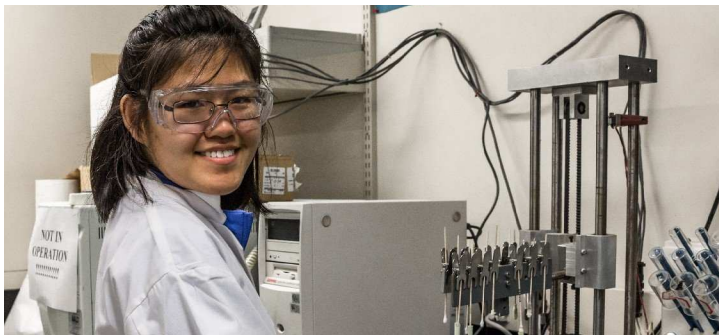
I was placed in the Canadian Centre for Welding and Joining lab (CCWJ) in the department of Chemical and Materials Engineering with another WISEST student, Sareena. All the professors and the students in the lab were very welcoming and considerate; nobody expected us to have a level of education comparable to theirs. For the first few weeks, we had helped restore a 3D printer to working condition, although it soon became apparent that there were issues with print completion and deformation. In order to optimize the settings, we selected 6 settings that we believed may have an impact on the issues we were having and set up 144 unique trials which correlated to specific settings and would be carried out on both a simple and an intricate design. We also used the 3D printer and 3D modeling software to print a number of models, including an attachment for a high speed camera lens for use in the lab.

Outside of the lab, I had a very inspiring and eye-opening experience with the WISEST program. It had exceeded my expectations in almost every way. The sessions were quite interesting and informative, especially the TEC Edmonton tour, where we were able to see some of the work done in real research labs outside of the University. I also enjoyed the optional sessions, like the Ada's team introduction to coding session. Through these sessions, I was able to learn lots about things that interest me and discover many new things.

Participating in the WISEST program has allowed me to learn a lot about applying for and attending post-secondary. I was able to ask questions to university students, which allowed me to overcome certain fears and clarify my understanding of different things. Being a WISEST student has also helped me discover new interests and some of the endless possibilities available at the University of Alberta and elsewhere. I also learned lots about different options available to me within the STEM fields, like different groups and programs at the university as well as different career options after school.

This summer, I had an incredible experience at the WISEST Summer Research Program. I would like to thank my principal investigators, Dr. Leijun Li and Dr. Patricio Mendez, my direct supervisor, Rebekah Bannister, and the rest of the lab members at CCWJ for letting us work in the lab with them and for lending us a helping hand when we needed it. I would also like to thank Fervone, Michée and Rosie and everyone else at WISEST for running this program, and to all of the sponsors who have donated to WISEST. I would highly recommend participating in this program to anyone interested in the sciences.

# Yingxin (Julie) Song



**Supervisor:**  
**Dr. Tom Etsell**

**Department:**  
**Chemical and  
Materials  
Engineering**

**Sponsor:**  
**Canada Summer  
Jobs, SPECET**

We are shaped by all the choices we make, all the opportunities we take, and all the possibilities we see. This summer, the Women in Scholarship, Engineering, Science and Technology (WISEST) program allowed me to experience what research in a university laboratory is like while learning about many new topics in-depth and meeting new friends from across Alberta. It has shown me endless possibilities for my future, not only through a research perspective, but also through its many events and the variety of discipline groups in various faculties and departments in which we were able to participate in.

The research program I took part in was from the Department of Chemical and Materials Engineering, where I studied solid oxide fuel cells (SOFCs): tubular or disk shaped devices that produce electricity by reacting gaseous fuel such as hydrogen or hydrocarbons with oxygen. One of the main benefits of an SOFC is that it can use up greenhouse gases such as carbon dioxide and methane, since these gases can react to form the fuel for the fuel cell; however, a by-product of this reaction is carbon monoxide gas, which can cause solid carbon to form within the cell and reduces the cell's stability. My project this summer thus involved solving this problem by infiltrating fuel cells with different solutions of a nickel-tin catalyst that allows only the wanted fuel to diffuse into the anode while keeping out the carbon monoxide, followed by testing the performance of complete and infiltrated fuel cells to see the effectiveness of the infiltration. Through this research program, I have gained a better understanding about practical skills in a university laboratory and improved my communication and presentation skills from making and presenting a research poster.

Although the focus of the program was research, there were many other events throughout the summer as a part of the program as well. At the beginning of each week, there were events for all students to participate in together, such as tours across the university campus or in other university research laboratories, or even in professional companies. We also had the opportunity to speak with many graduate students and working professionals at the Networking Fair organized by the WISEST coordinators, where we learned about their experiences and the type of work that they do on a daily basis. It really opened our eyes to the numerous engineering, science, and health sciences fields available to us, and it was interesting to hear about the paths they walked as they searched for what the right career was for them. As each week drew to a close, we also attended Professional Development seminars that taught us how to write reports and design our research posters, answered our questions about university, and prepared us for the Celebration of Research.

This Summer Research Program experience has shown me many new things about engineering, given me many new skills, and allowed me to realize more about myself and about the endless possibilities available while making memories I will never forget. I would like to thank WISEST and my sponsors, Canada Summer Jobs and SPECET, for making this entire experience possible, and my research team, especially Dr. Etsell, Dr. Hanifi, and Ms. Sandhu, for guiding me through this experience and for being so easily approachable and answering all of my questions. It has been a wonderful six weeks, and I have truly enjoyed this unforgettable summer.

# Hannah Stormer

**Supervisor:**  
**Dr. Abram Hindle**

**Department:**  
**Computing Science**

**Sponsor:**  
**NSERC**  
**PromoScience**



When I was first reading the description of the WISEST Summer Research Program (Women in Scholarship, Engineering, Science, and Technology), I knew right away that I had to apply. I am fascinated and inspired by science, and I was excited by the opportunity to gain first-hand experience working in this field. I was thrilled that I was accepted to WISEST. I was placed into the Department of Computing Science, which would not have been my first choice, because while I did look forward to working on the research project, I expected that the programming side of it would not be very different from what I had already experienced at school and at other camps and programs at the UofA. However, my expectations proved to be very different from the reality.

The purpose of my research project was to create a program to collect examples of syntax errors that programmers make when working in Python. The data collected will be used to improve detection of these syntax errors, thereby speeding up the process of programming. My project began with learning how to use the different software programs that we would be employing throughout the project, including how to work with a terminal window and how to use the program Git to collaborate with other WISEST and HIP students working on the same project. I loved learning these new skills, and after coming home from work each day I was excited to come back for more. As we progressed through the research project, we got to explore machine learning and apply it to our data. While this was challenging, it was also fascinating, and my supervisor was always there to answer questions. Our project was completed with the creation of a program that could correctly identify 70% of syntax errors in a given set of data and the knowledge of the frequency of different types of errors, of which indentation errors were the most common.

In addition to the technical skills I gained while working on my research project, I also had the opportunity to experience working in a professional environment, including participating in daily standup meetings. Through WISEST events I learned many different skills that will be readily applicable in the future. After learning about networking at the WISEST Art of Networking session, I was able to attend the Networking Fair, where I had the opportunity to talk to students and professors that work in the science field. Not only was this a great opportunity to apply the skills I had learned about in the networking session, but I was also able to learn about different career paths.

As my time as a WISEST summer research student comes to a close, I am more confident in my abilities to succeed as a future student at the UofA, and as a co-worker in the future. In addition to this, I have made new friends and connections with the University. I would like to thank my direct supervisor Joshua Campbell and my Principal Investigator Dr. Abram Hindle for giving me this opportunity to work with them and for answering my questions. I would also like to thank my sponsor, NSERC PromoScience, for making it possible for me to participate in the program. Finally, I would like to thank the WISEST team for organizing and running the program, and for accepting me into it. Thank you so much for an amazing experience!



# Urbah Syed



**Supervisor:**  
**Dr. Erin Bayne**

**Department:**  
**Biological Sciences**

**Sponsor:**  
**Canada Summer  
Jobs, Beta Sigma  
Phi**

Best. Summer. Ever. WISEST was a lot more than a summer job for me. Not only did it prove a source of much-needed direction about potential careers in science and technology, but also provided me with exposure to a whole breadth of fields that I had only thought possible in sci-fi novels. Research aside, the atmosphere of WISEST was one in which I could say something like, “Did you know that the metal iron is not native to the Earth? It came down in the form of meteors billions of years ago,” and not have people look at me as if I had grown a third eye. My awesome biology teacher, Ms. Gwen Young was the one who introduced me to WISEST. Thanks to her, I was able to be part of a phenomenal program that put me a couple hundred meters ahead of most other people my age in the life-long quest for knowledge and wisdom.

My nature-nut nature gleamed through the entrance essay and forms I sent to WISEST, as I was given the wonderful opportunity to work with bioacoustic technology - among other fascinating things - under Dr. Erin Bayne. The science of bioacoustics is a cross-disciplinary one, combining biology with acoustic technology. My team was mainly concerned with using this technology to record the vocal behaviour of various species in Alberta’s ecosystems. This data would then be analyzed to determine things such as estimated population density, habitat use, and the effects of anthropogenic disturbances on the behaviour of various species. The data collection method for this was through ARUs(Automated Recording Units). These pieces of machinery are highly-sensitive to the calling patterns of certain species and are self-contained in tidy, camouflage-green plastic boxes; they can be attached to trees and activated to pick out certain calls for months at a time. Data collected through ARUs is far more accurate than data collection via humans, as some species are known to change their calling patterns simply based on the colour of a person’s shirt. While the use of ARUs results in sometimes-terrifying quantities of data to sort through, it still gathers information more accurately than humans could hope to themselves. When I wasn’t repairing ARUs fresh from the field or identifying species based on their calling behaviour, I was analyzing fascinating real-life footage of Burrowing Owls and their feeding habits. It wasn’t easy, but I ended up centering my research poster around the last activity, as the Burrowing Owl population has been declining for some time now and I was dreadfully curious as to why that was.

As a person from up north who had to live in university residence during my time with WISEST, the six-week program was an eye-opener in more than one way. I got to test and improve the caliber of my cooking skills, while learning how to manage time and budgets efficiently as well as effectively. One of the most valuable things my time with WISEST earned me was the knowledge and first-hand experience of university life. I would like to extend heartfelt thanks to all the amazing people who make WISEST possible each year, as well as my sponsor, Beta Sigma Phi, for helping me realize that my love for science can take me to heights I previously thought improbable. A special thank you goes out to my research team for being genuinely interested in my research efforts and supportive of my insatiable curiosity.

# Kalli van der Voort

**Supervisor:**  
**Dr. Heather Bruce**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science**

**Sponsor:**  
**NSERC  
PromoScience**



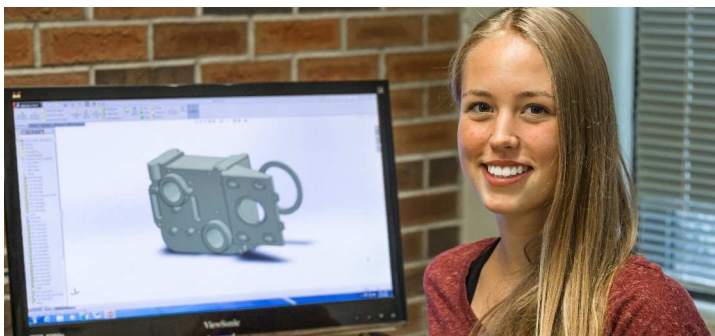
Being accepted into the WISEST Summer Research Program was an astounding feeling. Having an older sister who had completed the program 4 years prior and hearing all of her praise for the program, I was absolutely ecstatic. I didn't even mind moving to a different city and giving up my few precious weeks of summer. Orientation was a ton of fun and flew by, within what felt like minutes I was following my supervisor into a lab. Stepping into Dr. Heather Bruce's lab for the first time was a serious shock for me. Not only was I going to spend six weeks here with people I didn't know, but I was also going to do experiments with machines I'd never even heard of before. That first tour of the lab was intimidating to say the least. There were Graduate students, and undergraduate students all of which seemed a little frightening to a high school kid like myself. Luckily, this feeling quickly faded as I became accustomed to the lab procedures and the others working alongside me. Thinking back now it seems silly to have been scared of the little things that have now become part of my routine.

I was placed in a lab that was experimenting on the relationship between the age and the toughness of beef. With many hands-on experiments and hand-on processes I gained an abundance of knowledge not only pertaining to my specific research but also overall lab etiquette and techniques that were completely new and foreign to me. Although I do not believe that my future is heading in the direction of food science, I have still gained so much from this experience.

After spending six weeks in a lab environment I've had gained invaluable experiences that have given me insight into my ambitions for my future. Looking back it feels as though orientation was no more than two weeks ago, regrettably that is not the case. All the different events and adventures that occurred over the passed few weeks have introduced me into a world of careers outside of academia that I had never even known existed. I feel as though I am part of a community where a passion for learning and a determination to expand knowledge is the keystone. I have made many lifelong friends throughout these six weeks and cannot wait to see what we, as a collective WISEST group we will achieve in the future.

Being able to have this opportunity that many others must do without is truly an honour. It would have not been possible without the support of my sponsor, NSERC PromoScience. Without their support I would not have been able to be a part this incredible community, nor would I have been able to experience the best summer ever. I would also like to give a huge thanks to the WISEST team for running this program as well as all of the Lunch 'N Learns, Professional Development Sessions and offsite tours. I am also extremely grateful to my Principal Investigator, Heather Bruce, my supervisor, Bimol Roy as well as the graduate students that worked beside me in the lab. I would also like to extend a special thanks to my teachers that wrote my references; it is ultimately because of you that I got to attend the program at all. This six-week program has taught me so much about myself, as well as what my future might contain. I would not trade it for the world, thank you all.

# Jessica Van Os



**Supervisor:**  
**Dr. Kajsa Duke**

**Department:**  
**Mechanical  
Engineering**

**Sponsors:**  
**Canada Summer  
Jobs, Faculty of  
Medicine &  
Dentistry**

I'm going to start this off with a little blunt honesty, because who doesn't love that. For me, the exam weeks leading up to the program were stressful and long. All I wanted to do was grab some pizza and binge watch Netflix. I got to the point where I was starting to regret even applying to WISEST (Women in Scholarship, Engineering, Science, & Technology). For one thing I would have a lot less time to do nothing, something I was quite good at. However, signing up meant I was forced to go; I could not try and drop out last minute. After experiencing this summer, I'm glad that the choice was not open to my indecisive mind.

People always tell you all this cliché stuff about how amazing experiences like this are, and how they change lives. I can honestly tell you that this summer has been incredibly fun and interesting. Going in I was terrified to be the awkward kid sitting in the back of the room alone. As orientation started I realized that everyone had that same fear of having no one to talk to and enjoyed meeting so many other young women. For the next few weeks I enjoyed interacting with many different people. If you are a weird semi-antisocial person like me this probably sounds terrifying. So trust me when I say its way better than that sounds. We had the chance to interact with both fellow students and university members at the WISEST events. This gave me the chance to get a real glimpse into what life could be like on campus. Although I thought some of the events were going to be pretty lame, they all turned out to be entertaining and helpful.

The research portion of the program was also engaging, working in Mechanical Engineering. When I first heard where I would work I had a small panic attack thinking that I would have to think really hard doing calculations every day. It turns out that people were very friendly, easy going, and that my project really did not include calculations. My primary project was focused around creating better visualization of pressure data collected during Scoliosis surgery in relation to LFCN (lateral femoral cutaneous nerve) Injury. During surgery the patient laid face down on raised pressure mats positioned under the hips and shoulders; due to the long time period patients often wake up with numbness or tingling of the LFCN (located in the upper thigh). Data was collected concerning the pressure throughout the surgery, resulting in up to 13 files per surgery. My job was to convert these files to Excel documents so that they could all be strung together and looked at as one. Information could then be compared to check for a correlation between high maximum pressures and injury to the LFCN. My secondary project used a CAD (computer aided design) program called Solidworks to reverse engineer a machine. This involved measuring each part, sketching it out, and then rebuilding it in SolidWorks.

Overall my summer was amazing and I would recommend it to anyone who may be considering the program. Huge thank you to my chemistry teacher Mrs. Hall for letting me know about the program and pushing me to apply. As well to the Faculty of Medicine and Dentistry for sponsoring me, Dr. Duke for allowing me to work on her project and teaching me, and the WISEST office for keeping me laughing and working hard to make this program possible. Finally to my Lab mates Rachel and Kyle for this hilarious and unforgettable summer.

# Helen Wang

**Supervisor:**  
**Dr. Erin Bayne**

**Department:**  
**Biological Sciences**

**Sponsor:**  
**NSERC**  
**PromoScience**



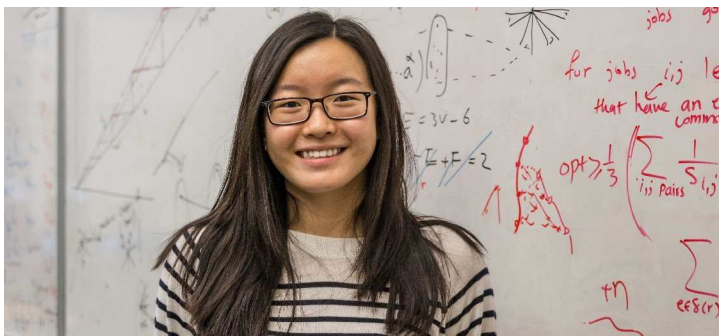
When I signed up for the WISEST Summer Research Program, I had hoped to experience hands-on research and experimentation in the lab, to witness the practical applications of science in the world. I had anticipated only the research aspect of the program. However, I got so much more out of my experience than that: I made new friends, was reunited with old ones, and what I learned from the incredible people I met would stay with me for a long time.

During my six weeks at the Summer Research Program, I was assigned to a Biological Sciences lab. The researchers working in that lab were monitoring wildlife and trying to determine the effects of human impact on the ecosystems. I worked on a variety of topics: listening to birdsong data recorded by Autonomous Recording Units (ARUs) and identifying any recognizable species, watching videos of burrowing owls and recording when they bring in prey, and finally filtering out high-quality owl calls from massive amounts of useless collected data. Ultimately, I decided to create my research poster around the second topic, using different statistical analysis tests to determine whether or not a correlation existed between the differing wind conditions in two separate habitats and the number of bird calls detected in each. Some valuable lessons I learned from my WISEST experience is that research is sometimes frustrating; one did not always receive the results they wanted, sometimes results were rendered obsolete because too many variables were uncontrolled, and the process of obtaining quality data can be a tedious one. Nonetheless, the research is rewarding in the end, watching hours of work coalesce into a research poster, and coming into the listening lab every day assisting researchers in their work that might one day be used to improve the world we live in.

The research projects were not all that WISEST had to offer. Scattered throughout the program were weekly Professional Development Seminars, during which we were presented with opportunities to witness scientific research in action both within and outside of the university campus. The tours into research facilities provided me with insight into the ways research and development in the lab connect with real-life applications of that research for the benefits of both industry and environment. Networking sessions put me into contact with professionals and university students in engineering, medicine, and other branches of science. I learned to not worry too much about deciding on or adhering to a plan for university. Only very rarely did I meet someone who is currently in the same position they imagined they would be in when starting post-secondary.

I would like to thank all the extraordinary people who have made my time at WISEST one of the most memorable in my life: my Principal Investigator Erin Bayne for pointing out some fatal flaws in my research poster and helping me solve them, Direct Supervisor Hedwig Lankau for her support, and Ph.D. Student Daniel Yip for helping me with most of the data analysis. Also I would like to give a special thank you to my sponsor, NSERC PromoScience, without whom I would not have been able to participate in this wonderful experience.

# Alyssa Wong



**Supervisor:**  
**Dr. Ryan Hayward**

**Department:**  
**Computing Science**

**Sponsor:**  
**NSERC**  
**PromoScience**

The WISEST Summer Research Program has been an incredible experience. The opportunity to work in research along with professional seminars have been invaluable. Like many high school students, I was unsure about life after high school. I believe that experience is one of the best forms of education and had no doubt that this summer would help me with that decision. When I discovered that I was going to be placed in the Department of Computing Science, I immediately became nervous. Having no experience in programming, I was afraid that I wouldn't belong. However, I quickly found that there were no expectations for me to know exactly what I was doing. Instead, I was expected to ask questions, and, most importantly: Learn something.

This summer, I worked under Dr. Ryan Hayward with the supervision of Emma McDonald, Elyse Hill and Arnoosh Golestanian. I was able to work with two other WISEST students, Lexi Nash and Delaine Lindstrom-Humphries, and six High School Internship Program (HIP) students. The project I worked on used a board game called Hex. I explored algorithms to make computers more efficient in solving the possibilities of Hex. Solving Hex is difficult because as board sizes get bigger, the number of possible game states grows to incredible numbers. I began by learning how to program with Python and various Hex gameplay strategies. Learning these was the easy part. It was much more difficult to actually use them in programming but extremely rewarding when they worked. I specifically focused on a strategy known as mustplay regions and looked at how humans learned them. Knowledge of how humans learn Hex can be used to make computers smarter. The concept of computers learning like humans was fascinating to learn about and see implemented in different programs.

Each week, we had several opportunities to learn professional skills and meet with other WISEST students. One of the most memorable events was the Social Science Challenge. The process of building a hydraulic system forced groups to bond over failures, small details and questionable fixes. The event was more about having fun and making friends than creating the best system. The U of A Q&A was a great source of information to reassure us that university is not as overwhelming as it seems. I also loved the Networking Fair. Learning how to network is a lifelong skill while also learning more about various careers I can pursue. It was relieving to hear that role models had the same struggles we are having now. Every week, I looked forward to Ada's Team Lunches. Having an event purely for socializing with other students and my own supervisors was fun and rewarding.

Taking part in the WISEST Summer Research Program was an amazing, eye-opening experience. Over the last six weeks, I have learned valuable skills that I will carry with me back to school and for the rest of my life. I have also developed numerous friendships, bonding over mutual interests and struggles in our labs. This summer has been full of challenges and successes, all of which have made this summer wonderful. I'd like to thank to Dr. Ryan Hayward, Emma McDonald, Elyse Hill, Arnoosh Golestanian and Noah Weninger for providing support and guidance this summer. Thank you to Lexi Nash, Delaine Lindstrom-Humphries and all of the HIP students for being great research partners. I'm so grateful to NSERC PromoScience for sponsoring and supporting the WISEST program. Ultimately, thank you to WISEST for providing me with this life-changing opportunity.

# Madeline Zurock

**Supervisor:**  
**Dr. James**  
**Harynuk**

**Department:**  
**Chemistry**

**Sponsor:**  
**NSERC**  
**PromoScience**



I first heard about Women in Scholarship, Engineering, and Science Technology (WISEST) from a student from my school. She came into my physics 20 classroom with her research poster and began talking about her research and experience in a lab. Already, I was interested because a focus on science with an opportunity to work in a real lab was, as exciting as it was intriguing. However, one thing about WISEST really stood out for me--its focus on diversifying the scientific community. In addition to being able to pursue my academic and career interests, I could also work alongside like-minded people, with whom I could begin to break down the barriers of sexism within science, engineering, and technology. Needless to say, I was extremely excited to get started.

Throughout the summer, my team and I have been striving to improve the current ISO method for testing the absorption rate of different fabrics. I worked mainly with gas chromatography (GC); an instrument that separates compounds that can be vaporized without decomposition. I worked with indole, nonenal, and isovaleric acid as my compounds, and cotton and polyester as my fabrics. The process involves taking a clean flask, spiking it with the compound, and then leaving it for two hours. We test the sample of gas after the two hours and then put the results into charts in order to compare it.

Not all my time at WISEST was spent in my lab, of course. The WISEST team had put together many different activities and seminars, including “Lunch N’ Learns” that took place every Friday, as well as Professional Development Sessions that were held at least once a week. They were all fun and informative, but the one that I enjoyed the most was the library orientation. It was fascinating to see how a University library differs from a public one, especially since I plan on applying to the University of Alberta. I learned a lot during the seminar, the librarian who gave us the presentation was very well spoken and answered all my questions understandably and with detail. Another presentation that I liked was the Networking Fair. During this fair, the WISEST students all had the opportunity to meet with and ask questions of different professionals working/studying in science, engineering, or technology. It was extremely helpful to be able to discuss with these people face to face and ask questions that were important to me. All these seminars helped me develop skills like networking, speaking in front of an audience, professionalism, and communication. I feel much more confident in my workplace and in daily life with the skills I have learned over the course of these six weeks. WISEST has also helped me narrow down my list of potential careers by showing me different aspects of laboratory work that I like, as well as the things about research that I don’t.

WISEST has changed my perspective on the scientific community, and has equipped me with some valuable tools that I will carry with me for the rest of my life. I’m very grateful for the opportunity I was presented with, and I can’t think of a better thing to be doing during my summer. I’d like to thank my sponsor NSERC PromoScience for making this experience possible, as well as my Principal Investigator and supervisor for making me feel included in their lab. Finally, I’d like to thank the WISEST staff and volunteers for making such an amazing program. Their hard work has given me a once in a lifetime experience, and I will remember this summer going forward into the future.



## HERITAGE YOUTH RESEARCHER SUMMER (HYRS) PROGRAM 2016

WISEST was pleased to administer the Alberta Innovates – Health Solutions (AIHS) HYRS program over the summer of 2016. The program was run alongside the WISEST Summer Research Program as a six-week paid experience for young women and men who have completed grade 11 to gain first-hand experience in biomedical and health research. It is an exceptional opportunity for the students to learn about innovative research, participate in current investigations, meet incredible people, and broaden their horizons to the many educational and career options available in this field. Students work on health research projects in a variety of work environments with a variety of researchers.

*Photo: Ana Catuneanu*

# SOCIAL SCIENCE CHALLENGE

*By Destiny Peyton*

It was July 8th; the first Friday of our research program. This was our first event as a group apart from orientation and I was looking forward to getting to know the other WISEST and HYRS students a bit better.

Upon arrival, we were split into our assigned groups and were able to converse with our fellow group members until the challenge started. Michée and Rosie then began to introduce our task. We were to build a hydraulic device that could pick up a cup of water and, if we were ambitious enough, pour it. The materials we had available were a variety of crafting items; coming up with ideas and a blueprint was the most challenging aspect. Although, the collaboration between my group members and I allowed us to come up with a design that we collectively thought would be successful.

After we were done building our devices, each side of the room took turns demonstrating their apparatus. Being able to see the variety of results and collaborating with my group members allowed me to see the diversity of solutions that can be used to solve problems. This challenge was great in demonstrating the importance of teamwork and sharing ideas. The students in attendance learned that collaborating with others is essential to bringing forth the solution for any problem.

The Social Science Challenge was an enjoyable afternoon that allowed the students of both HYRS and WISEST to become more acquainted with each other and taught us skills in collaboration; it was a great start to my HYRS experience.

*Photos: Ana Catuneanu*





# EXPLORING U OF A RESEARCH: GREENHOUSE



*By Emily Skousbol*

*Photo: Ana Catuneanu*

After everyone had settled into their respective labs, a new opportunity was presented: to tour a research lab other than one's own. Four tour options were presented, but, as botany is one of my favourite aspects of biology, I chose the tour of the greenhouse. Our guide took us through every individual greenhouse, busting any misconceptions of plants we may have had. In particular, the subject of the Venus flytrap arose. Personally, I had only ever seen pictures of the plant, so I had assumed it would be at least a foot in diameter, and I became distinctly aware of how wrong I was as we were presented with a mature plant, about 3 inches in diameter. Regardless, it was, to be quite honest, adorable.

As we progressed through the greenhouses, led enthusiastically by our guide in hot and humid glass buildings, one thing became clear: no career is out of reach. Our guide had been working in the greenhouses for 25 years, and he told us details of the plants with as much enthusiasm as if he had just started working there. It was reassuring to see someone so content with their career after having done it for years; it served a reminder that, if one's job has enjoyable aspects, then career satisfaction is easy to attain. This is one of the points that WISEST and HYRS aim to make, that careers in science and academia are accessible, and have the potential to lead to fulfilling lives.

# RESEARCH IN ACTION: GILEAD SCIENCES INC. TOUR



*By Shaina Corrick*

*Photo: Ana Catuneanu*

One of the enriching experiences in the Heritage Youth Researcher Summer Program was attending the Gilead Industry Tour. Gilead is a biopharmaceutical company focusing on three procedures: research, development, and manufacture.

On the tour, we were introduced to the three stages of medicinal development, and why coordination between all three is vital for efficiency. The company's current projects were also presented, including a Hepatitis C drug, "Epclusa". Ambitions of Gilead were also discussed: an inspiration for the company is to address those whose medical needs have not been met, and provide easy access to pharmaceuticals for those suffering from life-threatening diseases internationally. Gilead develops medicine in a variety of health areas such as hematology, oncology, liver diseases, cardiovascular, respiratory and HIV/AIDS.

We were also exposed to labs in which research and development of the pharmaceuticals take place. We learned about the extent to which chemists must go to discover and create. The second half of the tour consisted of looking at the manufacturing process of the pharmaceuticals. The complexity and cost of the equipment used to create medicine floored me.

On completion of the tour, we began a networking session with some of Gilead's employees. Most of the employees were chemists, engineers, or technologists; it is amazing how so many careers of such distinction can collaborate so easily. Without any knowledge of what Gilead was before HYRS, it was a notable experience. It was very interesting for me to be exposed to the different pieces of such a crucial international company. It has inspired me to look further into the medical field, and to keep my mind open to various possibilities.

# RESEARCH IN ACTION: MICRALYNE INC. TOUR

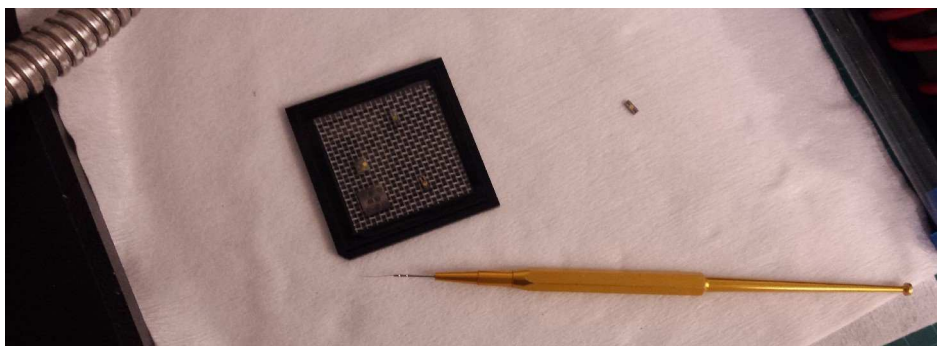
*By Nitya Khetarpal*

Throughout my time in HYRS, I have been exposed to everything from an on-campus research tour involving a live mouse to collating data for analysis in an office. This allows me to get a much deeper insight in the diverse areas of work that a researcher has. To emphasize this, WISEST worked with companies in Edmonton to organize the Research in Action tours.

One of the companies featured was Micralyne, which focuses on the manufacturing of microelectromechanical systems (MEMS). At the beginning of the tour, we were shown MEMS usage in everyday technology, like the chips in my phone. Everything from consumer electronics to medical eye implants use MEMS in some way; they are small but mighty devices. We toured the clean room where the manufacturing takes place. Because even the smallest grain of dust can destroy an entire wafer, costing the company thousands in the process, special precautions are taken to ensure the environment remains as clean as possible. I was one of the three students who got to suit up (I looked stylish in my full-body white suit) and go through the air shower.

I enjoyed my time at Micralyne and I learned many things. Prior to going on this tour, I thought that research and development careers in a commercial setting were limited in scope. After going on this tour, I find myself enlightened – the bioMEMS applications are astounding and I could see myself working in one of the many diverse R&D-related occupations. I'd like to thank Micralyne, as well as Debbie and Nazanin, our two tour guides. It was a brilliant opportunity to see the practical aspect of research.

*Photo: Michee-Ana Hamilton*



# RESEARCH IN ACTION: TEC EDMONTON TOUR

*By Sabrina Feng*

*Photo: Kujtesa Beka*

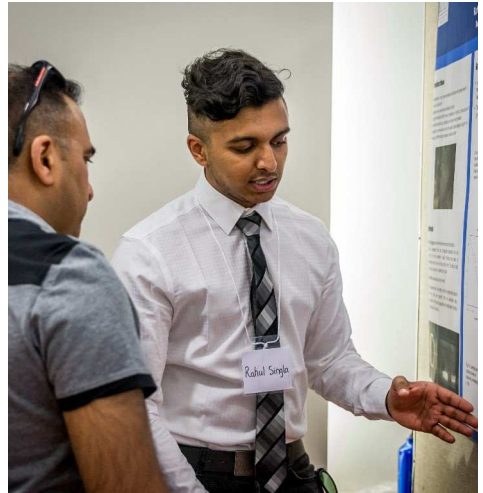
As a part of the HYRS program this summer, I had the opportunity to visit TEC Edmonton, a non-profit company that helps to commercialize research. We got to see what four companies working with TEC Edmonton were producing. The first was CanBiocin, a company which specializes in developing lactic acid bacteria for different industries. We had the opportunity to tour the CanBiocin lab and it was very shocking how similar the lab looked to the one I was doing research in this summer. This lab in particular has showed me what a career in research might look like. I think it was very interesting to see how they grew bacteria and used it to test other companies products. The one project we saw was next was Exciton, a company that creates wound-dressings using silver to help fight off infections. I liked seeing how despite Exciton being mainly focused on chemistry, their products are used in the medical field. This really proved how interconnected all science is.

After Exciton, we visited Extraordinary Absorbents, a company that does separation of gas. Here we learned how the many of the skills we develop may be useful in our future even though they may not seem to be related each other. Finally, the last TEC client we visited was Delta Genomics. This is a company that does biobanking and genotyping for the livestock industry. The entire tour was exciting because it really showed how interconnected research can be in the different fields as well what a research job in industry might entitle. I am very thankful I had the opportunity to visit TEC Edmonton; it was an invaluable experience.

*Photos: Ana Catuneanu*



# WISEST/HYRS NETWORKING FAIR



*By Abrar Alam*

*Photos: Ana Catuneanu*

Prior to the networking fair, I wasn't exactly sure what the concept of networking was, nor why it was considered to be of such importance. Although we were taught the basics of how to network, nothing can substitute the real-life experience we were given. Networking is something that tends to be unspoken of yet can be important for career advancement or just gaining insight from various professionals. Through the networking fair, I feel as if I've been given a head start to developing my career from the invaluable advice of the people I was privileged to talk to. We started off in small groups and had an intimate discussion with a few professionals regarding their different fields. All the groups then came together and everyone was given the opportunity to network with one another. There were engineers, nurses, professors, and graduate students who all offered their outlook on their respective fields. I along with many others were able to ask several questions about careers we were interested in and clear any misconceptions we had. When the fair came to an end, we were all still enjoying ourselves in deep conversation. The previously intimidating thought of networking had become an amazing experience that I look forward to having again.

# LIVING AT THE KING'S UNIVERSITY



*By Sarah Andrishak*

*Photo: Ana Catuneanu*

Over the summer, I was privileged enough to get to stay in residence at The King's University for the duration of the program. At first, the idea of living independently was very intimidating, tasks that I would have to do such as grocery shopping for myself and doing my own laundry seemed quite daunting. However, after meeting the people that I would be living with for the six weeks, those things did not seem as big a deal as it was before. The opportunity to live in residence allowed us all to grow in ourselves and in our independence.

Over the six weeks, the residence group alongside our Residence Advisor (RA), Michée, went to several different experiences that we could not see anywhere else. We did so many fun things on weekends like a group trip to K days and going to an escape room. All 10 of us soon became really close friends. We often enjoyed movies nights, board games and even a few friendly pranks between each other. Michée did a fantastic job of being our RA over the summer. She organized many outings and often had prizes for us if we won a competition. The suites we were in were nothing short of perfect. When we arrived even our parents were surprised to see how good the accommodations were. We could easily cook for ourselves and take care of all our needs.

Along with the students that were in HYRS program, most of the students were in WISEST, but it didn't matter at all. The people that I have met through staying in residence are as close as family. We will always have each other's back, even after the program is finished. My favorite part of each day was coming back to residence at spending time with my friends. Each one of us with our own quirky personality and interests I will always cherish these people at the time that we spent together, even if some of those times resulted in friendly room-to-room pranks.

Overall, my stay at The King's University was an incredible experience which gives us a feel of what University life will be like. I am incredibly thankful that I was given this opportunity.

# STUDENT REPORTS



Photo:  
All student portraits (pg 84-105): Ana Catuneanu

# Abrar Alam



**Supervisor:**  
**Dr. Vincent Biron**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Surgery**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

Following my earliest encounter with biology, it has since become a field I envisioned myself working in. Unfortunately, I did not have any related experiences to justify such an ambition. My curiosity with the field of genetics research and my progressing interest in the health sciences is what gravitated me towards the HYRS program. My knowledge in research and laboratories prior to the start of this program was essentially non-existent. What I had to accommodate that however, was a passion and drive to take my experiences to heart and learn the subject matter as best I could. Although I was unsure of what to expect, I entered the program with enthusiasm and an open mind. I was highly expected of, treated professionally, and I was trusted to perform experiments and collect data that could potentially be publishable. With that said, the initial transition into my laboratory was not an easy one, nor did I expect it to be. There were articles I was expected to read and assignments to complete that would enhance my understanding of our labs research. Little did I know of the heights I would reach and the confidence I would gain in just six weeks.

I was placed into Dr. Vincent Biron's lab under the supervision of Cameron Lindsay at The Otolaryngology - Head and Neck Research Laboratory of Alberta (OHRLA). Our lab focused on testing epigenetic inhibitors as potential chemotherapeutics. My specific project dealt with the effect of dimethyl sulfoxide (DMSO), a common drug solvent, on gene expression in oropharyngeal cancers. Just by quantifying gene expression, I was exposed to a wide variety of protocols and terms unbeknownst to me. To begin, we scraped separate samples of human papillomavirus (HPV)-positive and negative squamous cell carcinoma's treated with DMSO. RNA was then extracted from each of the treated cell lines and formed into complementary DNA strands using a thermal cycler. Lastly, using a novel technology known as droplet digital Polymerase Chain Reaction (ddPCR), we were able to quantify the various expression levels from the different cell lines. What we noticed was that DMSO had shown distinct alterations in our target genes. The HPV-positive cell lines in particular showed a trend of overexpression of target genes, thus suggesting possible interactions with viral proteins. Due to the wide usage of DMSO in clinical and research settings, it proposes that an alternative solution be sought.

Although a significant portion of the HYRS program was spent working in my lab, lab skills alone were not what I took away from such an experience. Not only has HYRS offered me an academic scope, my experience has been supplemented with professional development seminars and leadership opportunities that can serve to be assets in a multitude of careers. The wide range of events and opportunities to socialize with fellow students in the program was really something I looked forward to each week. I especially enjoyed the networking fair where we were given the opportunity to discuss careers with professionals from a variety of backgrounds.

HYRS has had a tremendous impact on me and my career aspirations. The program has fostered my curiosity and solidified my endeavours to seek further research opportunities in the future. This truly was a one of a kind opportunity for any high school student. A special thanks goes to my supervisor, Cameron Lindsay for his patience and time. Lastly, I cannot thank Alberta Innovates -Health Solutions enough for this opportunity.



# Sarah Andrishak



**Supervisor:**  
**Dr. Vivian Huang**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Medicine**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

When I had learned that I had been accepted into the Heritage Youth Researcher Summer program (HYRS) I was more than ecstatic, in fact I am unashamed to say that I nearly cried. I had heard about this program from my sister who had gone through the Women in Scholarship, Engineering, Science and Technology (WISEST) program and had known about HYRS. As soon as I was able, I applied to this program knowing how much it would benefit me and the people around me. One of the main reasons I applied to this program was because I have an interest in the fields of medical sciences and because I wanted exposure to the variety of careers available. When I first entered the program, I was expecting the summer to be similar to school, where you are learning something new every day. My expectations were met in a surprisingly different way than I had imagined. During the research program, I learned a lot, but I also discovered how research is done. There were a few days throughout the summer that could be described as either hard or boring, but that is what the true desire for knowledge is. It is going through the hard work and the sometimes not so exciting days in order to find even the smallest amounts of information that can affect people's lives.

Over the summer, I had the privilege of working beside Dr. Vivian Huang in the Faculty of Medicine & Dentistry. I was researching the effect Inflammatory Bowel Disease (IBD) has on breastfeeding patterns. Before I came to the HYRS program, I did not even know that this field of study even existed. Over the next six weeks, I was gathering information out of patient files and inserting them into a spreadsheet so that the information would be easier to read and it would be more accessible for my colleagues. After that, I combined the information with other known data and I was able to analyze it to get my results. Through this research, not only did I learn the answer to my research question, I also learnt so much more about the disease that I was studying and the benefits of breastfeeding. One thing that I got to do through this research was witness an endoscopy, which I found really interesting. Many changes in my perception also took place during the summer. I was able to change my viewpoint on how research worked.

Since HYRS was run alongside WISEST this year, I was able to be a part of the many learning opportunities with many other incredible student researchers. One of my favorites was the tour of TEC Edmonton where we got to see several companies working in the fields of science and their projects that they were working on. As well, I learned a great deal at the Lunch 'N Learns that took place every Friday. As a result of these lunches, I learned how to network, how to create a research poster and how to write a professional report. Many of these experiences have equipped me with information that I will take with me into the twelfth grade, such as how to network with others and what to look forward to in University.

I would like to thank the Alberta Innovates-Health Solutions team for sponsoring me. I would also like to thank Dr. Vivian Huang, Alisha Manocha, Shanika Wijayanayaka and Kate Haynes for helping me with my research and my research poster throughout the summer.

# Amanda Buchner

**Supervisor:**  
**Dr. Adrian Wagg**

**Department:**  
**Medicine and  
Dentistry -  
Medicine**

**Sponsor:**  
**Alberta Innovates -  
Health Solutions**



The HYRS program was such an incredible, once-in-a-lifetime experience for me. While most of my friends were working standard summer jobs in retail or service industries, I was lucky enough to be in employment where I was excited to start work every morning. I was placed in the Division of Geriatric Medicine in the Department of Medicine and Dentistry.

The main focus of my research was on the personal factors which affect the nonparticipation of older adults in clinical research. Low participation rates decrease the validity of results by increasing risk for selection bias and resulting in a sample that is much less representative of the general population. Slow or incomplete enrollment can undermine trial completion, the timely availability of results to guide clinical practice, and adds expense. My study was a sub-study of the trial 'Continence Across Continents To Upend Stigma and Dependency' (CACTUS-D), which aims to evaluate whether a continence promotion intervention improves urinary incontinence symptoms in women over the age of 65. CACTUS-D is a multi-centre trial taking place in France, the U.K., Quebec, and Western Canada (Edmonton and surrounding areas). In Edmonton and surrounding areas, potential participants who declined enrollment in CACTUS-D were provided with the option to give a reason for their refusal. I took those responses and combined them with a narrative literature review to get a larger perspective on this issue. With my findings I have written an article which, with the assistance of my direct supervisor and PI, I hope to get published in a medical journal. This is very exciting for me, as I am aiming for a career in the medical field, and a publication while I am still in high school is a big deal.

This summer was not all about the research, though. Twice a week the entire HYRS and WISEST programs met for activities and sessions to teach us more about university life and what a career in the sciences can look like. My favourites of these events were the tours of research labs and industry sites. I found the tour of an obstetrics lab at the University of Alberta particularly fascinating. I was able to see equipment that I had only read about in action and get a feel for what work in a wet lab looks like, as my own research was conducted solely in a dry lab. For my industry tour I chose to go to TEC Edmonton, a company that fosters the development of research organizations. I really enjoyed that visit because it opened my eyes to the wide range of careers that are possible in science. It was interesting to see all of the different applications for research in solving real-world problems.

This summer was also the chance to meet other grade 11 students with a passion for the sciences. As much as I looked forward to the actual events, I also could not wait to spend time with the truly incredible people I had met. I know that I have made some lasting friendships and it is a relief to know that I will have a network of people that I met in HYRS and WISEST also attending the U of A next year. I highly recommend both programs to anyone considering them. They are an amazing opportunity that you should not miss out on.

I would like to thank Alberta Innovates - Health Solutions for their sponsorship. Special thanks to my Direct Supervisor Dr. Saima Rajabali and my Principal Investigator Dr. Adrian Wagg, as well as the entire research team in the Division of Geriatric Medicine for their support and leadership.

# Shaina Corrick



**Supervisor:**  
**Dr. Dilini**  
**Vethanayagam**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Medicine**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

My interest in Medicine sparked in grade 10. I was immediately drawn in to the Heritage Youth Researcher Summer Program (HYRS), an opportunity introduced by my chemistry teacher. The HYRS program has allowed me to expand my mind to the different possibilities and potentials in medicine.

During the summer, I had the privilege of working in the Clinical Sciences Building under the care of Dr. Dilini Vethanayagam (Department of Medicine, Division of Pulmonary Medicine). I also worked with a third-year medical student, Monette Dimitrov, on her study called “Does the Presence, and Type of Primary Care Influence Asthma Control and Severity”. I spent the first few days familiarizing myself with the disease of asthma; through this, I learned how to properly use Medline (a database) which will aid in future research. The research project I was involved with consisted of a web-based survey (administered through iPads) including three additional hard copy questionnaires. We administered the survey to subjects recruited from malls, the University Campus, and community events in Edmonton and the surrounding area. The questionnaires included: the Asthma Control Test (ACT), the Asthma Control Questionnaire -5 (ACQ-5), and the mini-asthma Quality of Life Questionnaire (mini-AQLQ), used to assess asthma control and quality of life. The survey involved areas of primary care, including the presence of a General/Nurse Practitioner, frequency of hospitalizations and intensive care unit visits, and medication usage. Challenges we crossed in the study included finding enough participants with asthma, and those willing to take the survey. As this was a study in “pilot phase”, these challenges indicated that we did not meet sufficient a recruitment method, and that further amendments to the study for expansion was needed.

As a student learning in the clinical sciences, I gained remarkable first-hand experience. I was honored to shadow doctors in the Cystic Fibrosis clinic, witness an embolization procedure (wrapping a coil around in vessel to obstruct vascular flow), and watch pulmonary function tests in action. Watching the practicing doctors inspired me to follow a similar career path; I fell in love with the atmosphere of the hospital.

HYRS offers many opportunities for personal growth and development; twice a week, a session for all students was held for collaborative learning. I found the “Effective Presentations” seminar to be most helpful for me in preparing my research presentation. In this seminar, we were taught tips for vocal variety and emphasis of key points, summarization, body language, impacting speeches, and impromptu speaking strategies (O.R.E.O. guideline). Included in the seminar was an impromptu debating activity, which I found beneficial because it involved me going out of my comfort zone. I am grateful for this particular opportunity because it will make future presentations less stressful for me.

The networks I’ve created and the knowledge I’ve gained over six weeks is outstanding. HYRS has given me a great introduction to daily life in the medical field, and some exceptional research skills to enter grade 12 and my undergraduate degree with. A lesson I have learned is that you should take every single opportunity you create: the end result could be self-discovery. I would like to thank the WISEST team Rosie and Michee, my Principal Investigator Dr. Vethanayagam, Monette Dimitrov, Iris de Guzman, and my sponsor Alberta Innovates Health Solutions for making this experience possible. Without their hard work and efforts, I would not be the same person I am today.

# Lixuan (Sabrina) Feng

**Supervisor:**  
**Dr. Jens Walter**

**Department:**  
**Agriculture, Food,  
and Nutritional  
Science - Food  
Science**

**Sponsor:**  
**Alberta Innovates -  
Health Solutions**



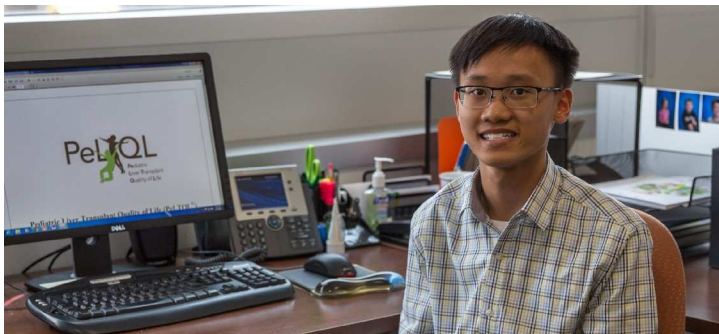
I have always had a passion for science. Being able to answer your own questions through experiments and tests is the pinnacle of learning. The HYRS Program this summer has given me the chance to experience first-hand what scientists and researchers do on a daily basis. When I heard about the program, I was nervous just to apply. After a couple of weeks, I was informed that I had been selected to participate and this made me excited beyond belief. While many different aspects of biology hold my interest, the biomedical field is something I want to pursue. I wrote my essay topic on immunology and antibiotics so at first being placed in the Department of Agricultural, Food and Nutritional Science was somewhat shocking. However, this summer, I really learned how interconnected all of science is. Although I was in this department, I was doing research on the antibiotic resistance of a particular bacteria. I think this only goes to show just how many different paths there are in science itself. As a person who thought they had their life planned out, I have to say it is invigorating to know there are so many different opportunities out there as long as I have the courage to pursue them.

I have been very lucky to be placed in the lab of Dr. Jens Walter with Rebecca Duar as my supervisor. My project was to test the resistance of different animal isolates and do a comparison study between the wild, domestic and zoo strains. At the beginning of the week I would go into my lab and plan out my experiments for that week. This was so if I had to create media for the bacteria to grow on I would not run out. Everyday I would be growing bacteria, plating, streaking or measuring my results. I have loved being able to work on a project and get results. Although day to day activities were less earth-shattering then I thought they would be, all of my work accumulated to fascinating results. I truly learned how the misuse of antibiotics can affect the larger ecosystems. Another big highlight of being able to work in the lab was that I could see what other graduate and doctorate students were working on. While most of the science was very complicated, it was eye-opening to see the innovation happening all around me.

This summer, I also attended several events hosted by Women in Scholarship, Engineering, Science and Technology (WISEST). One of my favourite events this summer was the Social Science Challenge. Although at first I was hesitant to explore the engineering side of science, I found I enjoyed being tested to my limits. This was one of the things that made this summer amazing. All throughout the six weeks I was constantly being challenged to learn new things. Other events included learning how to network, designing a research poster and being able to explore research currently being done at the University of Alberta.

This summer has been amazing and I want to thank my sponsors: Alberta Innovates-Health Solutions and the University of Alberta for giving me the opportunity to participate in HYRS this summer. I also want to extend a huge thank you to the WISEST team. Looking back on the six weeks, I have learned so much. I have learned technical information such as different methods and lab procedures but also information about myself. This program is truly amazing and I believe that the exposure to research was both an enriching and invaluable experience.

# Daniel Fung



**Supervisor:**  
**Dr. Susan Gilmour**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Pediatrics**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

The Heritage Youth Summer Research (HYRS) program was designed to give High School students first-hand biomedical and health research experience and also introduce us to the educational and career options available in the fields. In the six weeks of the HYRS program, I expected cells, solutions and clinical trials. Yet the HYRS program was much more than my expectations. The HYRS program was in fact an opportunity to gain experience in medical research, but also an opportunity to be exposed to radically different environments, people and perspectives. From my research experience and the HYRS program, I have learnt an open-minded approach and a passion to further explore health research.

During the course of the HYRS program, I was given the chance to explore the relationship between health and quality of life of children and adolescents who had undergone liver transplant. Under the guidance of Dr. Susan Gilmour and Cheri Robert, I was able to explore an area of research where seemingly few had trod on. An approach beyond successful transplant, even years after transplant, was intriguing. In combination with an approach to quality of life outcomes and the Pediatric Liver Transplant Quality of Life (PeLTQL) Questionnaire, a novel tool for assessment of quality of life, the research was fascinating. I was tasked to use PeLTQL questionnaires completed by patients and caregivers and identify significant areas and domains of quality of life for patients post-transplant. With the supported guidance of the research team, I was able to navigate through establish research and literature and acquire a sense of the impact and interconnectivity of all academic research. Starting from data collection to statistical analysis, I was able to experience the whole course of a research project, and it also brought to mind the applications of academics outside of highschool and also the vast areas of research that are open to exploration.

In collaboration between the Women in Scholarship, Engineering, Science and Technology (WISEST) and the HYRS program, numerous Professional Development and Lunch 'n' Learn sessions were provided. These sessions were enlightening and lively in introducing essential skills, such as networking, as well as in expanding our horizons through exciting lab and industry tours. Unlike a school curriculum, the sessions provided an opportunity to explore careers and research by meeting other people as we developed essential skills to last a lifetime. The interactions and discussions made possible by these sessions added to my appreciation of passion in careers, academics and life.

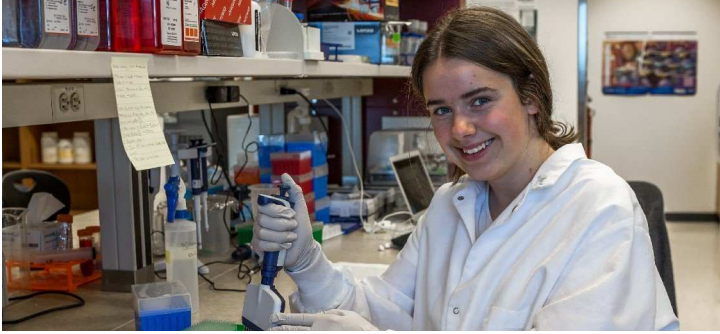
I am grateful to Dr. Susan Gilmour and Cheri Robert for welcoming me to the Pediatric Liver Transplant team and their guidance. Thank you to Alberta Innovates – Health Solutions and the University of Alberta for your support of this HYRS experience. To the University of Alberta Women and Children's Health Research Institute (WCHRI) office I would like to thank for welcoming me always. I would also like to thank the WISEST team, Rosie and Michée, for your organization and commitment. To Mrs. Coleman, Mrs. McIntyre, and Pastor John Lam, I thank you for your encouragement. To all I thank for allowing me this unique opportunity and to develop an open minded, passion for research. My only hope was that the HYRS experience would not end so soon.

# Sarah Hanstock

**Supervisor:**  
**Dr. Shokrollah**  
**Elahi**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Dentistry**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

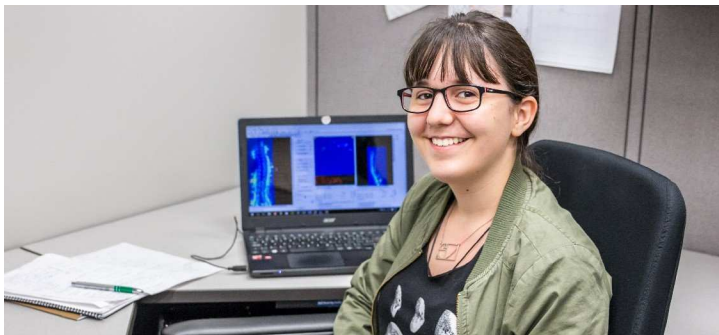


Throughout this summer I have learned many valuable lessons and skills for my future, the most important being that diversity is crucial whether in the workplace, or in scholarship and learning. The combined Women in Scholarship, Engineering, Science and Technology (WISEST) and Heritage Youth Researcher Summer (HYRS) research program has demonstrated to me that gender representation in non-traditional fields is important, and diversity of both genders should be acceptable and achievable within any profession. The Professional Development sessions we experienced, offered reinforcement that there are a multitude of diverse professions which allow interaction with accomplished university students and researchers. Importantly, within Dr. Elahi's lab, I also learnt that there are a plethora of ways in which a research team can each take on their own unique project, and have autonomy over their experiments and ideas.

Through the program, we are required to attend Professional Development Sessions, the most valuable being the Networking Fair. Here we were required to interact with professionals and students in a variety of fields in order to develop our networking skills and ask pertinent questions about their profession. This was the highlight of the series of sessions since we could not only observe a diverse array of different professions, but we could also have our questions answered directly. Although sometimes the material might appear bland, all these sessions provided necessary skills to take with us wherever our future leads us. Not unlike going to a foreign place where culture and language is eventually learned, my lab experience has allowed me to adapt to, and understand the terminology, language and ways of the laboratory. In high school I gained a rudimentary understanding of the immune system, which was a valuable background, however the depth of my knowledge has been transformed by this experience. Within Dr. Elahi's lab there are many diverse projects in progress, such as looking at the immune cells from HIV patients. My project focused around examining the role that immature red blood cells have in whooping cough infection. Through being in the laboratory I was able to learn basic skills such as micro-pipetting, cell counting and safety, but also how to use software to analyze my data into meaningful results. In addition to my own research project, I assisted and observed others perform their own intriguing projects. Over the course of the HYRS research program I have been able to cultivate many relationships with other lab members due to their inclusiveness and kindness and this has been truly gratifying. Sometimes even the small things, such as allowing me to watch and help with harvesting a mouse spleen and thymus. This diverse and rich lab environment has allowed me to learn so much and those encouraging me have made it that much better.

The HYRS program would not be possible without sponsors, so I would like to thank Alberta Innovates -Health Solutions (AIHS) for sponsoring me. I would also like to thank the University of Alberta and the WISEST program for making this experience possible. Finally, I would like to thank Dr. Elahi for allowing me to work in his lab, Dr. Okoye for being an outstanding supervisor and everyone in the lab for making my experience so everlasting. I would highly recommend this program for anyone interested in the sciences or maths as it will provide a unique and unforgettable experience. I applied for an experience yet found myself on a journey one I will never forget.

# Julieta Hernandez



**Supervisor:**  
**Dr. Edmond Lou**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Surgery**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

Being part of the HYRS Program has been an amazing way to spend six weeks of my summer. This year, the HYRS program was fused with the WISEST program. This gave me an opportunity to meet many other students who want to pursue a career in science like me. I applied for the program because it seemed like an incredible opportunity to meet new people and learn so many new things. I was thrilled when they told me I got accepted, and once it started, time just flew by. Before the first day of the program, I thought that I'll be able to make long-lasting connections and expand my knowledge about the various science fields, but the program offered so much more than that. Through the WISEST events, I learned new things such as social skills (e.g. networking and communication) and the different paths available for me in university. With the Lunch'N Learn Sessions, I learned important skills such as report writing and poster designing. Not only did I make new friends with the students in the programs, but also with the summer students in my research team.

When I first read the project overview, I was feeling overwhelmed with all the new technical vocabulary. By the end of the first week in the program, I understood every single word that was written on that page. The program has provided me with a whole new set of vocabulary and fresh knowledge that I didn't know before starting the six weeks program.

During the six weeks in the summer program, I got the chance to work in a research lab on kyphosis. Kyphosis is an excessive curvature of the spine in the sagittal plane. As the curvature of the spine progresses, more radiographs are needed. Since X-ray emits ionizing radiation that increases the risks of cancer, it has been proposed an alternative: to use ultrasound. I was handed the project to evaluate if it is feasible to use it. First, I had to measure the kyphotic angle using the Cobb method (the upper most tilted vertebra to the lower most tilted vertebra within the thoracic region) and Standard method (the first thoracic vertebra to the last thoracic vertebra) on 33 radiographs twice with one week apart. I had to then measure the kyphotic angle using the Standard method on 33 ultrasound spinal images. Afterwards, I calculated the reliability and accuracy of my measurements using the Average  $\pm$  Standard Deviation (SD), the Mean Absolute Difference (MAD) between the first and second trials, and the MAD between the average Cobb method and the Standard method on radiographs. I had to analyze the accuracy and reliability of the kyphotic measurements on the ultrasound images using a linear correlation analysis between the Standard/Cobb method and ultrasound. My results suggest that the kyphotic angle can be measured reliably from ultrasound images, but further validation needs to be done before using ultrasound in a clinic.

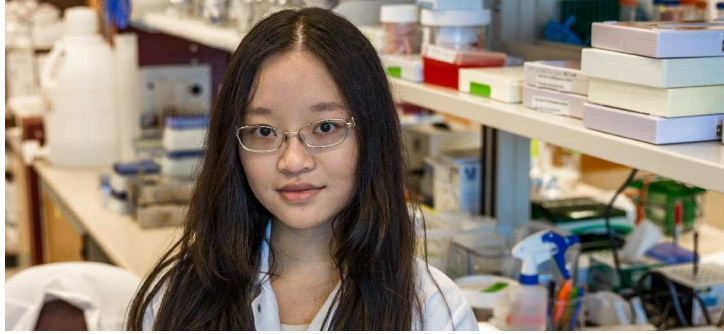
With this project, I learned different organization skills (e.g. time management) that I will use in the future. I also got a taste of what a working environment is like and what to expect when I get a job in science or become part of a research group. The experience I got this summer was a very valuable asset, and I'm happy to say that working in the lab was my favourite part of the program. I would like to thank Dr. Edmond Lou and his research team, my sponsor, Alberta Innovates-Health Solutions (AIHS), and the WISEST team for letting me spend the summer in the best way possible and have such a memorable time at the University of Alberta.

# Jing Huang

**Supervisor:**  
**Dr. Lynne Postovit**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Oncology**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**



When I submitted my application for the HYRS (Heritage Youth Researcher Summer) Program, I felt a mix of trepidation and acceptance. Trepidation at being in a lab for six weeks and acceptance of that I would be rejected. I assumed that I would not be accepted into the HYRS Program due to the robust competition. The call from the WISEST office telling me that I had been accepted into the HYRS Program was therefore a surprise, but a wonderful surprise. It was only after accepting the offer that the reality truly dawned on me. I hadn't prepared myself for the idea of spending my summer in a lab as I had prepared myself for a boring and uneventful summer. Immediately I was terrified. However, after spending these six weeks in the Postovit lab, the terror has definitely dropped down to nearly unnoticeable levels.

In the Postovit lab, the research is centered on breast and ovarian cancer. My supervisor, Dr. Gabrielle M. Siegers, conducts research on the role that gamma delta T cells ( $\gamma\delta$ Tc) which have the capability of killing tumour cells. In my primary project, I quantified migration assays which sought to determine the effect of Nodal, an embryonic protein that is present in breast tumours, on the movement of  $\gamma\delta$ Tc. In my secondary project, I assisted in the immunohistochemistry (IHC) protocol in order to determine whether  $\gamma\delta$ Tc are present in the skin of psoriasis patients.

When I received the information that I had been assigned to the Postovit lab, I was very pleased as cancer has always been an interest of mine. However, I came into the lab with a very idealistic view of what research is about. Now, I leave with a clarified perspective on its reality. What these six weeks have taught me is that the 'eureka' moment in research is extremely rare and failure is the most prevalent result. However, I have also learned that it is that moment where everything falls in place that makes all of the failures fade into the background.

HYRS was run under WISEST this summer and it gave me the opportunity to learn what faces me in my future. While I've always known that there was a gender bias in academia towards men, it was shocking to see the statistics. I was fortunate in that both my Principal Investigator and my supervisor are women who have shown me that while there are difficulties that face them, they have been able to succeed in spite of them. I really appreciate that in many of the events that WISEST organized such as the U of A Q&A and the Networking Fair, the speakers were women. As a girl, it was encouraging to see so many women succeeding at their respective fields despite the challenges presented to them.

This summer has been a rollercoaster of emotions but I am ultimately disappointed to see my short journey in research end. I would like to thank Dr. Lynne Postovit and Dr. Gabrielle Siegers for bringing me into their lab and allowing me to assist in their research. In addition, I would like to acknowledge all of the members of the Postovit lab who welcomed me and taught me patiently. Finally, I am extremely grateful to Alberta Innovates-Health Solutions (AIHS) without whom this summer of discovery would have been impossible. I hope to bring this experience and the lessons I've learned into my schooling and any future research I pursue.



# Nitya Khetarpal



**Supervisor:**  
**Dr. Jim Raso**

**Department:**  
**Medicine and  
Dentistry -  
Surgery**

**Sponsor:**  
**Alberta Innovates -  
Health Solutions**

I am interested in science, and I also want to spend my life doing something that will help make the world a better place, as cliché as it sounds. To successfully do this, I plan to go into a health-related career. This summer, I was accepted into the Heritage Youth Researcher Summer (HYRS) program at the University of Alberta. It is a six-week program that places a student in a health-related research position. The six weeks went by very quickly and, as I am typing this, I feel like I have only begun my journey in research.

I did two different research projects this summer. Both were literature reviews, one on the ethics of contacting patients for research and one on the effectiveness of gabapentin for pediatric spinal surgery. For my first project, I began by finding the acts and regulations in each province. Then, I read them and took note of the sections that involved personal health information. After this, I organized my data by province and summarized what I had found. Many of the provinces have different rules regarding who can share patient information. For example, in Alberta, two different provincial acts apply, whereas in Ontario, there is no provincial legislation that deals explicitly with healthcare and information sharing. Instead, the federal privacy law is applied. This is useful information to know, because clinical trials cannot be done if patients are not contacted to take part in trials. When I, in the (relatively near) future, conduct a research trial, I will keep this information in mind. My second project involved collecting and analysing articles from databases to see what the current literature published says about gabapentin. This drug is used to treat neuropathic pain and it may help to treat post-surgical pain in adolescents with scoliosis. As well, a rapid recovery pathway may reduce dependence on opioids (the current treatment) and may decrease recovery time, which is promising. However, many articles call for more research to be done. This is because, in science, things are constantly being ameliorated, causing new publications.

Prior to this summer, I barely knew what a database was. After these six weeks, I can now confidently search through many databases, like PubMed, Scopus, Embase, Hindawi, Lexicomp, DynaMed, CINHAL, and CanLII. I went from not knowing what an abstract was to explaining interesting articles to my peers.

In addition to the research, as a HYRS student, I had the opportunity to attend many events over the six weeks. We had weekly Professional Development Seminars and Lunch 'N Learns. These taught me useful skills, such as networking and creating posters. I also attended the Ada's Team lunches, giving me some exposure to computer science, while is interesting and applicable to everything, due to how useful computers are. The most interesting events were the research tours: interacting with professionals in their labs and seeing how passionate they were encouraged me to pursue a research career. In addition, by attending all these events, I have made lifelong friends and grown in knowledge and confidence.

I would like to thank Mr. Raso, Mrs. Southon, and Mrs. Lukenchuk for giving me these opportunities to whet my appetite for research. Thanks to them, I have learned so many things about how research is done and I plan to apply that knowledge when I come to the university as a student. I would also like to thank Michée and Rosie, our two coordinators, for always answering the many questions I had. And, last but not least, I would like to thank Alberta Innovates-Health Solutions for sponsoring me, giving me the chance to have this unforgettable experience.

# Sara Kluthe

**Supervisor:**  
**Dr. Yves Sauve**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Ophthalmology**

**Sponsor:**  
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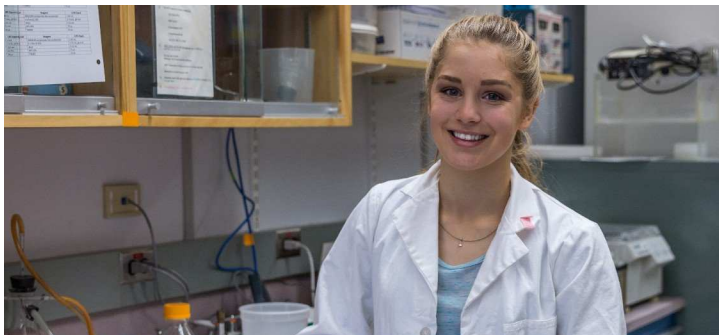
For me, HYRS has been a great opportunity and invaluable experience. I first heard about WISEST from my cousin who had participated in 2013. She told me of her unforgettable experience and I thought it would be a wonderful program for myself as I was not quite sure what I wanted to do yet in university. After approaching my school councilor about WISEST I learnt about HYRS, a biomedical based research summer program, and was immediately drawn to it being very interested in that field.

When I found out I would be working in an ophthalmology lab, I was ecstatic and very nervous at the same time as I knew nothing about the eye. However that nervousness disappeared very fast as I started the program. On the first day, my supervisor Julia came and took me to the lab where I would be situated for the next six weeks. She introduced me to all the people who were working there and I immediately felt like I was a part of the team.

During my time at the lab I researched how type 2 diabetes affects vision in Nile Grass rats. We tested two groups of Nile rats, one with diabetes (diabetic) and one without diabetes (Controls). To test their visual acuity we used a device that has four computer monitors surrounding a platform, creating a virtual cylinder. We would place the animal on the platform and bars of specific size would drift around them on the screens. We would then watch for head turning behavior (tracking) on an overhead camera. Then we would adjust the contrast of the bars, lowering it until the animal could no longer track them and we would find our threshold. We received some very interesting and unexpected results from this research. When we were conducting this research, we predicted that the controls would have a higher contrast sensitivity than the diabetic animals. But, what we found was that the diabetic Nile rats had a higher contrast sensitivity at certain bar sizes than the controls. We are not sure why this happened but it is very intriguing. During my six weeks at the university, WISEST provided all of us students with the chance to grow and learn and to meet new people. Through their seminars on Mondays and lunch and learn sessions on Fridays, I got to familiarize myself with the university campus as well as learn skills that will be useful to me in my university years to come. I learnt how to make a research poster, how to give an effective presentation and I got to meet many inspiring women working in science related fields and talk to them about their experiences.

I now feel comfortable going to university without a solid plan as I know that I have time to figure it out along the way. I would like to thank my supervisor and research partner Julia Lawlor and my Principal Investigator Yves Sauve for their leadership and patience, as well as the other members of the Sauvé lab for their help and advice. I would also like to thank my sponsor, Alberta Innovates-Health Solutions for making this a possibility for me and the WISEST team for this wonderful opportunity. I know with great certainty that the skills and experience I gained from this program will benefit me for many years to come.

# Destiny Peyton



**Supervisor:**  
**Dr. Paul Melancon**

**Department:**  
**Medicine and**  
**Dentistry - Cell**  
**Biology**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

When I first was introduced to the HYRS program, I was immediately intrigued. This was an opportunity for me to gain hands on experience in a medical research lab. I plan to pursue a career in medicine and I felt that this program would provide me with skills that would escalate my chance to succeed in my future career endeavors. I was ecstatic when I discovered that got accepted into this program; I knew that I would have an amazing experience and learn a multitude of skills.

The project I got assigned to was in Dr. Paul Melancon's lab researching the characteristics of fusion protein BirA\*-BIG1. The protein BIG1 is responsible for regulating traffic out of the Golgi Complex; I used the pre-constructed fusion protein of BirA\* and BIG1 because BirA\* uses biotin to tag other proteins that it interacts with. My research focused on proving that this protein remained in close proximity to the Golgi and confirming that this fusion protein would successfully biotinylate other proteins. This information will be used in future research to determine which proteins regulate the function of BIG1; that can then advance into possible targeted drug therapies for Hepatitis, Polio, and Dengue. Working in the Melancon lab was a great experience. Both Dr. Melancon and Calvin Chan were great mentors and taught me a multitude of skills. They ensured that I had a solid understanding of the project and guided me through many procedures.

WISEST provided many professional development events that I found exceptionally beneficial. There were two events that I found especially constructive, the Art of Networking Lunch N' Learn and the Networking Fair. In the professional world, networking is an essential aspect of your career and I feel as though these sessions really enforced not only the importance of networking but provided the WISEST and HYRS students with a stable foundation of networking skills. Additionally, my favourite Professional Development session was the "Effective Presentations". I enjoy to share my ideas with others and presentations are a common format of doing such. This session really focused on techniques for presenting that are often overlooked. Skills such as specific, targeted body language and voice tempo. Being a participant in the HYRS program truly launched my professional skills to the next level and I am so thankful to have been given this opportunity.

Additionally, WISEST was particularly valuable for me in the aspect of career discovery. In the near future, I will be deciding what university program I wish to complete; I have always aspired to go into medicine but have faced some anxiety on the fact that I may change my mind at some point. Although, throughout the six week program, I was exposed to many career paths and was given the chance to speak to numerous university students and working professionals. I was given insight on the flexibility of university and that changing my mind is not a big deal at all. Because of this, I feel a lot more self-assured and comfortable moving forward into the beginning of my career.

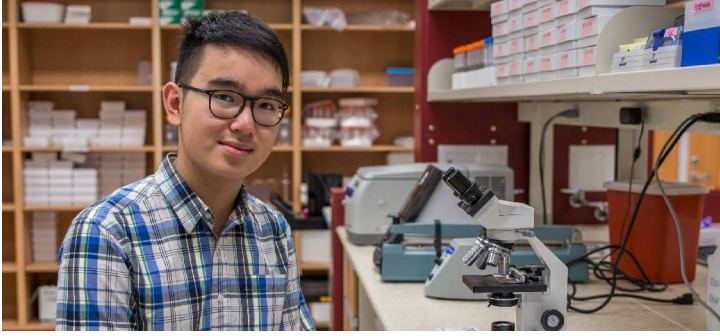
Having the opportunity to partake in the HRYRS program is something that I am exponentially grateful for. I have grown on both a professional and personal level. I would like to thank WISEST, Alberta Innovates-Health Solutions, the University of Alberta, the Canadian Institutes of Health Research, Dr. Paul Melancon, and Calvin Chan for making this experience possible for me. Your contributions, effort, and time is something that I am truly thankful for. I could not have asked for a better HYRS experience.

# Richard Mah

**Supervisor:**  
**Dr. Stephane L.**  
**Bourque**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Anesthesiology**  
**and Pain Medicine**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**



Before my Heritage Youth Researcher Student (HYRS) program, the word ‘lab’ to me meant wearing gloves, goggles, lab coats, staring into a microscope all day, and doing repetitive experiments. I applied to the program hoping to expand my definition of a ‘lab’ environment. Upon reflection, I realized this experience was so much more. From the opportunities to explore different research laboratories to the chances to network with people of various professions, HYRS has opened my eyes to not only a new perspective of a lab, but also to the plethora of great people, and possibilities around me.

My project looked at the effect of maternal iron deficiency on kidney development. During this study, I was able to experience the paraffin embedding of different tissues, hematoxylin and eosin staining of slides, and an analysis of the kidneys. Not only was I able to spend time learning about the different experiments that happened in our lab, but I was also able to attend weekly lab meetings to collaborate with other labs, and do experiments using equipment from other labs. What surprised me was how much I was able to do and experience in just six weeks. Working with people from other labs, and getting to know my lab partners by doing experiments changed my perception of what lab work really was. My view of scientific and clinical lab work changed from thinking it was a competition to publish papers and extrapolate results; to now, where I can understand working in a lab is about teamwork in order to find results. It feels amazing to know that at my age, I have been given the opportunity to not only learn about lab procedures, but also contribute to the pre-clinical research being done in our lab. This exposure to the lab has allowed me to make connections with people I will be able to maintain beyond high school, and taught me science that has motivated me to follow a career path in a similar if not the same field.

My experience in the program was further enhanced by the “Lunch n’ Learn” sessions and seminars provided by WISEST/HYRS. These sessions allowed me to meet new professionals from other fields of science and engineering, and talk to experts of all different ages. It would be hard to pick the “best” session as I feel all of them allowed me to learn something; whether it be how to deliver a good presentation, how to make an attractive research poster, or what it is like to work as a researcher or engineer. And because all the presentations, seminars, and sessions were led by such successful people in their field, the overarching lesson I gained from these WISEST events was that anything can be achieved with hard work. Time flies when you’re having fun, and I feel as if I started in the lab yesterday. Being part of the HYRS research program was unarguably the best learning experience, and choices I have ever made. Hence, I would like to thank Alberta Innovates-Health Solutions (AIHS) for sponsoring me; the organizers of WISEST; friends and family; the members of my in my lab: Ronan, Jihee, and Peter, Sareh, and Stephana; and most importantly my supervisor Andrew, and Principal Investigator Stephane for the awe-inspiring support. Thank you to everyone for allowing me to realize a ‘lab’ is not just white coats and goggles, but a vibrant community where even our littlest discoveries and learning can have make a huge impact for all. The only thing I could wish for, is a longer summer research program.

# Caroline Part



**Supervisor:**  
**Dr. Christine**  
**Webber**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Surgery**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

Although I have always had a passion for the sciences, I knew very little about a career in clinical research before participating in the Heritage Youth Researcher Summer (HYRS) Program. I applied to HYRS to expand my knowledge of the medical field and gain insight on working in a professional lab environment. Being accepted into the program filled me with extreme joy and apprehension. However, it quickly became one of the greatest experiences of my life. This program superseded my expectations in every way. Without participating in HYRS, I would not have had the opportunity to work alongside undergraduate and graduate students performing innovative research so early in my scientific career. There are few other experiences where you can learn and grow so much in six week's time.

Throughout my six weeks in HYRS, I worked in the Faculty of Medicine and Dentistry in a lab investigating neuropathic pain resulting from diabetes. Being in the lab felt like taking a course on the nervous system, an area which I was extremely interested in but still did not know very much about. In just my first week I had already seen dorsal root ganglions, nerves, and brains collected from rats. My research project was determining the levels of expression for three proteins in diabetic and healthy rat tissue. In order to do this, I was taught how to perform a procedure known as immunohistochemistry (IHC). Hearing this term for the first time made me incredibly nervous, but that quickly faded with the great instruction I received from members of the lab. IHC uses antibodies and fluorescent dyes to detect specific antigens in tissue. It was also very interesting to view the tissue under a fluorescent microscope and see the different neurons. I also learned how to identify and count neurons, cells, and nerves in the pictures taken from the microscope.

The members of my lab were truly amazing. I very much expected to be intimidated by such highly educated people, however all of them were very welcoming. Everyone was always eager to help me, no matter how many questions I had for them. All of them were able to give me insight on university life and courses, as well as explain various anatomical terminology. I learnt so much from my research team, which greatly contributed to my positive experience.

During the week there were also educational sessions held for HYRS students. Each of these were fantastic opportunities to meet other professionals in the science field outside of a lab setting. The Lunch "N Learns were invaluable in providing us with the skills to present ourselves and our work in a professional manner for a future career in research. All of the presenters for these sessions were very engaging and informative. The Networking Fair was a great chance to speak with successful people about their career paths, struggles, and any advice they had for our future. Other activities included a campus tour and a library orientation. Both of which will greatly help my confidence when I attend university in the future.

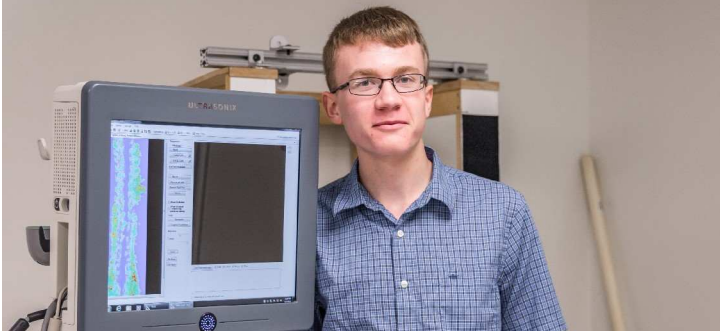
I would like to thank my sponsor, Alberta Innovates-Health Solutions, the University of Alberta, and the WISEST coordinators for providing me with such an incredible opportunity. I would also like to take the time to thank my entire research team. I will be forever grateful to Dr. Christine Webber, Timo Friedman, Jyoti Singh, and Haecy Macandili for their support, patience, and guidance throughout my six weeks in the lab and for making this an absolutely unforgettable and amazing summer.

# Campbell Rea

**Supervisor:**  
**Dr. Eric Parent**

**Department:**  
**Rehabilitation  
Medicine -  
Physical Therapy**

**Sponsor:**  
**Alberta Innovates -  
Health Solutions**



Ever since I was a young child my passion for science fueled my drive to do well in school and to hopefully one day add myself to the ranks of scientists and researchers working to expand human knowledge. Wanting to get a first hand experience into research, I signed up for the Heritage Youth Researcher Summer (HYRS) program. I was so nervous when I first applied to spend my entire summer at the University of Alberta; this was the first time that I had ever been given the opportunity to expand my horizons beyond my small town. Not only would I have to adjust to the more academic environment, staying in Edmonton also served as a crash course in independent living. Everything from doing my own laundry, buying groceries, and learning to cook for myself all presented its own set of challenges. All of that aside, I feel as though the transition to living semi-independently isn't as big as some people expect it to be. In addition to my concerns for the change in lifestyle came the anxiety of meeting new people. Being accepted into the HYRS program, I would be expected to meet and make good impressions towards other students, researchers, and doctors. I soon learned that the majority of my fears were unfounded. Everyone I met was respectful and understanding; many of them went through or were going through very similar experiences to me.

For my research project I worked under Dr. Eric Parent studying the various physical and emotional effects of a form of scoliosis exercise called Schroth on patients with adolescent idiopathic scoliosis (AIS). AIS is a 3D spinal deformity with the characteristic features being a curve of more than  $10^\circ$  and vertebral rotation giving the back a hump. In an attempt to lessen the effects of scoliosis, doctors traditionally used a ridged brace or surgery. Because bracing can be uncomfortable and surgery risky, Dr. Parent is studying the effects of this alternative treatment. Since the project is designed to be carried out over the length of a year, my project focused more on the immediate effects of Schroth to make sure the corrective movements have the intended effect. At first, my experience working as a research assistant went slowly; I was tasked with reading up on background information and data entry. Luckily enough, Dr. Parent had set us up to shadow a Ph.D. student working in the same lab as he performed an MRI scan on a patient. Later in that same week, we met with Dr. Doug Hill at the Glenrose Hospital to learn more about some of the technology used in rehabilitation medicine. After this first week, however, things really started to get interesting. One of the researchers working in the same department had recently developed a program to allow the creation of three-dimensional maps of the spine using ultrasound. The system works by taking a series of ultrasound images and arranging them into a column with the help of a GPS. The end result can be used by doctors to observe curve progression without the fear of radiation exposure. Not only did we get a chance to analyze this new form of measurement, we also received training on how to operate the ultrasound machine and perform scans on patients.

I learned a lot from my experiences in the HYRS program. Not only did I get to talk to so many amazing researchers, students, and other professionals to learn more about their work, I also got first-hand experience in research and everything that comes with it. In addition to collecting and analyzing data, I got exposure a great deal of other important topics such as applying for a research grant, background reading on similar studies, and organizing and presenting my research in a variety of formats. All in all, I really enjoyed my experience in the HYRS program.

# Dennis Rutar



**Supervisor:**  
**Dr. Eric Parent**

**Department:**  
**Rehabilitation  
Medicine -  
Physical Therapy**

**Sponsor:**  
**Alberta Innovates -  
Health Solutions**

Six weeks ago, I wouldn't have been able to tell you a single thing about university research except that "it sounds fun" and "maybe I should try it". Well, I did and it was definitely worth sacrificing my usual summer of sleeping in every day, shutting down my brain for 2 months, and waiting for the next school year to start. From the perspective of your typical high school student who counts down the days to every day off and holiday, I would still guarantee that no WISEST or HYRS student has regretted being a part of the program. From meeting other researchers, helping to run real studies, touring around campus, to even getting lost on scavenger hunts, every part of it was unlike anything I have done before.

As a HYRS student, I - along with another HYRS student - worked in a scoliosis research lab under Dr. Eric Parent in the Faculty of Rehabilitation Medicine. Like many of you reading this, I didn't even know what scoliosis was - the focus of my supervisor's entire research career. I did, of course, soon figure out that scoliosis is a 3D deformation of the spine and that there also seemed to be endless research papers on something I never knew existed. Half worried and half interested, I decided to just start with the project laid out for me. We investigated the effects of scoliosis-specific exercises on patients with adolescent idiopathic scoliosis (AIS) using ultrasound and 3D image reconstruction software. Much to my content and exceeding my expectations, we scanned actual patients, analysed the images, and recorded all the data. I think that is one of the most valuable qualities the summer research program has to offer: the opportunity to go beyond mixing chemicals from a standard recipe in a high school laboratory and trying something totally unique that is as close to - if not equal to - real research as grade 11 students will get.

Despite my concerns of asking the most simple questions imaginable - sometimes twice, other researchers in the lab were always willing to help without complaint. I found that the positive and open environment along with working with some of the most knowledgeable people at the university helped me learn so much more. Upon first stepping into the lab, I didn't know how to write reports, make research posters, use equipment, or even cite other papers; all I can say is that it's a much different story now. Don't be under the impression either that the HYRS and WISEST programs are aimed strictly at doing six weeks of non-stop research. Possibly more important than the research itself is the exposure to highly academic students and professors who have already completed several years of university. Informative lunch presentations, question sessions, and networking events were all included in the weekly WISEST schedule. The opportunity to hear first-hand accounts of post-secondary life and career options was very beneficial in strengthening my understanding of the many paths available after high school.

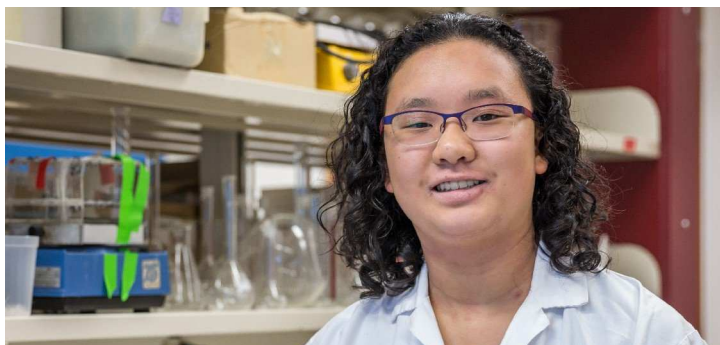
Finally, none of this would have been possible without funding for the program. I would like to thank AIHS, the University of Alberta, as well as the many other contributors for making these summer research positions available not only to myself, but also to the other 62 students in WISEST and HYRS. I hope that many others take advantage of this program provided by an amazing WISEST team and become involved in the endless yet fascinating fields in research.

# Caitlyn Shum

**Supervisor:**  
**Dr. Vera Mazurak**

**Department:**  
**Agriculture, Food  
& Nutritional  
Science -  
Agriculture Life &  
Environmental  
Sciences**

**Sponsor:**  
**Alberta Innovates -  
Health Solutions**



Through elementary and junior high, my dream career had never been totally clear. I remember always looking at the careers presented in television dramas and thinking that one would be the best fit for me. The career goal would last as long as the drama; every new drama was another career dream I would chase after for a while. It was only after I started high school that my career path became clearer. I knew I loved all my science classes but especially biology and chemistry. To gain further insight into the application of biology and chemistry in the real world, I decided to apply for the Heritage Youth Researcher Summer (HYRS) program.

This summer, I worked in Dr. Vera Mazurak's lab under two graduate students, Ana Anoveros and Amrit Bhullar. Their projects focused on quantifying muscle cell proportions in patient muscle biopsies collected from abdominal muscles. Biopsies were collected from the patients during surgery and brought to the lab to process. Muscle biopsies were frozen, cut and placed onto slides. Immunofluorescent staining was used to identify the types of muscle cells the tissue. Then the stained tissues are visualized using a confocal microscope. This microscope uses lasers to excite the fluorescent stains on the tissue to make different muscles cells glow a different color. Seeing the tissue lit up with so many colors was definitely one of my favorite parts of this experiment. Going into this program I imagined being given a pile of textbooks and having to read them all to get caught up with the theory behind the projects. I thought that the people in the lab would look down on me because I was not at their level of education. To my surprise, I was welcomed into the lab as another member of the family and they explained the theory behind the projects to me so that I could understand what was happening. At times, the amount of information was a little overwhelming but it got better as time passed. Mistakes were inevitable, I definitely made a few during the program. The interesting part was that with every mistake, I learned the proper techniques to avoid the same mistake in the future. The biggest thing I took from the research component of the HYRS program was that at the end of the day, researchers are still people. They have their ups and downs and most importantly, none of them are perfect. It demonstrated to me that with hard work and dedication, I too can pursue the career of my choice.

WISEST offered events for students to attend during the week. I enjoyed the professional development sessions as they balanced out the work week and taught other skills needed for the work world. It also gave me time to associate with the other students and learn about their research projects. Lunch hours session such as the campus tour were practical and saved me from going in circles or getting lost on campus. Out of all the events, I enjoyed the Networking Fair the most because I got to meet many interesting people from different fields and ask them questions about industry or their educational journey. It showed me how many different careers are available in the world and that the same education degree can translate to so many different jobs in the future.

In conclusion, I would to thank Alberta Innovates-Health Solutions for giving me this unique opportunity to experience firsthand, the research field. I learned so much about my field of research and about my capabilities and ability to adapt to new situations and challenges.



# Rahul Singla



**Supervisor:**  
**Dr. Peter Hurd**

**Department:**  
**Psychology**

**Sponsor:**  
**Alberta Innovates -  
Health Solutions**

Nearing the end of my grade 11 year, I realized how truly close I was to beginning university. Many questions with regards to which courses I wanted to take and what my career goals were began to intimidate me. My biggest worry of all is how I would fit into a university with over 30,000 students when I come from a school with barely 400. Would I be able to find my way around? After applying for the Heritage Youth Researcher Summer (HYRS) program and eagerly waiting for a response, I finally received the call informing me that I had been selected for the program. During my six weeks in the HYRS program, many of those questions were either resolved or eased. I learned that you don't need to come into your first year with your entire academic life planned out and that, most importantly, it is acceptable to switch your plans throughout your degree.

The experiences I have acquired throughout the last six weeks in Dr. Hurd's Sex and Violence lab have been nothing less than exceptional. Here, I had to measure the behavioural lateralization of 18 convict cichlid fish. The term "behavioural lateralization" seems daunting but in simple words describes which eye is more dominantly used by fish, as determined by which eye the fish prefers to face toward stimuli. To do this, I used an apparatus called the "Mirror Octagon". Using this and a digital camera that was programmed to take one picture every two seconds for a total of 320 pictures, I was able to determine which eye each fish preferred. I was also given the task of determining the anxiety levels of each fish. An experiment called "Open Field" was required to deduce this information, which requires an open tank and a video camera to take 360 second videos. We discovered that fish with stronger right-eye lateralization were more likely to explore inside squares of open field, but that the overall level of activity was not influenced by lateralization strength. This is interesting because it implies that lateralization does not impact every aspect of anxiety, just exploration patterns. By running these experiments, I came to a realization and developed an appreciation of how much dedication, patience, and discipline is required in research.

Apart from the research itself, the Women In Scholarship, Engineering, Science and Technology (WISEST) team set up wonderfully informative sessions where all the high school students from both the WISEST and HYRS programs could interact with one another, and also professionals and students in the university. We were given various opportunities to ask questions, learn skills, and above all, make friendships that will last a lifetime. Whether it be the Ada's Team Lunches, the Professional Development seminars, or the Lunch 'N Learns, we always had an opportunity to meet new individuals and hear their stories. These activities have changed my perception of university and also answered many of the questions I had about my professional future.

My experience this summer has had a tremendous impact on my life and my expectations for the future. I would like to express my gratitude to my sponsors, the AIHS team, the University of Alberta, supportive family and teachers, as well as the WISEST and HYRS programs, without which I would not have had such an opportunity. I would also like to thank Dr. Peter Hurd, Brittany Hope, John Hoang, and all of the members of the Hurd lab for the support and advice they readily provided me with this summer.

# Emily Skousbol

**Supervisor:**  
**Dr. Jens Walter**

**Department:**  
**Agriculture, Food  
& Nutritional  
Science -  
Agriculture Life &  
Environmental  
Sciences**

**Sponsor:**  
**Alberta Innovates -  
Health Solutions**



A summer experience unlike any other, at least for a high school student; this is probably the best way to summarize time in the Heritage Youth Researcher Summer (HYRS) program. Instead of lazing about all summer, as was my backup plan, I was granted the opportunity to work with a research team in the Department of Agricultural, Food, and Nutritional Sciences (AFNS) on the Feed Your gut Bacteria morE fiber (FYBER) study. After the initial settling into the workplace, the program really geared up, and the time to learn and grow began. Above everything else, this summer was an extraordinary learning experience, and I will take all of the skills I have begun to learn into the rest of my high school career, and my future endeavors.

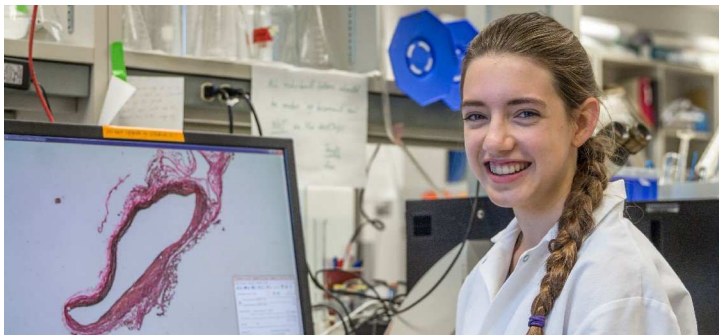
I remember first learning about Women In Scholarship, Engineering, Science, and Technology (WISEST) from a poster in my school advertising the Summer Research Program, which ultimately led to me discovering HYRS on the WISEST website. I remember applying for both because I desperately wanted to participate in science for the summer, and being positive I would be placed in a chemistry lab, but it was not meant to be. To be completely honest, I may never have put myself in nutrition, but I am so grateful that I was placed there. My time in nutrition was invaluable, and probably better suited to my current pursuit of pharmacy and public health.

I remember the confusion upon first entering the lab, and the ever-present feeling that everyone else knows more than you. That feeling was absolutely correct; everyone else had far more knowledge in the subject area than I did. The Alberta curriculum doesn't dare tread into nutrition beyond basic definitions of carbohydrates and lipids, and the depth into which the FYBER project took me was far beyond anything I could have anticipated. I now know more about fiber than I could have ever imagined. In the end, my project focused on how four distinct types of fibers affects perceived satiety in humans, but, due to a small sample size, the results I attained were not conclusive.

I remember every Professional Development session and every Lunch N' Learn; the twice weekly learning opportunities which each presented new life skills. A common theme, though, was preparation for choosing a career. The various chats with professionals in the industry gave plenty of insights, but perhaps this is the most important: there is more than one career path. A person may not find a career in the subject area in which they intended. Sometimes, a person gets a degree in nanotechnology and finds a job in computing science; life will find a way to work itself out for hard-working and honest individuals.

As the summer draws to a close, and I prepare to return to high school, I have but one thought left to share: the HYRS program was a learning experience far better than anything else I could have done this summer. As such, I would like to thank Alberta Innovates -Health Solutions for sponsoring me through the summer; without their support I would not have been able to learn all I have this summer. I would also like to thank my PI, Dr. Jens Walter, as well as my supervisors Edward Deehan and Janis Baarda for welcoming me into their workplace, and giving me numerous opportunities to learn and grow. I am positive every experience I have gained this summer will aid me as I progress through my life and career, and I will remember them for the rest of my life.

# Jacoba Snellen



**Supervisor:**  
**Dr. Zamaneh**  
**Kassiri**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Physiology**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

Getting accepted into the Heritage Youth Researcher Summer Program (HYRS) was the first step to an astounding summer. I applied because I have always had an interest in the medical field and after discovering HYRS it seemed like the perfect opportunity to gain a hands-on experience with medical research. After being accepted, school seemed to fly by and I began preparing for HYRS, though I was very nervous on the HYRS orientation day. It was intimidating knowing that the expectations for acceptance were high and I was worried that I wouldn't fit in with the other students. This all changed. Five minutes after walking into orientation I already knew that I was going to make lasting friends. Everyone was friendly and I learned that most people shared my anxiety. During the afternoon my experience got even better when I met my Principal Investigator (PI) and direct supervisor (DI). I was relieved to find out that they were also friendly and they gave me lots of time to adapt to the lab I would be working in.

The majority of my time during HYRS was spent in the research lab. The lab I was assigned to was in the Heritage Medical Research Centre building (HMRC) on the Heart and Stroke Foundation Floor. My DI was working on a project that researched aortic aneurysms. My project worked alongside this research to find the optimal protocol for human and murine vascular smooth muscle isolation and characterization. The research I did concluded that the enzymatic digestion method of isolation (a method of removing and isolating Vascular Smooth Muscle Cells (VSMCs) from a mouse aorta) proved more successful than the explant method (another method of cell isolation) in regards to primary VSMCs. I also found out that calponin, SM22, and HYM11 (all types of smooth muscle cell (SMC) markers) are VSMC specific. Smooth muscle alpha actin (another SMC marker for cell staining) is not. This research taught me the characteristics of VSMCs that I could have never imagined even existed without having had this experience.

The HYRS program offered more than just a great experience in a medical research lab. It also offered many professional development skills and sessions that helped teach everyone life skills. Some of these included effective presentations, designing a research program, research in action, the art of networking and so much more. My personal favorite session was the Social Science Challenge. This challenge was my favorite because it taught teamwork skills, it helped me make new friends, and it was really cool to see how other people used various ideas to make a mechanism that defeated the challenge. Although my favorite was the Social Science Challenge, the other sessions were all excellent too. I know that I will use the skills and life lessons taught in these sessions for my entire life and I am very appreciative for the opportunity to have such a wonderful experience.

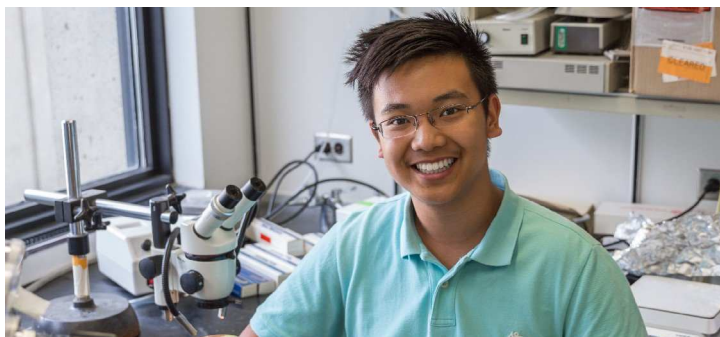
If I had the option of going back and changing something about this program, it would be that the HYRS program would last longer. Although this summer took dedication and there were points where the research seemed to drag on a bit, the overall experience was magnificent. Throughout this summer I've made many new friends, acquired many new skills, learned lots, earned so much experience, and had a blast along the way! I would like to thank Alberta Innovates-Health Solutions for sponsoring my summer and allowing me to have an amazing time.

# Jiayi Tang

**Supervisor:**  
**Dr. Frances Plane**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Pharmacology**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**



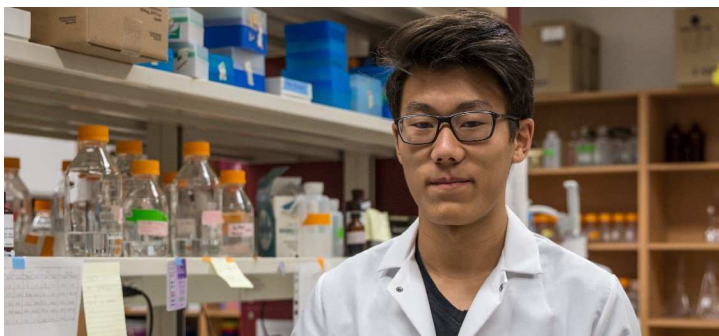
Science has always been my preferred field, which is why I was so excited when I was accepted into the Heritage Youth Researcher Summer (HYRS) Program. It has been truly rewarding to experience scientific research authentically. Working in a pharmacology lab for six weeks has been an extraordinary experience. I not only enhanced my understanding of the scientific concepts I learned in high school classes, but also got exposed to complex topics at the university level. In many ways, it has been humbling to see the depth of the research that happens at the University of Alberta. Nevertheless, seeing this depth has also shown me what is possible with a career in science, which is very motivating. I am very grateful that the HYRS Program has strengthened my interest in the sciences.

HYRS provided me with an authentic lab experience. From Dr. Plane's pharmacology lab on the top floor of the Medical Sciences Building, my supervisors introduced me to their experiments. I helped to run a perfusion setup, where we ran various drugs through a mesenteric vascular bed. We electrically stimulated the tissue to constrict the blood vessels and then recorded the subsequent change in pressure. We added drugs that either activated or blocked particular ion channels which altered the pressure changes induced by the electric stimulation. In the future, this could have applications in treating high blood pressure. While most of the science behind this was too advanced for me, I was still able to enrich my understanding of biology and chemistry through these experiments. Applying even simple chemistry concepts to making solutions in the lab proved to be more difficult than I thought. With the assistance of my supervisors, I even made and presented a scientific poster detailing the work we did this summer. Experiential learning is very effective for me and I have gained not only knowledge but also skills, from my six weeks in the lab. My experiences have been eye-opening and have offered me a lot of insight into the field of pharmacology and the health sciences.

Beyond the lab, HYRS has also provided me with many other valuable opportunities. From the scavenger hunt on orientation day to tours in University facilities and private industry plants to meeting with role models at a networking fair, some of my favorite moments outside of the lab were spent during these seminars. I was even invited to the pharmacology department's golf tournament. The program coordinators even brought in other organizations, like computer science group Ada's Team and Engineers Without Borders, to increase our awareness of different career fields. The skills that I gained in these professional development sessions will be very useful in university and beyond.

Altogether, the HYRS Program has made my summer memorable and unique. This wouldn't be possible without the support of my sponsor, Alberta Innovates-Health Solutions. I'd also like to thank Dr. Plane, Dr. Kerr and their entire pharmacology lab for their patience and for mentoring me this summer. I am so glad that I was part of this amazing program and had this unique experience. HYRS has further strengthened my motivation to pursue the sciences, and I am grateful that programs like HYRS exist to let high school students like me experience university level research and form connections with professors and like-minded peers. Once again, I would like to thank my lab, sponsors, and program coordinators for an extraordinary six weeks.

# Derrick Zhang



**Supervisor:**  
**Dr. Sujata Persad**

**Department:**  
**Medicine and**  
**Dentistry -**  
**Pediatrics**

**Sponsor:**  
**Alberta Innovates -**  
**Health Solutions**

When I was first introduced to the Heritage Youth Researcher Summer (HYRS) program, I was a little skeptical. As much as I loved learning and exploring the different aspects of science, I wasn't really enthusiastic on the idea of sacrificing my summer for one program. However, I ended up applying anyways, which turned out to be one of the best decisions of my life. Through HYRS, not only did I get to experience what it was like working in a professional lab, I also acquired many valuable life skills and lessons that contributed to my personal development as an individual. As I look back through all the wonderful memories crafted by HYRS, I can only say that I am extremely grateful for being part of such a life-changing program.

This summer, I was put into the Department of Paediatrics and given the privilege in working in Dr. Sujata Persad's lab while under the supervision of Noureen Ali, both of whom guided me greatly to success. The main goal of my project was to determine the role of proteins  $\beta$ -Catenin and Active  $\beta$ -Catenin (ABC) in osteosarcoma (a type of bone cancer) progression. First, I was given my own pair of osteosarcoma cell lines to work with. I was responsible for preserving them, which involved the process of cell culture. After, I would use a portion of these cells to perform different protocols. One protocol that I thoroughly enjoyed running was immunofluorescence (IF) microscopy as it was a simple yet efficient technique. It incorporated the use of luminescent antibodies that attached to specific proteins, which allowed me to visualize the location and intensity of  $\beta$ -Catenin and ABC proteins within cells. Along with other protocols I used such as Western Blots or Micro-Bradford Protein Assay, I was able to acquire my results and determine that ABC plays a major role in OS progression and that it can be used as a prognostic marker in future medical use. From working in a lab, I was exposed to a professional work environment, which I believe is very valuable. More importantly, however, I learned that patience along with teamwork are vital attributes when working and are virtues that I personally plan to further develop throughout the rest of my life. This year, the HYRS program and the Women in Scholarship, Engineering, Science & Technology (WISEST) program ran alongside each other under one organization, which is WISEST. One aspect that differentiates WISEST from the rest of summer programs is its amount of useful lessons it has to offer to students. Every week, there are Lunch 'N Learns as well as other activities planned by WISEST. At these planned events, students are exposed to an immense amount of knowledgeable information that aims to assist them throughout the rest of their lives. For example, one seminar that really helped me was the public presentations seminar. As someone who struggles with public speaking, this seminar helped me develop the technique and confidence that every great public speaker has.

To conclude, I would like to thank everyone who helped me throughout my journey this summer as a young researcher. First off, I would like to express my gratitude towards my sponsors, Alberta Innovates-Health Solutions and University of Alberta, Faculty of Medicine and Dentistry. Without their generosity, none of this would've been possible. Next, I thank Dr. Persad and her lab for their kindness and support through my research. Last, but definitely not least, I want to thank my supervisor Noureen Ali. Her patience and compassion really helped me settle into such an intimidating environment; I could not have asked for a better supervisor. In life, all good things must come to an end, and although the HYRS program has come to its end, I believe this is just the mere beginning for me as I explore new horizons science has to offer.





