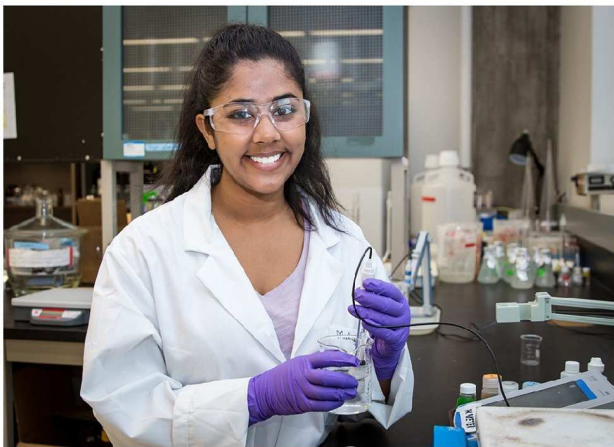
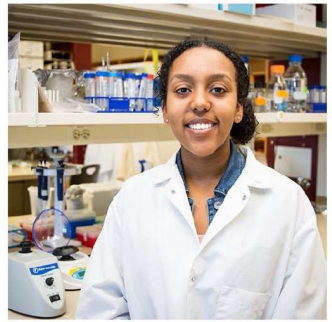
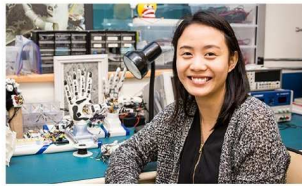
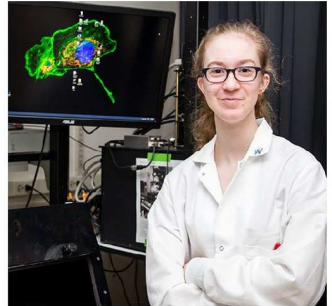


# WISEST

women in scholarship, engineering, science & technology



**JOURNAL OF STUDENT RESEARCH 2017**





© by WISEST. The book author retains sole copyright to his or her contributions to this book.

Photos by Ana Catuneanu (unless otherwise credited)

The Blurb-provided layout designs and graphic elements are copyright Blurb Inc. This book was created using the Blurb creative publishing service. The book author retains sole copyright to his or her contributions to this book.



# WISEST



## **SUMMER RESEARCH PROGRAM 2017**

The WISEST Summer Research Program is a six-week paid research experience for young women and men who have completed grade 11. Through first-hand experiences in diverse science, technology, engineering, and math (STEM) disciplines, the students learn about innovative research, participate in current investigations, meet incredible people, and broaden their horizons.

The students are placed in fields in which their gender is currently underrepresented, with young women researching in science, engineering and technology, and young men researching in nursing, nutrition and human ecology.

# CONTENTS

<b>WISEST Encourages Diversity</b>	10
<b>Thank You, WISEST Community!</b>	11
<b>2017 Partner and Contributors</b>	12
<b>Welcome to WISEST</b>	13
WISEST Orientation	14
Social Science Challenge	15
<b>Learning Opportunities</b>	17
<i>Professional Development</i>	
Designing a Research Poster	18
Intellectual Property	19
Effective Presentations	20
Practice Poster Session	21
Sharing the WISEST Experience	22
<i>Guest Presentations</i>	
Dr. Armour	23
UofA Q&A	24
Canadian Mountain Network	25
Engineers Without Borders	25
<i>Tours: Exploring UofA Research</i>	
Metallurgy Lab & Dino Lab	26
Greenhouses & BLINC Lab	27
TEC Edmonton	28
Virtual Reality Demo	29
<i>Tours: Research in Action - Industry Tours</i>	
Gilead Sciences Inc. & Collins Steel	30
Quantiam Technologies Inc. & Micralyne Inc.	31
<i>Networking Opportunities</i>	
The Art of Networking	32
The Networking Fair	33
<i>Perspectives</i>	
The Male Perspective	34
Living in Residence	35
<b>Special Events</b>	37
Celebration of Research	38
Teacher Appreciation Day	39
Researcher Thank You	39
<b>Social Activities</b>	41
Liquid Nitrogen Ice Cream & Scavenger Hunt	42
IMAX Field Trip	43
Ada's Team Lunches	44

<b>Student Reports</b>	45
<b>Marco Allegretto</b>	
School: Harry Ainlay High School	46
Supervisor: Dr. Bukola Salami	
Sponsor: Faculty of Nursing	
<b>Amanda Beaton</b>	47
School: Father Patrick Mercredi Community High School	
Supervisor: Dr. Erin Bayne	
Sponsor: International Paper	
<b>Sarah Boucher</b>	48
School: Henry Wise Wood High School	
Supervisor: Dr. Carlo Montemagno	
Sponsor: SPECET	
<b>Milan Cuthbert</b>	49
School: Hughenden Public School	
Supervisor: Dr. John Lewis	
Sponsor: Faculty of Medicine and Dentistry	
<b>Bailey Czuy</b>	50
School: Salisbury Composite High School	
Supervisor: Dr. Mohamed Gamal El-Din	
Sponsor: Anonymous	
<b>Alyssa da Costa</b>	51
School: George McDougall High School	
Supervisor: Dr. Mariusz Klobukowski	
Sponsor: Faculty of Science	
<b>Mackenzie Fix</b>	52
School: Archbishop Jordan Catholic HighSchool	
Supervisor: Dr. Larry Unsworth	
Sponsor: NSERC PromoScience	
<b>Jenna Tej Gill</b>	53
School: Paul Kane High School	
Supervisor: Dr. Mohamed Gamal El-Din	
Sponsor: NSERC PromoScience	

<b>Myah Grieve</b>	54
School: Fort Saskatchewan High School	
Supervisor: Dr. Erin Bayne	
Sponsor: International Paper	
<b>Renata Holko</b>	55
School: Mother Margaret Mary Catholic High School	
Supervisor: Dr. Heather Bruce	
Sponsor: NSERC PromoScience	
<b>Indira Huck</b>	56
School: Strathcona Tweedsmuir School	
Supervisor: Dr. Rajender Gupta	
Sponsor: SPECET	
<b>Kyra Jubinville</b>	57
School: Thorsby Junior/Senior High School	
Supervisor: Dr. Robert Driver	
Sponsor: Syncrude Canada Ltd.	
<b>Emma Kaliel</b>	58
School: R. F. Staples Secondary School	
Supervisor: Dr. Pamela Willoughby	
Sponsor: WISEST	
<b>Cassandra Karlzen</b>	59
School: Parkland Composite High School	
Supervisor: Dr. Maya Evenden	
Sponsor: International Paper	
<b>Fajar Khan</b>	60
School: Westwood Community High School	
Supervisor: Dr. Mohamed Gamal El-Din	
Sponsor: Syncrude Canada Ltd.	
<b>Taylor Lake</b>	61
School: Sir John Franklin High School	
Supervisor: Dr. Nadia Jahroudi	
Sponsor: Beta Sigma Phi	
<b>Annie Lam</b>	62
School: M. E. LaZerte High School	
Supervisor: Dr. Shokrollah Elahi	
Sponsor: Alberta Education	



<b>Sarah Lefebvre</b>	School: Eastglen High School Supervisor: Dr. Rafiq Ahmad Sponsor: SPECET	63
<b>Hadeel Mohamed</b>	School: Edmonton Islamic Academy Supervisor: Dr. Christopher Sturdy Sponsor: Faculty of Science	64
<b>Rebecca Moore</b>	School: Archbishop MacDonald High School Supervisor: Dr. Vladimir Michaelis Sponsor: The Rotary Club of Edmonton Glenora, Canada Summer Jobs	65
<b>Hannah Neumann</b>	School: Harry Ainlay High School Supervisor: Dr. Suzanne Kresta Sponsor: AWSN	66
<b>Jennifer Peterson</b>	School: St. Jerome Catholic School Supervisor: Dr. Rafiq Ahmad Sponsor: SPECET	67
<b>Rebecca Probst</b>	School: Calmar Secondary School Supervisor: Dr. Larry Unsworth Sponsor: NSERC PromoScience	68
<b>Jenaya Renema</b>	School: Strathcona High School Supervisor: Dr. Rajender Gupta Sponsor: NSERC PromoScience	69
<b>Mahed Riaz</b>	School: Roland Michener Secondary School Supervisor: Dr. Diana Mager Sponsor: Faculty of Agricultural, Life & Environmental Sciences	70
<b>Syed Saad Sadaf</b>	School: Lillian Osborne High School Supervisor: Dr. Diana Mager Sponsor: NSERC PromoScience	71

<b>Victoria Sawchyn</b>	72
School: Spruce Grove Composite High School	
Supervisor: Dr. Patricio Mendez	
Sponsor: Anonymous	
<b>Sarah Schneider</b>	73
School: Provost Public School	
Supervisor: Dr. Heather Bruce	
Sponsor: NSERC PromoScience	
<b>Saloni Sharma</b>	74
School: W.P. Wagner High School	
Supervisor: Dr. John Shaw	
Sponsor: Beta Sigma Phi	
<b>Gabrielle Smith</b>	75
School: McNally High School	
Supervisor: Dr. Larry Unsworth	
Sponsor: The Rotary Club of Edmonton Glenora	
<b>Kaleigh Taschuk</b>	76
School: Our Lady of Mount Pleasant Catholic School	
Supervisor: Dr. Jonathan Veinot	
Sponsor: Syncrude Canada Ltd.	
<b>Riana Tauscher</b>	77
School: Barrhead Composite High School	
Supervisor: Dr. Rafiq Ahmad	
Sponsor: Faculty of Engineering	
<b>Muskaan Tiwari</b>	78
School: Old Scona Academic High School	
Supervisor: Dr. Mohamed Gamal El-Din	
Sponsor: NSERC PromoScience	
<b>Salina Trac</b>	79
School: Ross Sheppard High School	
Supervisor: Dr. Patricio Mendez	
Sponsor: NSERC PromoScience	

<b>Justine Ventura</b>	80
School: Old Scona Academic High School	
Supervisor: Dr. Patrick Pilarski	
Sponsor: Process Solutions	
<b>Madison Warawa</b>	81
School: Austin O'Brien Catholic High School	
Supervisor: Dr. Jingli Luo	
Sponsor: Faculty of Engineering	
<b>Emily Willette</b>	82
School: St. Albert Catholic High school	
Supervisor: Dr. Rylan Lundgren	
Sponsor: Beta Sigma Phi	
<b>Lily Woldeabzghi</b>	83
School: Edmonton Christian High School	
Supervisor: Dr. Shokrollah Elahi	
Sponsor: Beta Sigma Phi	
<b>Anna Wright</b>	84
School: Lindsay Thurber Comprehensive High School	
Supervisor: Dr. Benjamin Tucker	
Sponsor: NSERC PromoScience	
<b>Colleen Wyering</b>	85
School: St. Augustine School	
Supervisor: Dr. Christopher Sturdy	
Sponsor: Faculty of Science	
<b>Julia Youm</b>	86
School: Christ the King School	
Supervisor: Dr. Mike Fleischauer	Sponsor:
Beta Sigma Phi	

# 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 ***encourage diversity and empower women in the sciences, engineering and technology.*** We primarily 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.

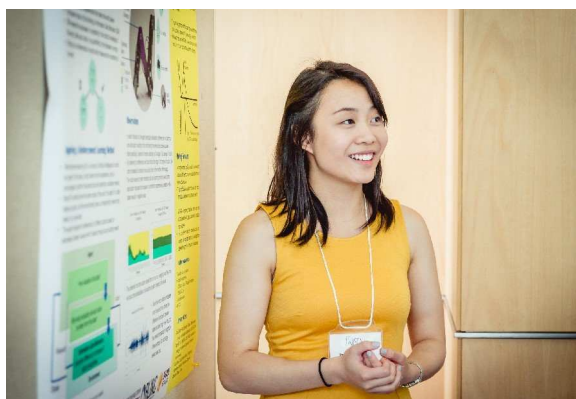
**SET** - a one day science, engineering & technology conference that provides young women in grades 10-12 with the opportunity to engage in hands-on experiences and learn more about careers and studies in the SET fields.

**Summer Research Program** - a once-in-a-lifetime, six-week, paid research work experience for young women and men in Grade 11. This unique program allows female students to research in science, engineering, and technology fields, and male students to research in nutrition, nursing, and human ecology fields.

**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 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 ***encourage diversity and empower women in the sciences, engineering and technology.***

# THANK YOU, 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):

Angela Seehagen (WISEST Program Coordinator), Fervone Goings (WISEST Team Lead), Quincy Hiscott (WISEST Records Clerk), and Alex Gabbey (WISEST Student Coordinator).

# 2017 PARTNERS AND CONTRIBUTORS

## WISEST Summer Research Program (SRP)

### Partners

Alberta Education  
AWSN  
Canada Summer Jobs  
Consulting Engineers of Alberta  
Edmonton Area Council: Beta Sigma Phi  
International Paper  
NSERC PromoScience  
Office of the Provost  
Process Solutions Canada Ltd.  
SPE Canadian Educational Trust (SPECET)  
Syncrude Canada Ltd.  
TEC Edmonton  
The Rotary Club of Edmonton Glenora  
Threshold Impact  
University of Alberta  
    Faculty of Agricultural, Life & Environmental Sciences  
    Faculty of Engineering  
    Faculty of Medicine & Dentistry  
    Faculty of Nursing  
    Faculty of Science  
    St. Joseph's College  
Weyerhaeuser

### Contributors

Collins Steel  
Gilead Sciences Inc.  
Micralyne Inc  
Photography by Ana Catuneanu  
Telus World of Science  
Quantiam Technologies

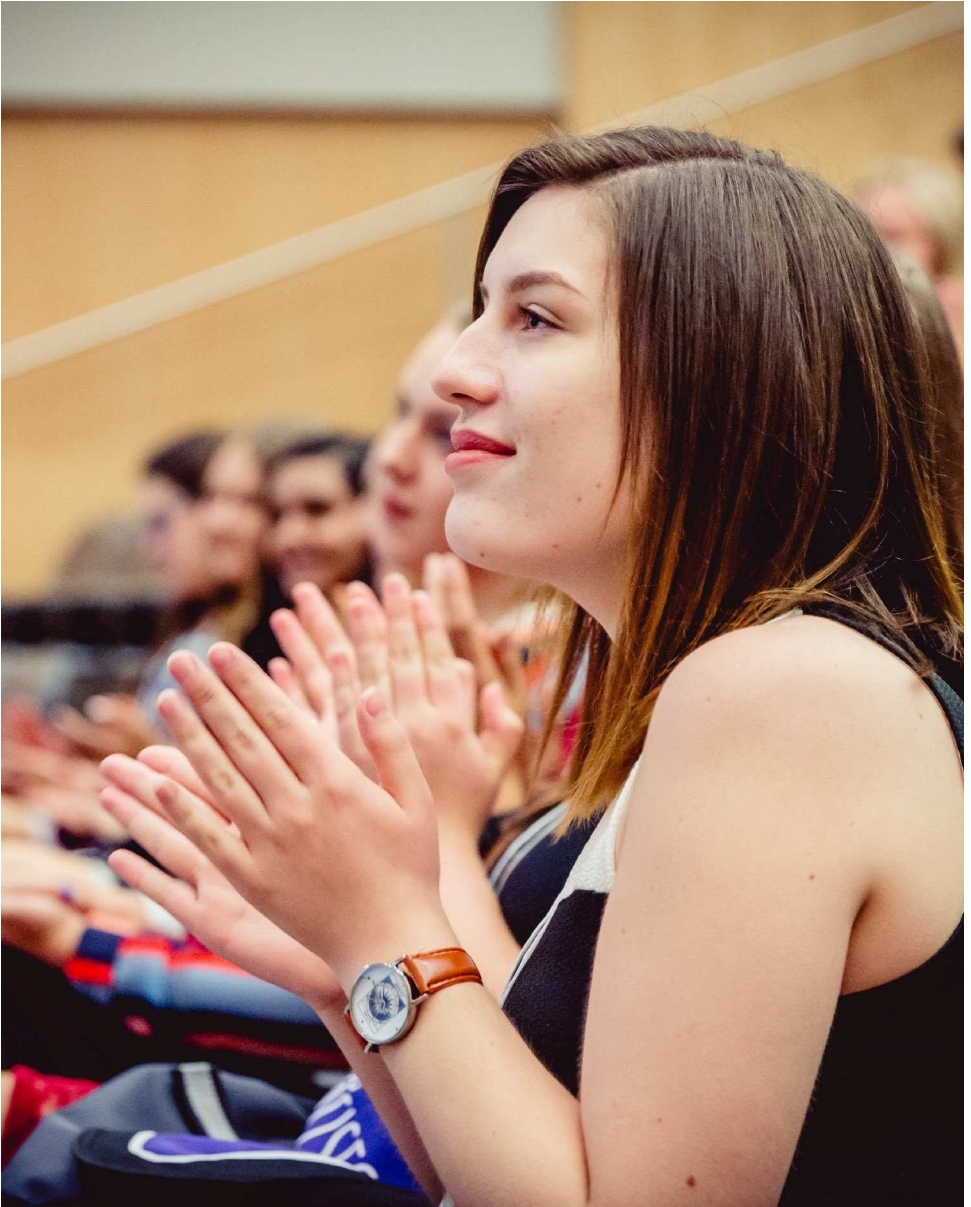
### Supporters

Ada's Team  
Canadian Mountain Network  
Chemistry Students' Association  
Engineers Without Borders



*Photo credit: stock*

# WELCOME TO WISEST



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

# WISEST ORIENTATION

*By Salina Trac*

I walked into orientation day feeling tremendously excited. I had been waiting for this once-in-a-lifetime opportunity for months and could hardly believe that it was right in front of me. I looked eagerly at all the fellow student researchers, wondering if they were as fascinated and somewhat clueless as I was. I walked to sit at the tables with my newly acquired nametag and backpack, occasionally glancing around me and exchanging many smiles with the other students. Though everyone in the room was a stranger, I realized that it was ultimately our passion for sciences and engineering that related us. Knowing this, I felt an instant connection with everyone in the room. We started with the icebreaker game "The Great Wind Blows" and I was determined to remember faces and names. The activity gave me a boost of energy and I laughed and started conversations with new friends that happened to sit beside me. I was already starting to feel comfortable alongside this group of likeminded individuals. After our game, Fervone welcomed everyone and, listening to her tell us about the WISEST program's goals, I could not help but feel overjoyed at how all us student researchers were able to participate in this program to gain insight into a potential career path.

I was able to converse more with the fellow researchers as we ate our lunches, and was delighted at how welcoming everyone was. Being surrounded by all the positive energy, I knew that I would be making so many amazing new friends. While waiting for our supervisors to pick us up, I looked around at all the different supervisor names taped onto the walls and marvelled at how many different research projects we would all be participating in. It blew my mind that there were so many projects available and I could not wait to ask everyone how their project was going and learn more about different aspects of sciences and engineering. As I left with my supervisor, I could not wait for the journey that the next six weeks would provide me with.



*Photo credit: Angela Seehagen*

WISEST Orientation included the following:

**Tour of the UofA Campus** - to point out the popular facilities and spaces.

**WISEST 101** - a panel of former SRP students speak about their experiences and answer questions from the new researchers.

**Library Orientation** - introduces students to the many library resources available to them in the Cameron Library.



# SOCIAL SCIENCE CHALLENGE

*By Jennifer Peterson*

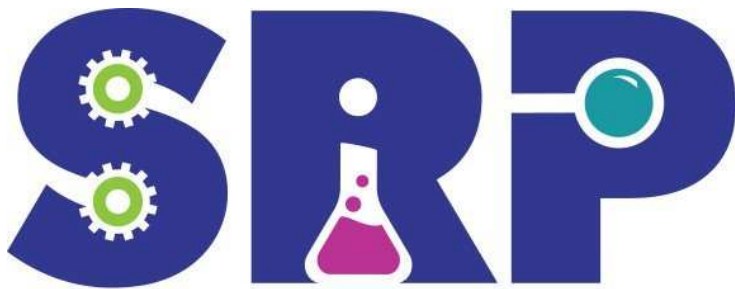
Spirits were high as we filed into the Edmonton Clinic Health Academy for the the Social Science Challenge. All of us branched off into our groups and introduced ourselves to our fellow WISEST researchers as we awaited instructions. We curiously stared at the materials at the front, which included syringes, small wooden dowels, pieces of tubing, tape, brass pins, scissors, cardboard, and more. Next, Alex and Angela gave us our mission: build a hydraulic system capable of raising a glass, pouring a cup, or even both. A hydraulic device is one which uses liquids trapped in a confined space to do work. Before we began our projects, we received a refresher on the principles of hydraulic systems, learning that hydraulics are used in everyday life; for example, these systems can be found in cars, elevators, lifts, airplanes, and even some office chairs.

In the challenge, we were asked to imagine that we had to move a dangerous chemical which we could not touch. Only by creating a hydraulic system could we keep ourselves safe. A one hour timer was set and groups began frantically planning and gathering supplies as each raced to beat the clock. While working, we socialized with our new partners and learned more about one another and each researcher's summer project. Teamwork, communication, and open-mindedness were essential for a group to overcome the task at hand. As the minutes ticked down, there were shouts of excitement and sighs of failure, but no matter how many setbacks a group faced, they continued to make progress and strive to complete their mission. At the end, every group succeeded in creating a unique hydraulic device. Everyone was satisfied as we proudly displayed our mechanisms to the entire group. Each set of students demonstrated the flexibility, creativity, and ingenuity that would allow us to be successful in the WISEST Summer Research Program.

The Social Science Challenge had a purpose other than allowing us to be inventors: it allowed us to meet other student researchers and make connections that will last a lifetime. By encouraging us to work with one another, we bonded in ways that are otherwise difficult. When we have completed our summer research internship, it is relationships that are formed in activities such as the Social Science Challenge that will keep the community of women in science, engineering, and technology together. If we do not support one another, it will be impossible to bridge the gender gap in the science related fields.



*Photo credit: Angela Seehagen*



**SUMMER RESEARCH PROGRAM**

# LEARNING OPPORTUNITIES

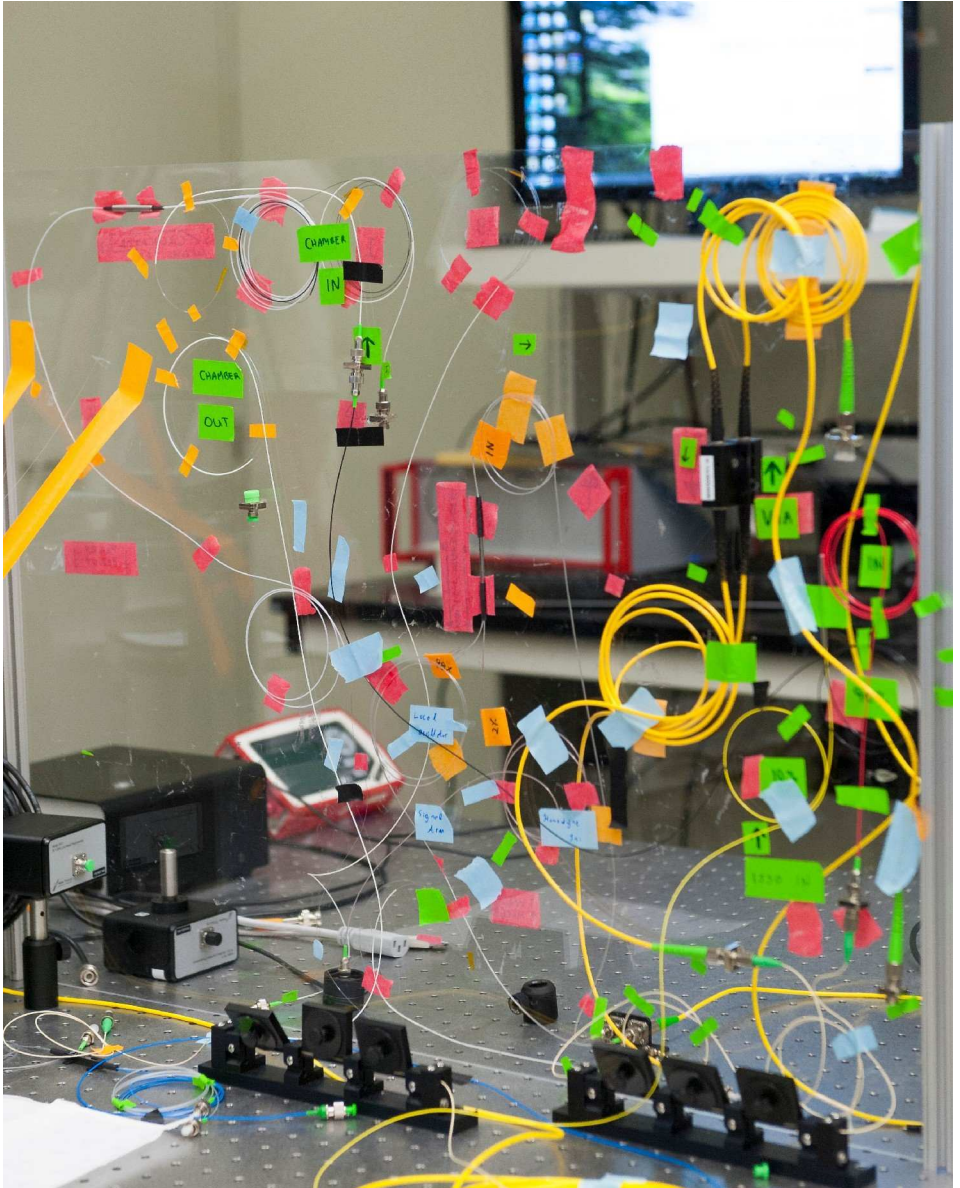


Photo credit: Joanna McQueen

*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.*

# DESIGNING A RESEARCH POSTER

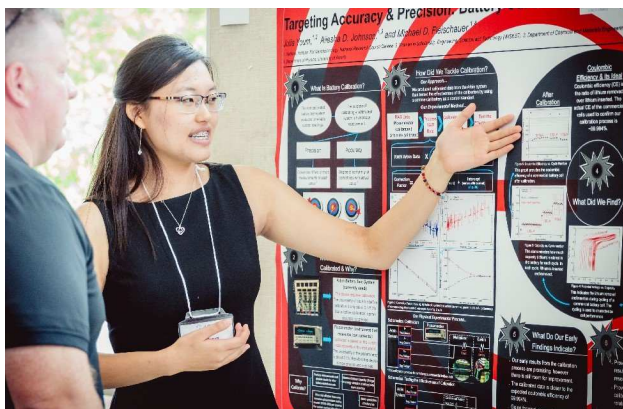
>> Professional Development

By Justine Ventura

As you walk through many of the hallways at the university, it is hard to ignore the massive posters plastered on the walls, and while I had experience creating posters for school events, I quickly realized that designing a professional research poster is a completely different ball game. Research posters are a medium by which you can present your work in a concise manner which allows the reader to leave with a few, main ideas. They are also accompanied with an oral presentation which can give further insight and explanation of the different parts of your poster. Prior to this “Lunch ‘n’ Learn” I was unsure of what needed to be included in a poster besides a fancy title, but over the course of a lunch break, Dr. Stephens addressed our concerns and made the seemingly daunting task of creating our own poster more manageable.

She gave us the necessary tools to effectively present our research in the form of a poster and shared some advice on how to be a more engaging presenter. Using various examples and anecdotes, she gave us a run-through of the basic components required in a research poster such as methods, citations and a conclusion. She also provided helpful tips like informing us of several stylistic choices that we need to take into consideration, such as using complimenting colours, presenting the majority of the text in point form, and being mindful of white space. Furthermore, she emphasized the importance of pictures, graphs and other visual aids, as they help to attract an audience. On a similar note, Dr. Stephens also reinforced that to be a good presenter, one should be mindful of their audience by making sure that the language and jargon used is suitable. Lastly, she gave us pointers on engaging our audience by having good posture, using appropriate hand gestures, and welcoming questions.

A large aspect of the WISEST Summer Research Program, and research as a whole, is being able to share what you have learned with others. However, without the knowledge of putting together an effective poster, it can prove difficult to showcase your findings. Leaving this lunch seminar, I can say that my fellow student researchers and I felt more prepared and well-equipped to design and make our own poster. I was pleasantly surprised with the depth at which Dr. Stephens discussed the intricacies of a research poster, and her extensive experience with creating her own posters was evident.



# INTELLECTUAL PROPERTY

>> Professional Development



*By Sarah Boucher*

*Photo credit: stock*

Each Friday WISEST hosts professional development seminars that provide us with diverse opportunities to learn outside of lab work. The Intellectual Property session gave an introduction into the legal implications and challenges involved in the protection of ideas and inventions in research. The presentation was hosted by TEC Edmonton. They are a company that supports the growth of emerging STEM companies by assisting in the commercialization of technology and fostering innovative companies.

Intellectual property (IP) is defined as any invention, discovery or idea with value. The presentation used a fictional case study titled ‘Who Owns the Rights to an Invention?’ to examine the services available to protect new discoveries. This case study featured a student: Samantha, who while working in a lab modified a machine to better detect defects in automobile parts. The case study opened up a discussion about the options Samantha has in terms of protecting her invention and whether or not she could claim ownership and patent over the modification to the preexisting machinery given a preexisting agreement with an automobile company. The discussion and thoughts of other students explored IP ownership under circumstances where multiple parties were involved. This offered a great introduction into the complicated process of patenting and it was interesting to listen to the thoughts of the other students and presenters on the issue. From this we learnt what patents are and what conditions must be met for a patent to be approved. These conditions include an inventions novelty, non-obviousness and utility. The complex, and lengthy process of filing a patent claim was also explained in addition to other simpler methods of IP protection like trademarking. The presentation also explained the importance of the IP protection system and how it helps to encourage innovation and promotes competition.

This engaging presentation provided a great introduction into the legal elements involved in STEM and the diverse career options within this field that combines the disciplines of STEM and law. Prior to this presentation I had little idea how intellectual property was protected and the processes involved. Many students agree that this was a great presentation with tons valuable content. Without this presentation I’m sure many of us would have felt that the legal rights of ideas were far too overwhelming understand, let alone examine as a career option. Overall everyone learnt a great amount of valuable information about a complex system during this presentation.

# EFFECTIVE PRESENTATIONS

>> Professional Development



*By Myah Grieve*

As the time for our poster presentations approached, the WISEST students were lucky enough to receive some tips and tricks for presenting. We attended an interesting and informative session which set a great example for us students by demonstrating the many factors of a good presentation, which included basics such as eye contact, loud and clear speaking, and posture. It also included ways to avoid and/or eliminate nervous habits, which I found particularly helpful.

The portion of the session which I found most helpful, however, was when we were asked to present to our fellow students. We were challenged to find a random student and attempt to summarize our research projects in one sentence. I felt slightly nervous for this, but it acted as a nice warm up for the next challenge that was on the list: a debate. The students were given a topic (like whether or not technology was a good form of communication), and each partner had to pick the “pro” or “con” side of the argument. This made me far more nervous because I was expected to come up with an argument on the spot. Luckily, I was in a very encouraging environment, and the previous presentation had provided me with loads of techniques on how to deliver a message clearly. Thus, I was able to push through my nerves and debate my point. After the debate, my partner and I were able to exchange tips on how we could improve our speaking skills, which will come in handy when we begin to practice our presentations.

After this activity, some students were pushed even further out of their comfort zones and were asked to give a one sentence explanation of their research project in front of the entire room. The students who spoke seemed nervous at first, but as they continued their explanation, they became more and more confident with their words. Afterwards, all remaining nerves of the students were washed down with the sweetness of cookies.

Overall, this event was able to push the students out of their comfort zones, and relieve the nerves of presenting during the upcoming poster presentations. Alongside the confidence, we gained methods to improve our public speaking skills to deliver amazing presentations on the projects we had worked very hard on. This event taught me valuable lessons that will come in use for the rest of my life.

# PRACTICE POSTER SESSION

>> Professional Development

*By Mackenzie Fix*

The anticipation for this session led to both excitement and nerves. To be able to share the research that I had spent the last six weeks working towards filled me with a sense of pride, but presenting it filled me with fear. This event also marked the end of regular WISEST activities, with only the Celebration of Research (COR) remaining, leading to a feeling of finality at the end.

This session began with being split into seven groups, where we were told that we would be presenting our poster to one another. This brought on some nerves as presenting to the research team a few days prior was simple, due to their extensive background knowledge, but presenting to someone with no knowledge about your project seemed daunting. This experience was fantastic though, as getting to listen to others present greatly reassured me that I would be able to properly present as well. Being given the opportunity to receive feedback contributed to a greater feeling of confidence for the COR, as I now knew what I needed to work on. The session concluded with us reconverging as a group to receive feedback from the entire group of WISEST Student Researchers. Receiving feedback and getting to practice presenting was very helpful to not only myself but to all other student researchers. Heading into the session I was wary that either I would gain nothing out of the experience, or that I would receive little to no feedback from others. I was pleasantly surprised by what actually happened and I was able to get something out of the session that will help me for years to come. Following the session we had a pizza supper, a sort of congratulations on getting through the entirety of the program. We all spread out within the lecture hall, sitting with the newfound friends from the program, and ate our pizza. It seemed almost insane how far we had come. The pizza supper was a nearly perfect way to end our last day in the program, and gave us a chance to unwind and prepare for the COR the next day. As we left the session we left full, and with friendships that are sure to last for years to come. This session truly had a feeling of finality to it, with the summer beginning to come to a close.

This session, as well as the program, was truly amazing, and I received the opportunity to learn more than I ever thought I would. On behalf of myself and all other WISEST student researchers, thank you to the WISEST staff and to our sponsors, for helping us excel over the past six weeks, and for helping to prepare us for the years to come.



# SHARING THE WISEST EXPERIENCE

>> Professional Development

*By Saloni Sharma*

The final WISEST Lunch n' Learn session was the perfect way for us students to reflect back on the six weeks we spent in this incredible program. We were given a handout that had questions regarding the different Professional Development sessions and activities we had throughout the Summer Research Program. The handout was a perfect guide that allowed us to replay the entire summer journey in our heads and think about all the amazing opportunities we were given. After having some time of reflection individually, we were able to get into groups and share our own experience with other WISEST students. This was truly an activity that evoked bittersweet feelings among us students about the program coming to an end. While we were sad about this experience coming to an end, we were also excited about going back to school and promoting WISEST in our individual schools and encouraging boys and girls to look into careers that they're not traditionally geared towards.

Being able to think about all that we achieved through this program allowed us to remember the most invaluable experiences. The six weeks during this summer research program began with some nervousness, continued with incredible opportunities and ended as one of the most memorable experiences. This program will surely have one of the strongest impacts on our career choices as high school students. And this Lunch n' Learn certainly had us identify all the different ways we students had grown in the past six weeks and allowed us to remember this experience one last time.



*Photo credit: Angela Seehagen*



# DR. ARMOUR

>> Guest Presentation



*By Alyssa da Costa*

Our first WISEST on Wednesday (WOW) session was a lecture from Dr. Armour, a highly accomplished and inspirational woman. As a founder of WISEST, among many other things, she had many pieces of valuable advice for us based off her own life experiences.

Throughout her lecture, Dr. Armour made sure we all were engaged with some well-aimed questions. She covered many topics, including planning for the future. She stressed the importance of planning, but also that a plan should never be completely inflexible. There are always more options out there, and adhering to a strict plan doesn't allow you to explore those possibilities. Another idea that Dr. Armour mentioned was the importance of mentorship. She told us how various people had had a huge impact on her life, and had helped shape her into the person she is today. She emphasized the amount of influence a mentor can have on your life. Another especially important point that she drove home was the importance of asking questions. She said that to learn best from others, you can't be afraid to ask them questions. This also plays into public speaking. Dr. Armour made it clear that being able to interact, to communicate with others, is an essential skill, no matter your career path. The more you develop your social interaction skills, the more you can forge important connections in the world. A final important topic Dr. Armour covered was diversity. She said that when you have a diverse group of people gathered together, many new questions are raised, versus when you have a group of similar people. When you have people with many differences gathered together, you are gaining some radically different perspectives, due to some different life experiences. All of her advice was something we should all keep in mind for the future.

Overall, Dr. Armour's lecture was very inspiring and impactful, more so than I was ever expecting. One specific quote that will stick with me for quite a while is, "Life is more amazing than dreams." Therefore, you should always dream big, and achieve bigger. Thank you Dr. Armour, for the truly inspiring speech you gave us.

# UofA Q&A

>> Guest Presentation



*By Julia Youm*

As I approach the end of high school, there are many things to consider, and I have begun to ask myself the age-old question. What am I going to do with my life? What's next? My next step seems to be to attend a post-secondary institution. The Professional Development sessions set up by the WISEST staff aids in this major transition between high school and post-secondary. In particular, the *UofA Q&A* session answered many of the questions I had about university admission and the general university experience.

There were two parts to the session. Firstly, we were given a very informative presentation about the University of Alberta. As we sat in a classroom in the Edmonton Clinic Health Academy (ECHA), a.k.a. the Lego building, the presenter spoke about tuition, class size, programs, facilities, scholarships, and admission. Personally, I found this information valuable, because I am interested in attending the UofA. Occasionally, the presenter would throw in casual remarks about some of the great food places on campus and gave us pointers on which Starbucks usually had the shortest line. This relieved some of the tension that was in the room, and it felt less like a classroom lecture. Furthermore, the presenter shared the factors she considered when choosing a post-secondary institution: cost, reputation, academic style, location, and interest. I found this useful because it gave me direction on what considerations I should take when choosing a post-secondary institution.

For the second part of the session we were split into three groups and we headed toward smaller classrooms where students from the UofA waiting to answer our questions. In the beginning, there was much silence and awkwardness within the room. However, once the first question was asked, there seemed to be a constant flow of questions and answers afterwards. This part of the session was insightful. Not only did I learn things by asking my questions, but also by hearing the questions of others. Fortunately, my group had volunteer university students from both engineering and science. Therefore, I learned about the distinction between engineering and general science. Hearing about the different perspectives from the volunteers was intriguing. In addition, one surprising similarity between the shared experiences was the flexibility of their studies. For example, they told us that we can switch our major on a website by the click of a button. One of the volunteers stated that finding what you want to do is like a "guessing game." They seemed clear on the fact that our studies are customizable according to our interests and needs. After the session, it appears that not knowing what you want to do with your life is all normal. Not knowing exactly how you're going to achieve your long-term goal is normal.

# CANADIAN MOUNTAIN NETWORK

>> Guest Presentation

*By Annie Lam*

Did you know that over a billion of the human population live on mountains? Or that mountains cover a quarter of the Earth's landmass? Walking into the Canadian Mountain Network (CMN) Presentation WOW session after completing our first two weeks of exploring what it is like to work in career fields we have always dreamt about, WISEST students got another wonderful opportunity to discover the plethora of opportunities and the ground breaking research happening in our very own province. The CMN brings together universities, governments, Indigenous communities, and businesses who are dedicated to the sustainability of research on mountains across the country and around the world. This engaging presentation allowed us to confirm what we knew about mountains and learn what was happening to them. It also helped inspire the inner researcher in ourselves by informing us about courses we can take in university, mountain festivals, and research opportunities for which we would be able to get up and personal with the mountains themselves! We were reminded and inspired to protect the mountains which play a huge role in our day to day lives, whether we know it or not. This presentation let us explore one of the many fields of research we may find ourselves in and allowed us to discover careers in this field. Through some fierce mountain trivia, this WOW session may have just been the spark to a lifelong passion for the great mountains.

# ENGINEERS WITHOUT BORDERS

>> Guest Presentation

*By Lily Woldeabzghi*

What does an engineer do? This was one of the questions asked by the presenter at the Engineers Without Borders (EWB) presentation. Prior to this presentation I may have said design buildings or planes, but at the EWB presentation I learned Engineers can be involved in almost any area possible, even politics. This was an engaging and informative presentation about the UofA chapter of the international organization which invests in people and ideas. The presenter, a third year engineering student, was relatable and incorporated audience participation through thought provoking question. Throughout the presentation we learned about the different areas which Engineers get involved with through EWB. We learned that not only do Engineers do "typical" engineering work like working on pipelines, but they can get involved with areas like advocating for the rights of others. We learned about the work they do to improve the standard of living in developing countries as well as for communities right here in Canada. This information was valuable to people in any discipline, not only Engineers because it emphasizes all the vast pathways available in any profession. In addition to this, the EWB presentation encouraged us to think outside of ourselves and realize how we can use our interests and future profession to help the global community.

The EWB presentation exceeded my expectations by applying to all disciplines and even detailing how people from different faculties can get involved with the UofA chapter of EWB specifically. This presentation left me with more knowledge than I came in with and a deeper understanding of how I could use my future profession to help others. Furthermore, at the EWB presentation I learned not to pigeon hole my profession but rather be open minded to all of the possibilities.

# EXPLORING UofA RESEARCH

>> Tours



*Photo credit: Alex Gabbey*

## Metallurgy Lab & Dino Lab

*By Riana Tauscher*

The WISEST students got the choice between two different tours which explored various areas of research at the university. The group I was in went to the Metallurgy Lab and the Dino Lab. During our time in the Metallurgy Lab, we learnt how welding is much more than just sticking two pieces of metal together. There are many people working in that lab with various academic backgrounds. Each of them studies a different area in the welding process. The focus of some researchers in this lab is the physics of the weld and learning what is actually going on so they can later predict and change it. We were shown slow-motion videos of a few different welding processes and it was explained to us how each of them worked and what was happening to the metal during the weld. Examples were globular, short circuit, submerged arc and autogenous welding. They also did a demonstration with a robot designed to weld. There were black screens concealing it to protect us from harmful UV radiation, but when the robot began the weld, it lit up and we could see what was going on through the screens. They also have a 3D printing machine but we did not have enough time to look at it. They did, however, mention that they have been working on 3D printing hearts for surgeons to practice on before they do the actual operation.

On our Dino Lab tour, we first went to the museum in the Earth and Atmospheric Sciences building. Our guide told us that paleontology is a mix of biology and geology. He also mentioned that more dinosaurs have been found in Alberta than anywhere else in the world; most dating back from 160 million years ago when Alberta had a tropical biome. We learnt about a few types of dinosaurs they had on display and why they had their particular characteristics and the advantage it gave them. Next we headed over to the Biological Sciences building. On our way there, we stopped in CCIS and our guide told us about a baby Ceratops that was discovered by Phil Currie, who is a paleontologist at the university, which they named "Phil's Baby". When we got to Bio Sci, they showed us where they clean the bones and we got to see and learn how they excavate, clean and attach dinosaur bones. They also showed us their storage facility where they keep some of their fossils.

The tours were very intriguing and it was interesting to learn more about welding and dinosaurs. I had no idea there was so much science that goes on during welding and that people can study it and still need to improve the process and the weld itself. It was also fascinating to see the different dinosaur bones and learn about what the dinosaurs might have been like.

# EXPLORING UofA RESEARCH

>> Tours



*Photo credit: Angela Seehagen*

## Greenhouses & BLINC Lab

*By Madison Warawa*

In addition to working in our own labs, WISEST also gave us the opportunity to explore other research labs at the University of Alberta! This gave us student researchers a chance to see what other kinds of research was going on. This professional development seminar fascinated me as I got an up-close view of research that I had not thought was happening at the UofA prior to this. I went on the tour of the Greenhouse and the BLINC Prosthetics Lab. The Greenhouse tour took us up to the greenhouses in the Biological Sciences building where we were met by our guide. He led us through all the individual greenhouses and fulfilled our curiosity as he answered all our questions regarding the plants around us. If it was not for our guide, we would have been lost staring upon the plants that surrounded us, with many of them being from exotic and tropical places. It was exciting to view and learn about plants that most of us had only ever seen pictures of. One specific aspect we got to learn about in the greenhouse were the insect eating plants. Before, I had not realized that many of these carnivorous plants are actually very small and only eat small insects, mostly ones that are even smaller than mosquitos!

The next research lab I visited was the BLINC Prosthetics Lab. BLINC stands for Bionic Limbs for Improved Natural Control, and it is a lab that combines many disciplines, including medicine, science and engineering. This lab works to “improve the control and performance of robotic prostheses.” Our guide, Katherine, told us about her own research project, as well as showed us the different types of bionic hands they had there and explained their features and costs. One of the interesting things that we learned was that this lab not only develops bionic limbs for amputees, but also works to develop exoskeletons to assist people with limited body movement. Another thing we learned was that most of the pieces used to build these prostheses, other than the motors, are 3D printed! This allows for custom designs for the prototypes they create, as well as saving time and money. Additionally, the professor working in the lab told us that one of the main goals of this research lab was to better connect humans and robots. He explained to us how the further advancement of a connection between amputees and their robotic limbs was the next step for research, and that by doing this, it would allow us as humans to truly advance our knowledge of the world. Lastly, visiting this lab and the greenhouse introduced me to opportunities that I had not even considered before as someone who is interested in science and engineering.

# EXPLORING UofA RESEARCH

>> Tours



*Photo credit: Alex Gabbey*

## TEC Edmonton

*By Muskaan Tiwari*

The WISEST summer research program provided its participants with many exciting learning opportunities beyond lab work. One of these opportunities was the UofA Research Tours. I chose to attend the TEC Edmonton tour. This organization has one primary focus; to encourage the growth of innovative, technology based companies in Edmonton. Companies from the university and private and public sectors are chosen to promote, in order to push Edmonton forward as a center for scientific innovation. We went to the TEC Edmonton labs in downtown and learned about three of these companies.

The first lab we visited was Delta Genomics. As suggested by the name, this company works with the genetic material of animals. Here clients mail in a sample of the animal, typically in the form of a small tuft of fur, along with what information they want to know about the animal. We were taken through the labs in which Delta Genomics scientists extract and prepare the DNA. The DNA is then mapped out, and the information that the client needs is extracted. Many different clients come, each with unique needs that can go from finding the parentage of the animal to finding whether it is susceptible to a specific disease. The tour was very insightful as the role of the company, the functions of the various machines and the opportunities available were explained thoroughly. Afterwards, we visited the ExtraOrdinary Adsorbents lab. This company specializes in adsorbents. Their products have several uses, the primary one being separating one material out of a mixture. This can be used anywhere from oil sands processing to purifying oxygen. The employees were enthusiastic and eager to explain their projects in a manner that was easy for us to understand. The last tour that we were taken to was the Exciton lab. Here, we learned about how this company produces sterile wound dressings with a special, antimicrobial silver coating that is used in hospitals and clinics. These dressings are useful for the long-term recovery of severe wounds and burns. We had the opportunity to observe the labs in which the specialized silver coating is created and tested. We also were able visit the ultra-sterile facility in which it is applied to the dressings before being shipped to clinics and hospitals for use. It was interesting to see the many unique processes and precautions that go into creating these wound dressings.

Overall I found this tour engaging and insightful into the world of research. There were several career paths and fields in research that I had previously not known about that were presented and it was exciting to learn about the large scale impact of the innovation that is taking place right here in Edmonton. The TEC Edmonton tour made me feel enthusiastic about the possibility of contributing to progress in science and technology.

# EXPLORING UofA RESEARCH

>> Tours



*Photo credit: stock*

## Virtual Reality Demo

*By Sarah Lefebvre*

While WISEST students spend the majority of the six weeks in our labs, the program also offers activities which are meant to expose us to some of the incredible work others are doing. An example of such opportunities were the University of Alberta research tours, including a virtual reality demonstration.

This interactive trial involved using our cellphones in combination with Google Cardboard viewers to get a unique perspective on a scientific concept. In particular, the application contained three-dimensional renderings of phospholipids, a key component of cell membranes, and several other structures related to them. As we listened to the explanation of the roles of each entity, the VR viewers allowed us to get the whole picture. It was easy to become immersed in learning about these tiny structures and cellular processes when we could see them in detail right in front of us. Many of us, and a majority of the population, are visual learners; because of this the app's developers hope that this type of technology will be used in classroom settings, to help students connect with the material.

We had a chance to speak with the content expert for a scientific perspective, a 3D artist who designed the models, and a programmer for the application. They answered any questions we had, and were particularly interested in our feedback about what else we would like to experience through this kind of virtual reality. We discussed the future of their program and of VR for education. As with any technology, with time comes sophistication, and the user's experience will be shaped by this; for now though, I'm glad we had the chance to try learning about science through a different lens.

# RESEARCH IN ACTION: INDUSTRY

>> Tours



*Photo credit: Alex Gabbey*

## Gilead Sciences Inc. & Collins Steel

*By Bailey Czuy*

We had the option of choosing local industry tours based on individual interests, so I chose to visit Gilead Sciences Inc. and Collins Steel.

Gilead Sciences Inc. is a research based company that focuses on analytical chemistry to produce viable treatments for various diseases, including HIV/AIDS, cardiovascular conditions, and cancer. Gilead develops the active drug substances through unique, small-scale chemical processes in their labs, and once the product is perfected, the labs generate instructions for the plant to produce the drug in considerable amounts. Once the project is commercialized, it is sent away to another manufacturer as a powder to then be developed into pills. The company is also continually optimizing older chemicals to improve performance. When we first arrived we attended a presentation describing how their drug development affects people across the globe. Gilead has over 9000 employees across six continents, making it one of the largest biopharmaceutical companies in the world. In the laboratories we witnessed how the pharmaceuticals are developed, on a smaller scale this allowed us to understand some of the daily tasks that employees complete and gave us a better understanding of technologies and resources used in this field. Next we toured the manufacturing facility where active drug ingredients are produced in high quantities. We saw specialized machines used in the operation and precautions that have to be taken to prevent contamination and ensure safety for the employees, consumers, and environment. Finally, we had the opportunity to engage in discussion with employees from Gilead to increase our awareness of the different career paths employees can pursue at this company and how to achieve this.

Collins Steel is a structural steel and fabrication company that produces steel for all sorts of industrial and commercial buildings and projects in Alberta. When we arrived, we were given a presentation that described the process of designing the steel framework of a building, which is a process that can take up to a year. We were shown the software that is used to make the steel building plans, allowing the designer to digitally place every piece of steel in the building's framework, including the beams and rivets. After the presentation, we toured the production shop where the steel is produced, cut, and loaded onto trucks to be shipped to building sites. We learnt about several of the specialized pieces of equipment that Collins Steel uses to produce the steel, as well as to transport it around the shop.

Overall, I loved the experience, which provided me with a greater insight for opportunities that exist after university.



# RESEARCH IN ACTION: INDUSTRY

>> Tours



*Photo credit: Angela Seehagen*

## Quantiam Technologies Inc. & Micralyne Inc.

*By Milan Cuthbert*

I had the opportunity to visit two companies in the Edmonton Research Park - Quantiam Technologies and the Micralyne MEMS foundry. These tours were designed to give us some exposure to careers in research outside of a university and boy did they deliver!

Quantiam Technologies specializes in advanced materials engineering, catalyst coatings and clean technologies. They develop disruptive technologies - that is, technology that is not improving on what is already there, but developing something groundbreaking and effective. They focused on 5 main areas, the first being the Petrochemical industry. Quantiam developed a coating for the inside of large furnace pipes, utilized in petrochemical product engineering. The coating stops the buildup of carbon on the inside of the pipes, which makes them more efficient and resource-friendly. The other 4 areas they focus on are oil and gas sands, aerospace and defence, alternative energy, and future innovations. Their facility has two main areas: the front, which consists of all the tech and offices for the research and development team, and the back, which is the manufacturing area. Touring the front we saw the special tech they use to develop and test their products. The popular machines among the students were the two scanning electron microscopes: one can magnify over 1,000,000 times! Touring the manufacturing area, we saw some of the much larger equipment, such as massive furnaces and cranes. One of the biggest takeaways from Quantiam was the pros and cons of running a small research company. Both manufacturing and research teams work closely together, but confidentiality is very important for them as patents on their products are expensive and take a long time.

Micralyne is a microelectromechanical systems (MEMS) foundry. We learned where MEMS are in our daily lives, like in the sensors in smartphones. We also learned the different applications for Micralyne's products, which are used in biomedical, optical, industrial and even automotive fields. The things they make had an extraordinary range considering they all started on the same standard 6 inch silicon wafers! We got the chance to dice some of the wafers as a demonstration of silicon's crystal structure. The majority of their facility consists of cleanrooms with very strict regulations on the amount of particles allowed in the air, so we weren't allowed to enter them. We did get to see them from the outside, and some lucky volunteers even got to suit up in full cleanroom gear and have a minute-long air shower. And that was all before they got to enter the hallway! Overall, this tour exposed us to some of the benefits and challenges of working in specialized research environments.

# THE ART OF NETWORKING

>> Networking Opportunities

By Emma Kaniel

Out of all the Lunch n' Learn sessions that took place over the course of the program, I can easily say that the Art of Networking was entirely new and extremely helpful to me personally. Before that lunch, I had no idea what to expect when faced with networking. I knew the basic details, mainly that this required one-on-one conversation with a professional. For someone like me who struggles to continue conversing with someone I am not entirely familiar with, I was incredibly nervous about the Networking Fair that was going to happen after this session. If you know me, or I am comfortable in your presence, the possibilities are endless and I can chat your ear off about topics that can range from the book I am currently reading to a recap of a recent hilarious stint. Since that was not the case, I was an attentive listener when Alex and Angela took the stage to begin the Art of Networking session.

Right off the bat, I felt better when they named what I (and probably many other students in the room) was going through: *the Fear*. With that addressed, it was comforting to know that I was not the only one at unease and it is entirely normal to feel that way. It also helped that whenever they said "*the Fear*", their tone of voice was similar to when the villain is introduced in old movies and you expect lightning and thunder to simultaneously go off. While it is frightening in film, it is just a bit ridiculous when you are sitting in a classroom in broad daylight.

Moving on, the rest of the presentation was insightful and supportive. From starting a conversation with someone new, to maintaining it with different topics, I was more than thankful for even the little things. Wrapping up the session with a video on power posing, which is a phrase I like to think I have heard before (but cannot place where from), I was definitely not as nervous leaving as I was going in. Next time I get *the Fear* before going into something, I just have to find a seat and table to kick back and rest my feet on.



# THE NETWORKING FAIR

>> Networking Opportunities



***"The Networking Fair has taught me to push myself out of my comfort zone, improved my ability to communicate, and allowed me to build connections with others."***

*By Hadeel Mohamed*

This summer, students were given the wonderful opportunity to cultivate relationships and exchange information with inspiring role models in STEM at the Networking Fair. Engineers, biologists, nurses, industry workers, researchers, PhD students, and professors were all present this year, allowing us to get advice from many different perspectives, and gain insight on the pursuit of an excellent career in the future.

The event kicked off small scale; role models and students were put into groups to discuss gender representation in STEM, employment opportunities, and establishing confidence in the workplace. It was a great way to start off the event, as it wasn't too overwhelming and felt comfortable. The unique stories of these individuals from a diverse range of careers were uplifting and inspiring to hear. As we made our way to the large networking event, I reminded myself of the techniques we learned in the Art of Networking session; be confident, be cool, and be interested. However, once I arrived, I became overwhelmed with the situation at hand; everyone was already engaged in conversations with the role models and it felt as if there was nowhere for me to go. After nervously standing in the same spot for a few seconds, I remembered that this event was all about pushing myself to get out there and communicate with amazing people. I soon found my way and talked to several individuals with unique careers and experiences, discussing challenges, how to find a career that fulfills passion, and advice on thinking about careers as a high school student.

As the fair came to a close and everyone started to disperse, I felt satisfied but also willing to do more. I wanted to hear more stories and ask more questions. I was extremely happy with the new knowledge I'd gained. Among the many pieces of advice, the most common was that the journey to find a great career is not a straightforward path. Things can, and probably will, change on the road to finding the right job, and it's perfectly okay. It may seem kind of funny, but I've realized that networking is like knitting; you start with plain yarn, some needles, and you may be unsure about how to get started. But once you are brave enough to start working, you are left with an impeccable set of interconnected stitches that form something beautiful. The Networking Fair has taught me to push myself out of my comfort zone, improved my ability to communicate, and allowed me to build connections with others.

# THE MALE PERSPECTIVE

>> Perspectives



*By Syed Sadaf*

As the name suggests, Women in Scholarship, Engineering, Science and Technology is generally directed towards female youth. I was incredulous when I learned that men were eligible as well, and so I applied on a whim, with nothing planned for the summer. When I arrived on the first day of the program, I was not surprised to see only three males (including myself) in the program, compared to 38 females. These numbers might seem like we were isolated, but quite the opposite was true. I had never imagined that the environment itself would simulate a typical high school setting: friendly and accepting, with countless opportunities to learn. Even so, there was a nagging thought at the back of my mind that we, as a very small number of males, would be accidentally forgotten or neglected. However, I was happy to learn that the WISEST coordinators went out of their way to make us feel included, from our own bags to special water bottles for the guys. I feel confident in saying that WISEST was a very positive and rewarding experience for both genders.

The goal of WISEST is to place women in fields where they are generally underrepresented, and this goal extended to men as well. With this in mind, the males this year were placed in two faculties: Agricultural, Food & Nutritional Science, and Nursing. One other male student and I were placed in the Faculty of Agriculture this summer, at the Li Ka Shing Centre for Health Research Innovation. Unsurprisingly, the office where we spent most of our time was dominated by women - we were the only guys working there. But, similar to my time with my WISEST colleagues, I never felt apprehensive or nervous in my work environment. Gender was never an issue or controversial topic during my time here. Working in an underrepresented field had its perks, too. I was exposed to many diverse career paths in nutrition itself, and the ones that I did already know about, I saw in a completely different light.

Before I came to WISEST, I heard a lot about 'traditional jobs' for men and women, and the stereotypes created about which career suits which gender. I was inclined to pursue a career in engineering or healthcare, fields where men are currently dominating in numbers. Thanks to WISEST, the barriers in my mind about jobs suited for only one gender have been broken. Now that the program has ended, I am much more open to an 'untraditional' field like nutritional science because I know what it involves. Hopefully, every WISEST student, male or female, has an experience similar to mine, and pursues a career regardless of whether their gender is underrepresented or not.

# LIVING IN RESIDENCE

>> Perspectives

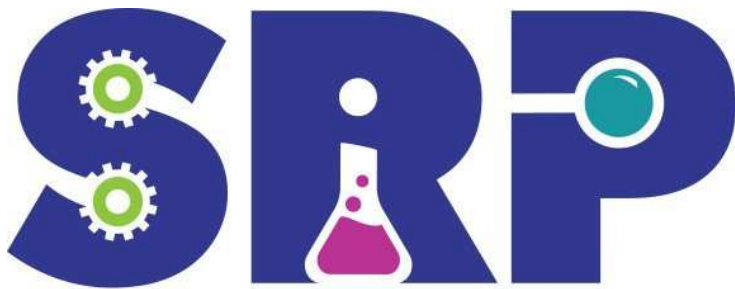


*By Kaleigh Taschuk*

For the six week duration of the WISEST Summer Research Program, I was able to stay in the residence at St. Joseph's College Women's Residence. Before the program began, parts of me were very excited; I would get the opportunity to live independently, and meet new people who are like minded and in a similar situation to myself. These things combined have strongly encouraged me to grow as an individual. Parts of me were also worried, though, as I had never been away from home for this long and I would soon have many new and possibly overwhelming responsibilities. However, once I got to know the girls in the residence group and my Residence Advisor (RA), Tonia, my nerves were quickly calmed.

Tonia worked very hard to ensure we all got the most out of our summer in Edmonton. Staying on campus meant we were a ten minute walk from Whyte Ave. This allowed for fun group activities that brought us together and helped us get to know each other, such as going for delicious and extravagant milkshakes, having a bubble tea night, going to an escape room, or even just wandering down the street and looking through the shops. Throughout the rest of the city we were able to do a lot of fun things this summer as well, like having movie nights, going to Taste of Edmonton, exploring Fort Edmonton and even attending Cirque du Soleil. The suites we lived in had four bedrooms and two bathrooms, so all of the time spent as a group was never overwhelming because everyone had their own privacy in the residence. That being said, it was always very easy to get everyone together to play board games.

The six weeks flew by and we all believe it has gone way too fast, but having the chance to stay in residence meant we were all able to create friendships and memories that will be carried with us for years to come. One of my favourite aspects of the WISEST program has been the opportunity to live in residence. On behalf of everyone involved with the program, I would like to thank NSERC PromoScience and the Margaret-Ann Armour Endowment Fund for Rural Students. Without them, our unique residence experience would not have been possible. I would also like to thank the WISEST team and Tonia for putting in so much effort to make our time at the University of Alberta truly memorable.



**SUMMER RESEARCH PROGRAM**

# SPECIAL EVENTS



*Special events at the end of the Program give us all a chance to celebrate each student and their amazing accomplishments.*

# CELEBRATION OF RESEARCH

>> August 16, 2017

*By Fajar Khan*

Getting ready for the last day was one of the hardest things to do. It was a shock that six weeks were already over and everyone was excited to finally present the research they had conducted. The day started off with everyone getting their posters set up onto boards and then waited for the teachers and researchers to start arriving. Being able to present all the hard work that had been put in this summer was so relieving. Many researchers came to my poster to ask me about my experiences and research over the summer. Teachers were highly interested in hearing about the work all of us had completed and about the WISEST summer experience. It was a great opportunity to talk about our individual and unique summer which was different for every student. From there we went into a lecture hall to hear speeches that had been prepared by two of our own WISEST students in thanking the teachers and researchers for their support throughout this program, along with the WISEST Coordinator. It was hard to believe half of the day had already passed and it was lunch already as the speeches came to an end. Most students were free to go for lunch while a few had been selected to give tours of the lab they had worked in throughout the summer to the teachers. As the teachers were guided through the labs, they were really enthusiastic to learn about the variety of labs that the UofA held, from Agriculture and Nutrition to Nanotechnology labs. The students then had group photos to capture everyone together for one last event of the summer. As this finished, it was the final portion of the day, where guests and parents arrived. They looked at our posters and tried to understand as much as they could. As the day got closer to the end, there was this feeling of excitement and sadness all at once. Soon it was the last bit of the day and we made our way into the lecture hall where the

final speeches of the day were given. This last bit concluded our summer and it was time for everyone to say goodbyes. This WISEST Summer Research Program was an amazing summer placing women and men into fields they are underrepresented in, in the field of research. The Celebration of Research for me was a roller coaster of emotions as I got to express myself but also leave many of the wonderful friends I had made. My expectations were met as I learned a lot through the summer and was able to practice my presentation skills at the Celebration of Research.





# 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 Each year, high school math and science teachers from across Alberta 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. 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

Over a wonderful lunch provided by the Faculty Club, presentations included:

- Fervone Goings, WISEST Team Lead – Unconscious Bias in the Classroom
- Kristy Burke, Masters of Communications (in progress), “Digital communication in the science class”

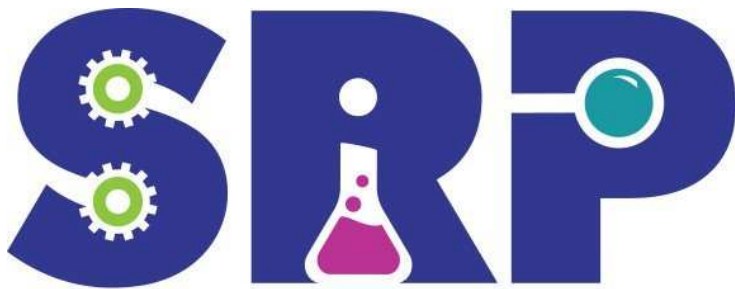
# RESEARCHER THANK YOU

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.



*Photo: Angela Seehagen*



**SUMMER RESEARCH PROGRAM**

# SOCIAL ACTIVITIES



Photo credit: Team 3



Photo credit: Team 8

*Throughout the Program, students have the opportunity to get to know more about each other during fun social activities.*

# LIQUID NITROGEN ICE CREAM & SCAVENGER HUNT

*By Marco Allegretto*

At the conclusion of the first week of the WISEST Program everyone eagerly assembled in the field by CAB. Everyone was really excited because it was the first event of the program. Once there, WISEST staff members and a couple of student volunteers made several flavours of ice cream with liquid nitrogen. This was accomplished by having heavy cream and flavouring mixed together in a bowl, and carefully pouring smoking liquid nitrogen in the bowl as you stirred. It was very intriguing because the liquid nitrogen had to be kept at negative one hundred ninety six degrees Celsius. Initially, people were quiet and spaced out, but then as people became more familiar with each other it got louder, and people congregated into large groups and talked about their lives back home and the fascinating research they were doing with WISEST. Overall, it was lots of fun, and provided us an opportunity to socialize with like-minded individuals as we enjoyed our ice cream.

Afterwards, we were all numbered off into teams of five or six for a photo-scavenger hunt. By this time we were all talkative and comfortable with each other so bonding with our group members was really easy. What was really shocking was how much we had in common with one another, which also made bonding easy; it became obvious how many people make lifelong friends in the WISEST program. Our competitive sides emerged as we proceeded to race around the campus in search of various landmarks such as the bear statue and a floral couch to get pictures with. At the end of the allotted time everyone rejoined at the Edmonton Clinic Health Academy building for the next activity, and we were ecstatic that there were juice boxes since it was so hot out.

I feel that everyone's expectations were easily surpassed for Friday events because of how fun and sociable it was, and this set the bar quite high for the next Friday event. I also feel that it was important to do this event (or at least the scavenger hunt) first because it made us familiar with the campus in a way that would not otherwise be accomplished. These events surely made us all even more excited to be in the program and go to work each day.



*Photo credit: Team 6*



*Photo credit: Angela Seehagen*

# IMAX Field Trip

By Jenna Tej Gill

To ensure that we could explore fields that interested us outside of our labs, WISEST continuously exposed us to many different careers and fields of study from all departments during our Friday sessions. A session that I felt was especially informative was our IMAX Field Trip. After a Public Speaking Workshop, we headed to the TELUS World of Science to see the film *Dream Big: Engineering Our World*. The film which was directed by Greg MacGillivray and narrated by Jeff Bridges focuses on engineering and how it can be used to help people around the world. The documentary follows four inspiring engineers, three women and one man, and showcases their groundbreaking work.

We first meet Menzer Pehlivan, who was motivated from her own experiences during a devastating earthquake to study engineering and build safer and stronger structures. Next we are introduced to Avery Bang who builds much needed bridges in the 3rd world. bang and her team along with the help of countless volunteers from the local community work together to design and build a bridge which will be long lasting, safe and inexpensive. Our third and final female engineer is Angelica Hernandez whose interest in STEM began after joining her robotics team in high school. Hernandez's high school team had limited funds and resources, however they had a tremendous amount of passion AND Compete in a national robotics competition. Lastly we meet Steve Burrows who is fascinated by ancient structures which are still standing. He studies the structure and design of the Great Wall of China, which has managed to survive for many hundred years, and tries to apply the engineering techniques used for the Great Wall to modern engineering. Aside from the stories of the incredible engineers, we learn about the design and the engineering behind of one of the world's tallest and most impressive buildings, the Shanghai Tower, and we see a high school team compete in the Bridgestone World Solar Challenge.

The film *Dream Big: Engineering Our World* really furthered my interest in STEM and introduced me to new possible career paths that I had no idea existed. The film made a point to emphasize the importance of newer generations getting involved in engineering and it introduces marvelous ideas about the future of engineering and of our world. Most importantly, it encourages the audience to be more curious about their surroundings and embrace their childlike wonder.

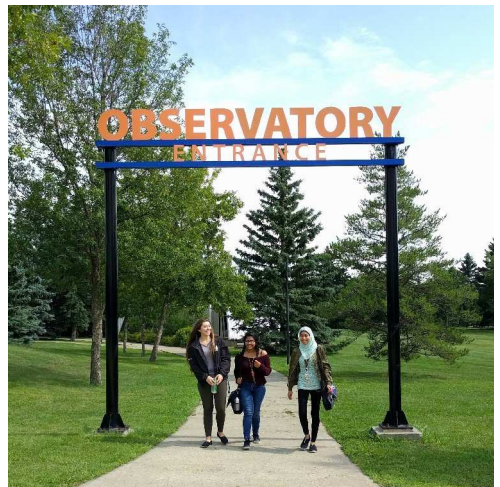


Photo: Angela Seehagen

# ADA'S TEAM LUNCHES



*By Gabrielle Smith*

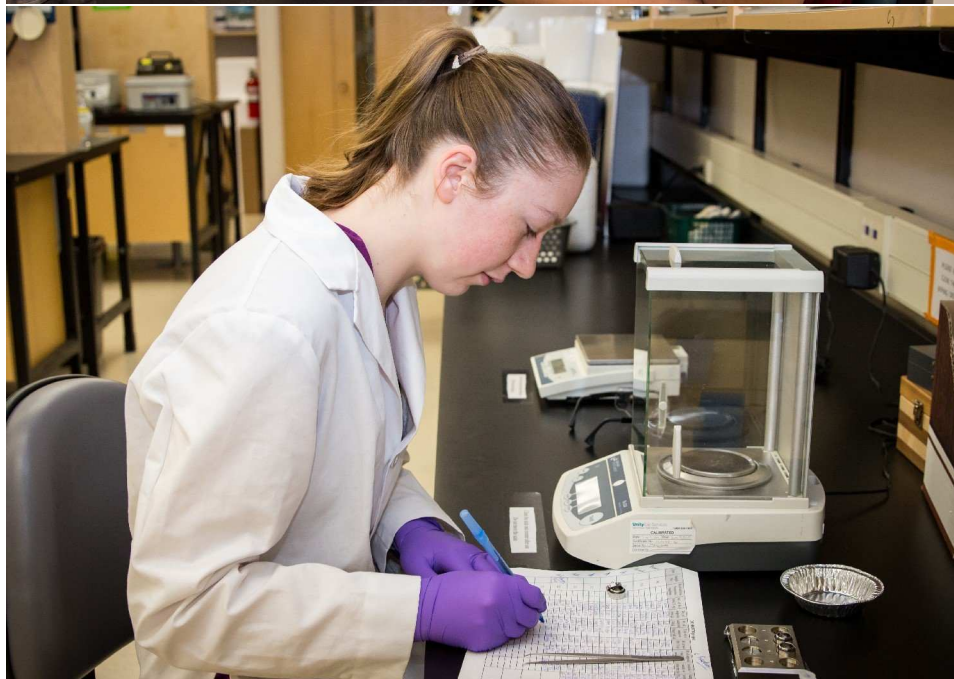
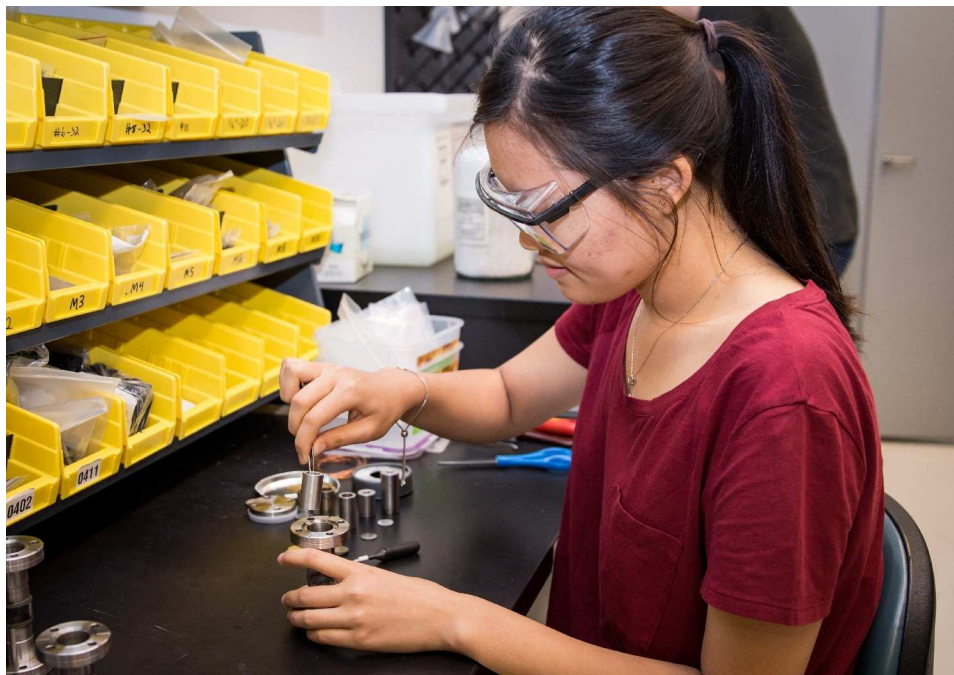
The WISEST Summer Research Program provided more than just experience in the lab. There were Lunch 'n' Learn sessions, Professional Development seminars and WISEST on Wednesday presentations that all helped us to learn and become more accustomed to university life. However, one of the most interesting groups of sessions was the Ada's Team lunches. These were optional lunch meetings that took place almost every Tuesday of the program. Ada's Team is a group at the university that promotes diversity in computing, games and technology. Although I am not intending on studying computer science, I was intrigued by one of the presenters who convinced me to go to a couple of the sessions. I figured that it would at least be a chance to meet new people.

Tuesdays at lunch we met together outside in the Engineering Quad, just outside of the Computing Science building. Our setup was usually just sitting in a large circle and talking for a bit before the meeting actually started. The first half of the meeting was generally an activity designed to help us better understand principles of coding. Our first lunch we learned about how blindly obedient computers are. To demonstrate this, Chanel asked us to instruct her on how to make a jelly sandwich. She followed our commands exactly as we related them to her. For example, when someone told her to grab a piece of bread, she ripped a small piece of bread from the loaf. From this activity we learned that in programming you have to be very specific in your instructions as computers are non-intuitive; they don't have the same ability to judge like a human. They will do exactly what you tell them to do.

After the large group discussion and activity we broke off into smaller groups of five and had a more casual conversation with different people in computing science. This helped us learn about the many different paths you can take in computing science. I talked to a variety of people who were using computers in very diverse fields, from medicine to using artificial intelligence to replace the skipper in curling. It was really interesting to see all the different paths you could take in computer science. Not only did we get to talk about computer science, we also got to talk about university life. They were always willing to help answer any questions we had regarding university.

Even though my interests may not lie in the realm of computing science, it was interesting to see the scope and variety of the field. It was also useful to learn some general knowledge about how computers work as they are becoming more important in our lives; no matter what profession I go into, it is likely I will have to use computers.

# STUDENT REPORTS



# Marco Allegretto

**Supervisor:**  
**Dr. Bukola Salami**

**Department:**  
**Nursing**

**Sponsor:**  
**Faculty of Nursing**



Upon finding out about the Summer Research Program (SRP) on the WISEST website, I knew I had to apply. The program was as good as it gets because I got to do research in nursing, a career I am considering, and the pay was a bonus. Throughout the placement my expectations were exceeded as I learned more about what it meant to become a researcher in nursing. I expected research in nursing to be oriented towards patient care; however, thanks to WISEST I learned that nursing research can be much broader and deals with mental health a fair bit, which is something I had never thought about.

My placement was under the supervision of Dr. Bukola Salami to work on research regarding African immigrants. For the first few days I was nervous because most people I met had a PhD or a Masters, while I have not even started grade 12. However, the nervousness vanished as I started talking to the others on the research team because they were all friendly and would happily answer my questions. I am very thankful to have worked with the individuals I did, and I could not have asked for a better team.

My primary focus during the program was preparing for, and working at, a stakeholder engagement session. The session was critical to the research the lab performed since it directly presented the results to those it involved. Afterwards, stakeholders could implement the changes necessary to make a smoother transition during immigration. This event was quite a lot of work because in order to make it run smoothly lots of preparation was needed, such as development of advertisements, booklets, and a letter of attendance. All the hard work prior to the event really paid off because on the day of the event there was minimal stress since all I had to do was set up guidance signs and assist guests on their way to the event. My involvement with the event was tough work but definitely worthwhile. Another fantastic component of the SRP was the WOW (Wisest On Wednesday) sessions. Some were very motivational and inspirational, such as Dr. Margaret-Ann Armour's Guest Lecture, and made me want to seize the day, every day! Also, the WOW sessions got me thinking about multiple careers, and increased my awareness about some topics such as mountains because of the Canadian Mountain Network. I thoroughly enjoyed the WOW sessions, and I feel like they greatly contributed to a terrific WISEST experience. However, some of the most intriguing sessions were the Professional Development seminars every Friday. Perhaps my favourite session was the Social Science Challenge. This is because it was fun to construct contraptions with a group, but the group was unlike any other I have been in since everyone was invested in, and contributing to, the activity. The most useful session was the Networking Fair because it helped me communicate with others. These were the perfect way to end the week since they made learning fun and equipped me with a variety of skills that will serve me well in life.

I have had an eye-opening experience over the past six weeks participating in the WISEST Summer Research Program. I am very grateful for the people who made it possible on the WISEST team, namely Dr. Denise Hemmings, Fervone Goings, Alex Gabbey, Angela Seehagen, my Principal Investigator Dr. Bukola Salami, and Assistant Principal Investigator Dominic Alaazi. I highly recommend the SRP because it provides a life-changing experience that no other program can offer.





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

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

**Sponsor:**  
**International  
Paper**

Applying for the WISEST Summer Research Program is quite possibly one of the best decisions I have made in my life to date. This summer job did not feel like a job at all. I found myself waking up every morning excited to see what the day had in store, and each day I found myself learning more than I'd ever imagined I'd be able to learn in just six weeks. The skills taught in the SRP through the lab work itself and the professional development sessions are skills I will cherish and practice for the rest of my life. These skills were not just lab safety or lab-specific; there were also skills in networking, becoming a confident speaker, working independently, working as a part of a team, and many more.

Some of the WISEST students do not actually get to work in a lab, and I was one of those students. In my biology lab, we were working towards creating a recognizer that would automatically identify bird species by their song or call. In order to do so, 100 clips of bird song for each song type of each assigned species was required. At first I was rather disappointed when I realized that my summer job might just be office work, but once I actually began working, I absolutely loved coming in and clipping in the "Listening Room" with Myah Grieve, the other WISEST student researcher in my lab. We were not able to start our poster projects until about a week and a half before they were due, which gave me a taste of getting something big done in very little time and completing work by a deadline. Myah and I were also taken to do field work in Jasper. The trip consisted of nights working until 4:30 in the morning to monitor bats, and one day spent hiking up and down a mountain to retrieve two hidden Autonomous Recording Units. The bat work was my favourite task. We had a rather unorthodox method of setting up our microphones for the nights- we're biologists, not engineers- but it worked better than we had imagined.

In this program, I discovered my new favourite feeling: discovering something that nobody has discovered before. When I found significant results in my project, I was buzzing. The thought of contributing to human knowledge was very exciting for me, no matter how small the new discovery is (even though not everyone is necessarily going to find the species-specific birdsong characteristic as interesting as I did). I am not sure if there are careers outside of STEM where I will ever feel that excitement again, which is what tells me that I belong in the STEM field.

For those considering applying to the SRP, my advice is to just do it. This truly was an incredible once-in-a-lifetime experience. To be able to participate in university level research and to be treated as an equal to everybody else on the research team was amazing. I never felt like an outsider, and I felt that I was an important member of the team. I cannot imagine anybody ever regretting participating in the WISEST Summer Research Program. It was the best summer of my life and opened so many doors for me.

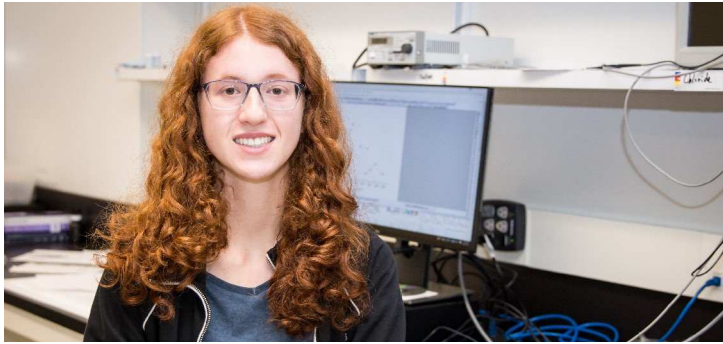
I'd like to give a huge thanks to Dr. Erin Bayne and Hedwig Lankau for allowing me the work in the Bayne Lab. I cannot thank Elene Haave Audet enough for all of the work she did to ensure that Myah and I had an enjoyable and educational experience. Thank you to Industrial Paper for making this opportunity possible for me, and thank you to WISEST for inspiring young women and men and proving that they can do anything.

# Sarah Boucher

**Supervisor:**  
**Dr. Carlo**  
**Montemagno**

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

**Sponsor:**  
**SPECET**

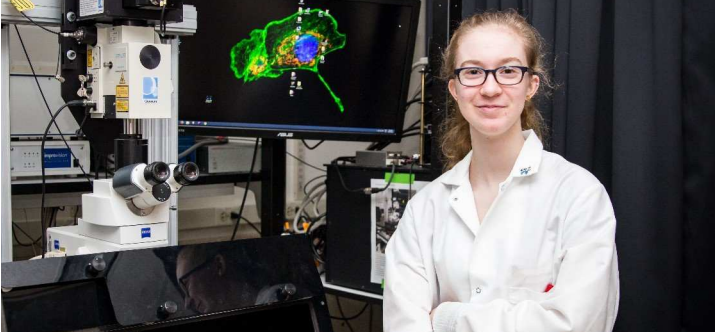


This summer I had the amazing opportunity of participating in the WISEST Summer Research Program (SRP). I first found out about WISEST by searching for summer programs related to my interest in STEM, and I'm glad I did. I wanted to find a program that would be enjoyable while assisting me in choosing an education and career path. I was considering engineering; however, at that point I only had a limited knowledge of what the field is like. The SRP was an extraordinary program that allowed me to gain experience working in a research lab as a high school student, and as a result I now feel confident in pursuing a post-secondary degree in engineering.

For the six weeks of the SRP I was conducting research in the Department of Chemical and Materials Engineering at the Ingenuity Lab under the supervision of Dr. Prashanthi Kovur. My research was focused on improving the sensitivity of flexible 2-D printed temperature sensors with conductive nanowires. The goal was to create a sensor ideal for physiological monitoring in healthcare. During my time at the lab I ran various experiments with the sensors at multiple currents, temperatures, and experimental setups ranging from controlled tests with a thermoelectric heater to timed on-body trials. I also learned a great deal about physics and how to use software like Origin while also being exposed to the scientific method in a professional lab environment. The results collected during my time at the lab indicated that the conductive polyaniline nanowires integrated with the surface of the sensor improved response time and hysteresis, which is the ability for a sensor to produce the same outputs regardless of whether the stimuli is increasing or decreasing. The sensitivity however did not improve. I found reviewing and analyzing the data especially interesting, whether it was comparing two figures or understanding the 'why' behind unusual data. It's amazing how the smallest changes can greatly influence results.

While lab work was my main focus for the duration of the program, I also found the multiple presentations, tours, and professional development seminars valuable and enjoyable. During Industry Tours we met industry professionals and were exposed to a multitude of the career options available in STEM. We toured the advanced facilities of Quantum and Micalyne. Other sessions such as the Public Speaking Workshop focused on developing vital professional skills. One of my favourite Friday sessions was the Research Tour. At this tour our group visited the BLINC Lab on campus where researchers work on improving the performance of robotic prosthetic arms. It was interesting to both explore the projects being worked at the lab and to see the interdisciplinary element of this field, which combines the studies of engineering, medicine, and computer science.

The SRP was an outstanding experience that gave me insight and an introduction into future careers, scientific research, and the university. I'd like to thank my supervisor Dr. Prashanthi Kovur, Richard Hull, and my Principal Investigator Dr. Carlo Montemagno for having me in the lab this summer and for helping me with my research. This would have also not been possible without the support of the Society of Petroleum Engineers Canadian Educational Trust Fund, The University of Alberta, and of course, WISEST. I had a truly amazing summer, and at the end of the program I left not only inspired but excited to pursue a career in STEM.



**Supervisor:**  
**Dr. John Lewis**

**Department:**  
**Oncology**

**Sponsor:**  
**Faculty of  
Medicine and  
Dentistry**

Before the end of March this year, I had never even heard of the WISEST Summer Research Program. Despite that, when my teacher mentioned an opportunity to spend the summer doing research in real labs at the University of Alberta, I knew I had to apply. For the last several years, I knew that I wanted to become a scientist. Coming from a small town, I had almost no idea what there was to pursue, or what I would find interesting enough to want to pursue in university. When I got my project assignment for the Summer Research Program and found I was placed in the Department of Oncology, I had to look up the term online, because I had never heard of it before. Oncology is the study of cancerous cells and tumors, in case anyone else was wondering. In just 6 short weeks, I went from an overwhelmed high school student to a person who considers themselves to have a solid understanding of all of the things happening in my lab and an amateur at a variety of lab techniques.

My project this summer differed from many of the other students. My lab has a protein called p14 that causes cellular fusion. My task was to create a time lapse movie of the fusion using cells tagged with multiple fluorescent labels. Several attempts left me with varying degrees of success. In spite of this, I am completely satisfied with my results. It's humbling to know that science doesn't always happen as you expect even (or perhaps especially) for people with PhD's who do research for a living. Dealing with the frustrations of failure and trying something new were valuable experiences that I learned not to take for granted this summer. Nevertheless, I leave the lab with a variety of new skills. I can culture cells and tissues, synthesize protein, crack eggs used in the lab's chorioallantoic membrane (CAM) model *ex ovo*, prepare *in ovo* eggs, and perform protein and DNA transfections. I can even xenotransplant a bolus of cancer cells into a CAM model.

Overall, working in the lab every day and learning about what it takes to work in research has confirmed that I want to pursue a future career in medical research. I've learned more in 6 weeks with WISEST than I have in any other summer in my life. I hope to take what I've learned, and my greater appreciation of science and its wonders, and share it with my high school.

I would like to thank my teacher Ms. Reynolds for mentioning this program at the beginning of class that day. It changed my life. To the rest of my teachers and my family, thank you for fostering a thirst for knowledge and insatiable curiosity in me. To my parents: thank you for supporting me and agreeing to ship me off hours from home for the summer so I could pursue my dreams. Thank you to WISEST and my sponsor, the University of Alberta's Faculty of Medicine and Dentistry, for providing me with this incredible opportunity. I would like to thank members of the Lewis Lab, where I spent my days this summer. A special thank-you goes to Dr. Desmond Pink, my Direct Supervisor, Deborah Sosnowski, Emma Woolner, and Neha Goel. Thank you all for everything you did for me!

# Bailey Czuy

**Supervisor:**  
**Dr. Mohamed**  
**Gamal El-Din**

**Department:**  
**Civil and**  
**Environmental**  
**Engineering**

**Sponsor:**  
**Threshold Impact**



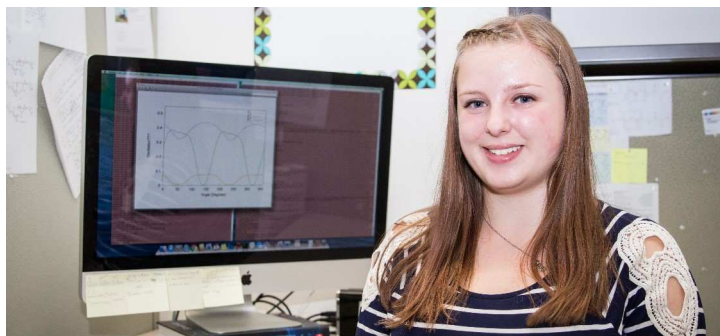
For as long as I can remember, I have been interested in pursuing science in my future but wasn't quite sure how to achieve this. When I first heard about the WISEST Summer Research Program, I felt intimidated by the idea of being surrounded by so many bright individuals while I was only a grade 11 student who barely even knew what research was. As I began learning about the program and the opportunities it provides students, I became intrigued with the idea of research and knew that I wanted to take part in the SRP. Participating in the WISEST SRP has not only exceeded my expectations, but also completely changed my outlook on my future and provided me with greater insight on how to make my dreams of pursuing a career in sciences a reality.

During the 6 week program, I had the privilege of working in the Department of Civil and Environmental Engineering under Dr. Mohammed Gamel El-Din, along with three other WISEST students. In the lab, I had the opportunity to research the effect of granular activated carbon on naphthenic acids through the process of adsorption. This was accomplished by making model samples to mimic oil sands process-affected water to evaluate the effects of different concentrations of adsorbent. Throughout the first few days of working in the lab, I felt very overwhelmed with all of the new information being thrown at me, but once I gained a better understanding and felt more comfortable with my research team, I found that I really enjoyed the research I was involved in. Once the experiment concluded, the results provided a better understanding of how this test can be utilized to clean oil sands process-affected water in the real world. Along with this project, I had the chance to work on experiments regarding coagulation and flocculation that were being conducted by other WISEST students working in my lab. Ultimately, working in this lab has helped me gain a better understanding of all of the aspects of research and has provided me with the opportunity to develop many skills that can be utilized in the future.

Outside of our research, WISEST organized many sessions for the student researchers to participate in. These sessions provided us with a chance for professional development and gave us the opportunity to get to know other researchers in the program and learn about their projects. My favourite sessions of the research program were the Industry Tours. These allowed us to become more knowledgeable about the opportunities that exist after university and how to get there.

By participating in this program, I have gained many transferable skills that will be useful in my future education and career. One of the most important things I've obtained from this program is an increase in confidence that I, as a woman, can pursue whatever I desire in my future. The WISEST SRP has provided me with an unforgettable experience and has greatly prepared me for university and life beyond.

I would like to thank my Principal Investigator, Dr. Mohammed Gamel El-Din, Dr. Mingyu Li, Dr. Selamawit Ashagre Messele, Dr. Pamela Chelme-Ayala, and Dr. Shu Zhu for their support and guidance with this project. I would also like to thank my anonymous donor and WISEST for making this once-in-a-lifetime opportunity a possibility



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

**Department:**  
**Chemistry**

**Sponsor:**  
**Faculty of Science**

When I first heard about the WISEST Student Research Program, I was somewhat skeptical that it was the right program for me. I initially didn't even want to apply, but eventually came to the conclusion that it would be a good experience for me. Now, after completing the program, all of my doubts have been eradicated. It was an incredible experience, and I'm extremely glad I took advantage of such a special opportunity. I can't imagine how much I would have regretted not applying.

During my summer at the University of Alberta, I spent my time working in Dr. Mariusz Klobukowski's computational chemistry lab. Chemistry has always been an interest of mine, though I had never really considered the theoretical side of the field until now. I was working with a chemosensor, called BODIPY-appended thiocrown ether, which is used to detect heavy metals ions, such as barium and mercury. I investigated how rotating a portion of the chemosensor affected the theoretical excitation energies of the chemosensor when complexed with barium and mercury as a free ligand. Our goal was to find a difference in excitation energies between the free and complexed chemosensor for experimental detection of heavy metal ions in the future. If a specific geometry of the complex yielded a larger difference with respect to the free ligand, it would be far easier to detect heavy metals than what is currently used experimentally. The first week I was working in the lab, I was completely overwhelmed. It seemed like I would never get the hang of any of it, from various computer commands to all of the concepts that I had never even heard of before. By day five, I was working through tutorials used for graduate computational chemistry classes. But by the end, I was able to work independently and gained some very valuable experience in research.

However, the SRP wasn't only about the research. Throughout our six weeks at the university, we attended several professional development seminars, lunch n' learn sessions, and other events, such as Ada's Team lunch sessions and WISEST on Wednesdays. All of these sessions contributed greatly to my experience here and certainly made it a positive one. I was able to pick up some additional knowledge about other fields and careers from the lab tours we participated in and also learn more about what it really means to work in research. Some of the speakers that came in were incredibly inspiring, such as Dr. Margaret-Ann Armour, one of the founders of WISEST. I also stayed in residence at St. Joseph's Women's College for the duration of the program, which was a fantastic experience. It allowed me to familiarize myself with the university, while providing better opportunities to make friends within the program. All of this gave me a good idea of what my future could resemble.

I would like to thank the Faculty of Science for sponsoring my participation in the WISEST Summer Research Program. I also would like to thank my supervisor, Meagan Oakley, and my Principal Investigator, Dr. Mariusz Klobukowski, for making my experience in the lab a great one. Most of all, I would like to thank WISEST and all its coordinators for making this opportunity available. WISEST pushed me out of my comfort zone and made me a far more confident person. This summer has been wonderful, and I will never forget it.

# Mackenzie Fix

**Supervisor:**  
**Dr. Larry**  
**Unsworth**

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

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



For as long as I can remember I have loved going to school and being given opportunities to learn. During summers I would count down the days until school started again, and bought countless math and science activity books to keep me occupied during these seemingly never ending months. This passion for knowledge is what led to immeasurable excitement when I heard about the Women in Scholarship Engineering, Science and Technology (WISEST) Summer Research Program. Going in, I thought this program would be excellent because it would not only keep me occupied over the summer, but give me the opportunity to learn. This program did not disappoint, and the amount that I have learned over these six short weeks blows me away. I was placed into a Chemical and Materials Engineering research lab and it has taught me the value of research, as well as shown me that I would like to pursue engineering in the following years of university.

During this six week program I was placed in Dr. Larry Unsworth's Chemical and Materials Engineering lab in the National Institute for Nanotechnology (NINT), under the supervision of Abdullah Alshememry. My project was to evaluate the assembly and disassembly behaviours of drug loaded peptide nanoparticles, specifically elastin-like polypeptides (ELPs). I was working with the ELP L40 and a drug called Sildenafil, which is used as a vasodilator in humans. This research contributes to the larger project of decreasing drug side-effects, as these nanoparticles will be able to target a particular location to release the drug, thereby increasing effectivity and decreasing side effects. From my lab experience I have learned that research is more than running experiments in the lab. It is also reading and examining the works of other researchers, while also analyzing your own results and writing papers.

In addition to an unforgettable experience within a university lab, I also learned through sessions put on by WISEST. The professional development (PD) sessions, as well as the WISEST on Wednesday (WOW), taught me not only skills that would help me present my poster, but skills that will assist me going into university and in my career. The most useful skills were presented in the Public speaking PD, where I learned that there is more to presenting than just speaking; there is also body language, arm gestures, and impromptu speaking. The SRP was not a summer job; instead, it was an opportunity to learn in a university setting and a once-in-a-lifetime experience for a grade eleven student.

I would like to thank Dr. Larry Unsworth, Abdullah Alshememry, and the members of Dr. Unsworth's lab for their help, both in the lab and with the production of my poster. I would also like to thank my fellow WISEST students for their constant support throughout the program. A special thank-you goes to my sponsor NSERC PromoScience, as without their support I would not have had the opportunity to participate in this program. Finally, thank you to WISEST for the PD and WOW sessions, as well as their continued assistance throughout the program.



**Supervisor:**  
**Dr. Mohamed  
Gamal El-Din**

**Department:**  
**Civil and  
Environmental  
Engineering**

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

The WISEST Summer Research Program has been a once-in-a-lifetime experience that has provided me with the skills needed to be successful as a woman pursuing a career in STEM. I entered this program unsure of myself and of my future. I felt overwhelmed by the great number of scientific fields and possible careers available. Through working hands-on in a research lab and being exposed to various careers in research and in industry, I now have a clearer vision of what I want for my future, and I am more confident in my abilities.

This summer I was involved in a project relating to environmental and civil engineering. My research lab focused on the treatment of oil sands processed-affected water using adsorption to remove toxic impurities. I spent my weeks in the lab running trials and performing test to find which concentration of the adsorbent is most effective, whether or not it was reusable, and how the properties of the different impurities affected its ability to be adsorbed. Research relating to oil sands and how to reduce its damaging effects on the environment is exceptionally important as oil sands process-affected water, if not treated properly, is toxic to living organisms and destructive to machinery after prolonged exposure. Albertans should be especially invested in this cause as Alberta is home to a few major oil sands reserves, including Peace River, Cold Lake and most notably, the Athabasca oil sands. Through my research I was able to learn more about methods used to treat water and the environmental cost of oil sands.

Outside of the lab, WISEST provided us student researchers with many unique opportunities. Although I worked in the department of environmental and civil engineering, I was able to learn about many other faculties and I also had the chance to tour different industries. My most memorable experiences were visiting the Bionic Limbs for Improved Natural Control (BLINC) Lab during the Exploring UofA Research session and Gilead Sciences, Inc. during the Industry Tours. Being able to visit these places firsthand and to meet the researchers and the working professionals was beyond helpful. To learn the stories of how they came to be in their positions helped me decide which faculty I am interested in.

The WISEST SRP exceeded all my expectations. I knew that the SRP would be an opportunity for me to gain research experience and learn lab skills; however, I could never have predicted the connections I would make with my fellow researchers. I was lucky to be in a lab with three other WISEST students who were all hardworking and passionate, and we were able to learn from one another and share our experiences. As I go into my last year of high school I feel confident and well-prepared. WISEST has improved my time management and organizational skills and has provided me useful public speaking and networking tools.

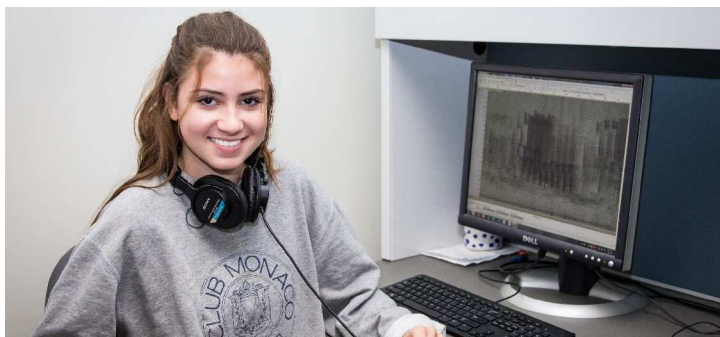
I would like to thank Dr. Mohamed Gamal El Din, my Personal investigator and Direct Supervisor, as well as Dr. Selamawit Ashagre Messele, Dr. Mingyu Li, Dr. Pamela Chelme-Ayala, and Dr. Shu Zhu, the incredible post doctoral fellows with whom I worked alongside in the lab and who taught me valuable lab skills and answered all of my questions. Finally I would like to thank my sponsor, NSERC Promo Science, and WISEST for making this incredible summer possible.

# Myah Grieve

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

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

**Sponsor:**  
**International  
Paper**



I remember walking through the mall with my friend, doing some casual shopping, when suddenly I felt my phone buzz in my pocket. When I saw the contact “WISEST” written across my phone screen, my entire being lit up. That feeling of excitement has stayed with me throughout my entire summer experience. Having a huge interest in biology, my joy only heightened when I was informed that my research project would involve how wildlife responds to human disturbance. I soon learned that I would be working with bird vocalizations.

My work involved identifying species vocalizations and organizing and recording data.

Alongside the computer work, my WISEST partner and I were given the amazing opportunity to join our fellow lab mates on a trip to Jasper to do some field work. We trekked up a mountain to collect Autonomous Recording Units (the microphones that had been deployed to collect the acoustic data), and were greeted by an amazing view at the top. Then, at night, we drove across the backroads of Hinton with a special microphone strapped to the roof of a car, recording the sounds of echolocation created by the bats. This opportunity gave us a taste of field life.

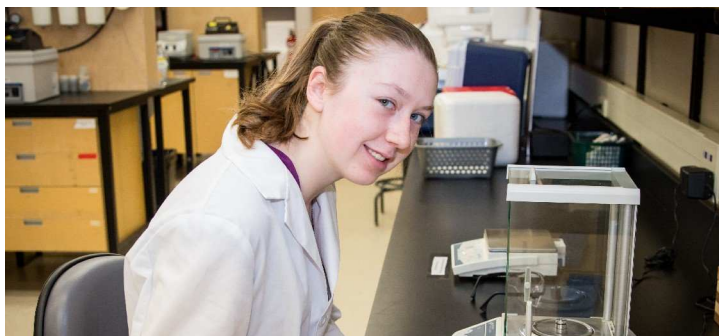
After returning from our field trip, it was time to begin working on our research projects. Mine involved temporal variation in the vocalizations of a Black-Throated Green Warbler. Specifically, I researched if a certain song type of the bird was more likely to be sung at certain parts of the day, or through different parts of the season. I discovered that song type is more likely to be sung during dawn. Further research is needed to determine if this is because different song types carry different meanings, and I would love to see if this research will be conducted in the future.

In addition to the research, the professional development and lunch sessions were very memorable. I learned many valuable lessons and developed my work-related skills, which will help me succeed in my future STEM career. This includes public speaking, communication, networking, and patenting. These sessions also allowed us to explore different areas of science, by taking us on lab tours. My favourite tour was the Dino Lab, because I was amazed by the fossils.

My favourite thing about this program was the encouraging community that I was a part of. My supervisor, my lab partner, and all of the WISEST students share so much in common, that it felt so natural to be around them. I felt supported when pursuing my research. The conversations I shared with my fellow students hold such great value to me, because it is rare to find people who share such a great understanding of your own thoughts. From talking about arthropods and the evolution of starfish, to what house I would be sorted into at Hogwarts, these conversations will forever remind me of the great connections I made in the program.

Overall, WISEST has provided me with unforgettable opportunities and lessons that will carry me throughout the rest of my life, and I am so lucky and grateful that I was able to take part in the program. I would like to thank the WISEST coordinators, my lab, and my sponsors for making this experience possible. With my newfound confidence and an even larger passion to pursue science, I believe that one day I can contribute to the world in the positive way, just as WISEST has.





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

**Department:**  
**Agricultural, Food  
& Nutritional  
Science**

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

I believe certain life experiences will change and influence my educational career path in a very significant way. The WISEST Summer Research Program is definitely one of them.

The WISEST (Women in Scholarship, Engineering, Science, and Technology) Summer Research Program is different from anything a student is going to experience during the course of a high school year. I was part of a team dedicated to a specific research goal for a full six weeks. Being in a research lab with assigned responsibilities makes me better appreciate the practical application of science with regards to the discovery of new things.

As a contributing member of Dr. Bruce's lab in the Faculty of Agricultural, Food, and Nutritional Sciences, and under the direct supervision Dr. Bimol Roy, I was fortunate to learn new skills required to evaluate, assess, and record data. More specifically, my research revolved around the examination of the compositional difference of beef from three different cattle breeds within two different muscles. The goal of our research was to determine which muscle was the most tender and would be best suited to the needs of consumers. We measured the protein, moisture, ash, and fat content; collagen content was also calculated to determine the tenderness of meat. My daily task would consist of starting and preparing the LECO machine to run our freeze dried meat samples for the day. The machine was used to measure protein content through the method of combustion, splitting carbon and nitrogen. The percentage of nitrogen is converted to a percentage of protein using a conversion factor. Once the machine was running I would begin weighing more samples for the next day, and it was a process that I took great pride in executing by myself. Time flew by so fast when I was working and I never wanted to stop. Other tasks included helping with the isolation of connective tissue containing collagen protein and running the Differential Scanning Calorimeter (DSC).

I really enjoyed working with my WISEST partner Sarah Schneider in the lab. Together we learned so much from each other and we were able to help each other on our projects. I hope to partner up with her again one day.

WISEST provided additional learning experiences outside of the lab. My favourites were the Industry Tours, the U of A Admission Process presentation, and Dr. Margaret-Ann Armour's Guest Lecture. I chose to go on the Collins Steel and Gilead Sciences Inc tours and I was very impressed. Both gave me insight into how science and math can be applied outside of a University research setting. The U of A admission presentation was engaging and it left me feeling better prepared to apply to university in the fall. In particular, I felt inspired by Dr. Margret-Ann Armour from her talk about her youth when it was uncommon for women to pursue the sciences.

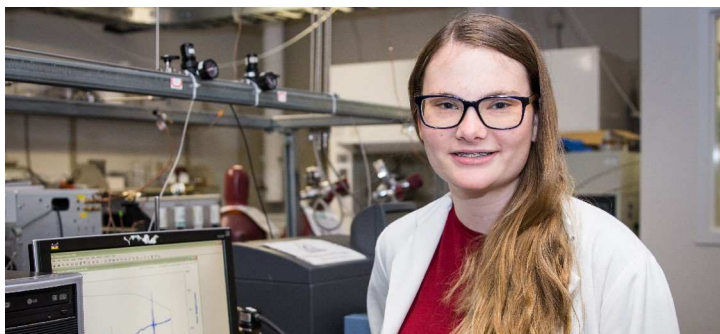
I want to thank my sponsor NSERC Promoscience. I appreciate the support and instruction of my mentors Dr. Heather Bruce and Dr. Bimol Roy, and the entire Lab Team for their guidance and I will always cherish this time in my life. I humbly thank WISEST for choosing me from many deserving candidates, and I will always strongly encourage other students to consider the same opportunity which I was fortunate to be part of.

# Indira Huck

**Supervisors:**  
**Dr. Rajender  
Gupta**

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

**Sponsor:**  
**SPECET**



Since the day my Physics teacher recommended the WISEST Summer Research Program (SRP), I was counting down the days until the application opened. The SRP had everything I wanted in a summer program: it was in the STEM fields, it was focused on promoting diversity, and I would be living in residence. All these aspects would help give me a taste of university and my future in the STEM fields. I was overjoyed and apprehensive for the great opportunity.

In the chemical and materials engineering lab that I worked in, I did research into coal carbonization and the coke that is produced. To produce coke, metallurgical coal was heated up to  $900^{\circ}\text{C}$  while nitrogen gas was passed through the furnace. Without oxygen to complete the combustion reaction it would start to melt while the volatile matter such as sulfur burned off. As the coal continued to heat up the carbon solidifies and forms into coke. Coke is used in the production of iron in the blast furnace. With the coke we produced, we later did tests to try and find an efficient method of calculating the Coke Reactivity Index (CRI) and the Coke Strength after Reaction (CSR) which are ways of quantifying the quality. The quality of coke is dependant on the quality of the coal that it is formed from. Being surrounded by graduate students, was at first very daunting because of the years of education they had over myself, but as the program went on I became more comfortable in the lab and began to ask more questions. I found the more questions I asked the more I had because the more I learned, the more I found there was to learn.

The WISEST Summer Research Program not only offered myself and others the amazing opportunity of getting to work in a university lab while still in high school, but also gave us the opportunity to gain life skills. We had many chances to be exposed to different professions and fields that would otherwise never have crossed my mind. From opportunities like the Exploring U of A Research event to the Industry Tours, I learned of the different paths that education in the sciences could take. I learned of the many opportunities that I could take advantage of in the future as well. In preparation for presenting our posters, we also attended workshops that were about the creation of the poster and public speaking. These are life skills that I will use in many situations, applicable in any field that I may later explore. Through the WISEST SRP, I have learned about more than just coke production, but also research, university, and the many opportunities that may stem from university and research.

I would like to thank my Principle Investigator Dr. Rajender Gupta and my Direct Supervisor Dr. Deepak Pudasainee for welcoming me in their lab. They, as well as the rest of their research team, have encouraged me to be curious and take advantage of this great opportunity. I have learned so many transferrable skills and am so grateful for the sponsorship from the Society of Petroleum Engineers Canadian Education Foundation. This was all possible due to the time and effort that the WISEST coordinators have put in to ensure that everyone had a fruitful summer. This experience has benefitted me in so many ways, and I hope the program goes on to help others for years to come.



**Supervisor:**  
**Dr. Robert Driver**

**Department:**  
**Civil and  
Environmental  
Engineering**

**Sponsor:**  
**Syncrude Canada  
Ltd.**

Over the summer I had the pleasure of working with not only one, but two supervisors, Victoria and Safa. While working with Victoria, I learned about extended shear tabs and their importance. Not only are shear tabs extremely common, they are also important when making a building that contains steel. They connect two metal beams together and have a low fabrication cost. Even though they are widely used, not much information is known about extended shear tabs. To test their strength and stability, we applied a rotational, vertical and an axial load to them.

When working with Safa, I was learning about progressive collapse. This is when a column is removed and the remaining structural members can't withstand the increase of load and fail. A portion of the building collapses as a result. We are doing this experiment to prove that a gravity frame does in fact have robustness. Both of my supervisors used a program called ABAQUS to run models of their experiments before executing them. I also was able to run a model of my own on a beam. I applied different loads and saw how the beam reacted. Victoria did lab experiments within the first week I started working here. Safa won't run her experiment until September, but I hope to come back and watch the experiment.

Throughout the summer, I have learned so many new things. I had a very steep learning curve with information from the WISEST SRP and the other things going on in my everyday life made it more of a struggle. I learned how to balance these challenges and handling everything became much easier. Not only have I been able to learn information on structural engineering, but also things like networking and computer skills. I never realized the true value of networking until I experienced the SRP, and this is something I will definitely use for the rest of my life. I also learned that I will most likely change my university path and that it's okay to do so; most students do this.

My overall experience has truly been incredible! I am so happy that I was chosen to partake in the SRP because it has better prepared me for life after high school and life after I attend university. I have met so many amazing people in Civil Engineering, as well as other disciplines. I never would have had the chance to do this without the WISEST Summer Research Program. When I was first going into the SRP, I had the idea that I might want to pursue a career in Civil/Environmental Engineering. Now I know I want to do something in that discipline. I found the research and topics very interesting. I had expected to learn about what engineering was really like in, and outside of, university. After meeting lots of grad students and engineers I now know what engineers do for their job, and this makes me enjoy it even more.

I would love to give thanks to my supervisors Victoria Buffam, Dr. Safa Masajedian, as well as Dr. Robert Driver for making this experience truly amazing. They always made sure I was happy with what I was doing and made sure I was helped at every step of the way. All of the other Steel Centre members also made me feel very welcomed and it was a pleasure to get to know everyone. I would also like to give thanks to Syncrude, who was my sponsor for the WISEST Summer Research Program. I am very grateful to have had the chance to enjoy this experience.

# Emma Kaliel

**Supervisor:**  
**Dr. Pamela**  
**Willoughby**

**Department:**  
**Anthropology**

**Sponsor:**  
**WISEST**



Halfway through grade 10, I was approached by my physics teacher about applying for the WISEST Summer Research Program once I had finished grade 11. Now looking back over at how my summer went, deciding to go through with it was one of the best decisions I have ever made.

I was one of the ten students who lived in residence over the course of the program, and I would not have changed it for the world. The other nine girls were wonderful to hang out with and talk to, and many of the activities we did as a group were extremely memorable; this included trips to the Hexagon Board Game Cafe on Whyte Avenue, Cirque du Soleil, and Fort Edmonton!

As for my placement, my summer was spent in the Department of Anthropology with Dr. Pamela Willoughby and the members of Iringa Region Archaeological Project (Jennifer Miller, Amy Reedman, and Jeffrey Werner). I was more focused on Dr. Willoughby's specialization, which included sorting and measuring stone tools from Tanzania. The information gathered is an attempt to understand the role of Southern Tanzania in modern human evolution. This experience was perfect for me, as I was able to see for myself whether I would really be interested in pursuing anthropology in post-secondary.

Another part of the WISEST SRP was the opportunity to attend WOW sessions and Professional Development Seminars, all of which were enjoyed immensely. Out of all of these, the DinoLabs ended up taking first place in my mind. These labs are not open to the public, which made the experience all the more compelling. From the museum of the fossils they have up on display to the labs where the fossils are preserved and copies are made, I was hooked by every feature.

As a result of this program, I have gained new skills and forged new friendships with like-minded people, both of which I hope to keep for the rest of my life. Being expected to run around campus to all kinds of buildings introduced me to the University of Alberta and even a few spots of the city. Furthermore, I have obtained more confidence in myself and that has been encouraged throughout the course of the summer thanks to those who have supported my journey.

I would like to thank WISEST first and foremost for the life changing summer I have had, but also for being my sponsor too. Without them, none of this would be possible and I hope that this continues in future years. Secondly, I want to recognize the IRAP members in my lab for the entertaining and informative time I have had. Be it assisting them with their own work or helping me with my research poster, I am extremely lucky to have had them the whole time, otherwise things would have been a lot tougher!

# Cassandra Karlzen



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

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

**Sponsor:**  
**International  
Paper**

This summer I was given the honour to work on a mountain pine beetle research team, alongside some very inspiring and encouraging university students. I was placed in Dr. Maya Evenden's lab, which was an incredibly inviting and exciting place to work. My project studied mountain pine beetle flight and the impact of morphology and environmental factors, including volatile organic compound exposure. Not much is known regarding their flight patterns and behaviour, so this project was considerably interesting. I learned a lot about the biology of the mountain pine beetle and I was particularly interested in the aspects that make it such a formidable pest. Working with live beetles and studying their behaviour was fascinating and I hope I have the opportunity to do a similar project in the future. The six weeks went by very fast, yet I will never forget my experience there. My time in the WISEST Summer Research Program has taught me skills that I had previously only dreamed of possessing. This project has been my only experience with research, yet I don't believe it will be my last. Working in a lab was both exciting and tedious at times. Yet, I learned that it is the tedious work that makes me truly appreciate science and research. I also learned that the people you work alongside also impact how you perceive science and research. I have always considered myself to be a quiet person, which isn't necessarily a beneficial personality in research, where cooperation and participation is encouraged. However, my supervisor, Kelsey Jones, was very understanding and made an effort to get me involved in the lab. There was something memorable from every day.

When my biology teacher recommended me for the program I was honestly taken aback by how incredible the program sounded. I was instantly suspicious. Going into grade 11 had forced me to start thinking about my future and my introduction to WISEST was so perfectly timed, it's almost laughable. I had always loved science, yet I had trouble picturing a career in which I got paid to do these things I was so passionate about. I was incredibly nervous throughout the application process and I remember how excited I was when I received that phone call. It made me anxious when I thought about how this privilege came with all these standards and responsibilities I didn't yet know how to carry out. I felt inexperienced and unsure of myself. When I learned of the research project I would be doing, however, much of my anxiety faded. I had stated that biology was my preferred area of study, but I was not very specific, so when I was placed in an entomology lab, I was both surprised and curious. Now I can confidently say that I'm considering it as an interest that will carry over into my university education. This experience opened my eyes and gave me the confidence to pursue a career that I truly want.

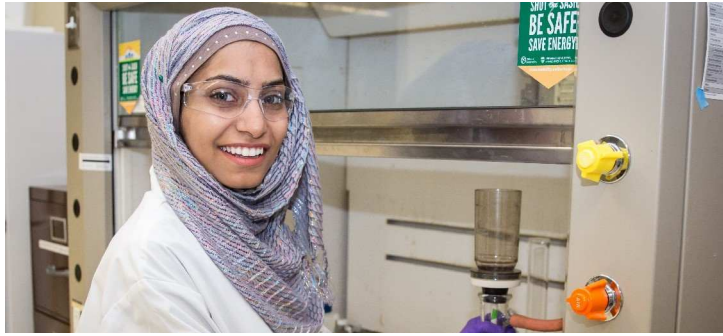
I'd like to thank WISEST and all of the coordinators for this incredible experience they've given me. The program helped me realize a great deal about myself. I'd also like to thank Dr. Maya Evenden and Kelsey Jones, as well as everyone else in my lab, for introducing me to research. I was always excited for work because of my team. I'd also like to thank my sponsor, International Paper. My entire experience was thanks to their generosity. Finally, I'd like to thank my mom for sending me her homemade food every weekend. I couldn't have done it without you.

# Fajar Khan

**Supervisor:**  
**Dr. Mohamed**  
**Gamal El-Din**

**Department:**  
**Civil and**  
**Environmental**  
**Engineering**

**Sponsor:**  
**Syncrude Canada**  
**Ltd.**



One phrase I have always held close to my heart is, “Never let anyone tell you, ‘you can’t do it.’” The world is open to those who are determined and passionate. Born into a society where women are generally not looked upon to work outside of the home, I had always questioned it as to why it was just men. Why not women?

Growing up my passion for sciences increased. I knew as I got older that I was determined to go into the sciences and help our world advance. Hearing about the WISEST program from posters around my school and how it worked to place women into fields that they are underrepresented in, I knew this was something I had to apply for. Whether I would get in or not, it was about my willingness to try new things. This would become a great opportunity for me to step out of my comfort zone, get away from home, make new friends, and most importantly have a summer experience no one else would have. This summer exceeded my expectations and was an amazing experience that I will cherish forever.

This summer, I had the opportunity to work alongside three other WISEST students and Dr. Mohamed Gamal El-Din’s environmental engineering lab under the supervision of two PhD students, and one student working towards her PhD. We were given two projects to work on, both of which were related to water treatment. The objective of our first experiment was to remove the Naphthenic Acids from oil sands processed water. We used Granular Activated Carbon (GAC) to adsorb the Naphthenic Acids from oil sands water. The GAC would stick the Naphthenic Acids to its’ outer surface, removing it from the water which then could be reused. Not only did I learn the techniques, but I was able to understand them thoroughly as to how they work with the water to clean and process it to be reused. I would collect samples of the oil sands solution water to see the effect of the GAC during various times after adding it into the solution. The next experiment revolved around wastewater treatment plants and cleaning sewage overflow specifically. We used a process called coagulation and flocculation, which is one of the several steps in municipal wastewater treatment. Through this experiment I learned the different steps taken in wastewater treatment plants and how the process of coagulation and flocculation works from slow and rapid mixing. By the end of the six weeks, I knew how to collect samples and perform these treatments of water very well. Before coming into the lab, I had not expected to learn this much.

Overall, this summer has been wonderful and I leave it with many great stories to tell, new friends, and confidence. I remember getting ready for the first day and being nervous as I knew no one in the program. Through our weekly seminars such as the Lunch N’ Learn sessions and the WOW sessions, I got to know so many people that I had not expected to meet prior to this. I would like to thank the WISEST team for giving me an opportunity to be placed in this program and helping me experience campus before any of my friends. Lastly I would like to thank Dr. Mohamed Gamal El-Din for taking me into his lab for the summer along with Dr. Pamela Chelme-Ayala, Dr. Selamawit Messele, Dr. Mingyu Li, and Shu Zhu. I would also like to thank Syncrude Canada Ltd. for sponsoring this memorable summer.



**Supervisor:**  
**Dr. Nadia  
Jahroudi**

**Department:**  
**Medicine**

**Sponsor:**  
**Beta Sigma Phi**

When I applied to the Women in Scholarship, Engineering, Science, and Technology (WISEST) Summer Research Program, all I could think about was how amazing this opportunity would be. While I realized that it would be way out of my comfort zone, I was determined to push my worries aside and get the most out of my experience. I'm glad I did because I thoroughly enjoyed these six weeks and I have learned more during that time than I ever could have imagined.

When I received an email detailing my project, I was simultaneously excited and terrified. I was scared because of how little I knew about the subject but I was excited to learn about it. During my time in the lab, I worked on a project where the purpose was to explore how the amount of time in hypoxia affects the release of Von Willebrand Factor (VWF) in lung endothelial cells. Hypoxia is a condition where there's very little oxygen available. VWF is an important protein that is synthesized in endothelial cells and is responsible for making blood clots. A previous study showed a connection between hypoxia and VWF expression and what we wanted to know was just how long cells need to be in hypoxia to begin showing increases in VWF. This research is important because, for example, when organs get transplanted they are exposed to hypoxia while they are outside of the body. This can be a problem for patients because the VWF could trigger blood clots, which could then lead to complications. My responsibilities in the lab included collecting the cells, extracting RNA, and using different analyzing techniques such as Western Blot and RT-PCR. Our results showed significant increases in VWF expression after 48 hours in hypoxia, which proves that hypoxia does have an impact on VWF release. This will help us to improve transplanting techniques and, as a result, lower the risk of complications and rejection.

I have learned many things during my summer at the University of Alberta that will stay with me for the rest of my life. Not only did I learn important lab skills, but I also learned important life skills like how to build work relationships and be more independent. Also, the WISEST-coordinated lunch sessions were very helpful because they taught us things like how to be a good public speaker and how to make an effective research poster. Living in the residence on campus also allowed me to learn and grow as I had to take on adult responsibilities like grocery shopping, doing laundry, and cooking meals. It seemed daunting at first to take on these adult tasks but I quickly learned that it's not as intimidating as it sounds. Having the opportunity to live independently but still have support from a residence advisor was amazing and I definitely feel more ready to live on my own in the future.

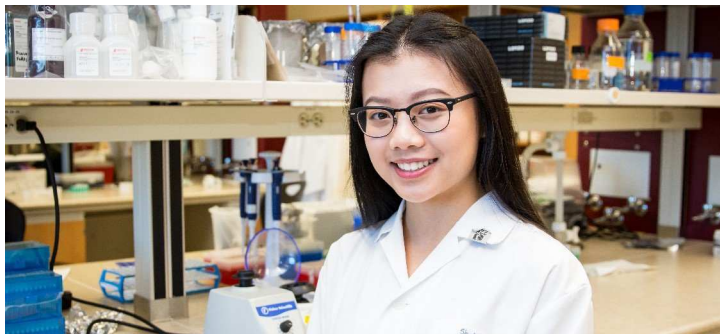
I'd like to thank Parnian Alavi and Dr. Nadia Jahroudi for mentoring me and making my experience in the lab enjoyable. As well, I'd like to thank my sponsor Beta Sigma Phi and WISEST for giving me this opportunity. Also, I am very thankful to my teachers Ms. Prescott and Ms. Schlosser who wrote reference letters for me. I'd also like to thank Tonia, our resident advisor, for making our time on campus fun and safe. I definitely had high expectations for this program and I can honestly say that my expectations were exceeded. This program allowed me to grow as a person and most importantly it made me realize that I love doing research.

# Annie Lam

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

**Department:**  
**Medical**  
**Microbiology &**  
**Immunology**

**Sponsor:**  
**Alberta Education**



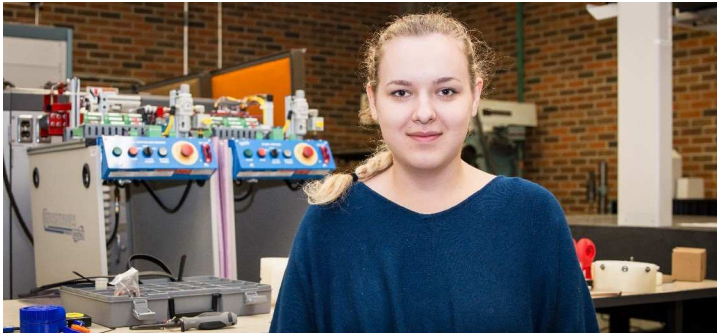
From a young age, my parents encouraged me to pursue my interests in the STEM fields, as they did not get the opportunity to do so. I remember telling my parents about my slight interest in science, and from then on, they never failed to remind me of that. When I was introduced to the WISEST Summer Research Program at school, I was certainly thrilled about such an amazing opportunity; I can assure you my parents were ecstatic as well. After getting the acceptance call after a busy day, I did not believe it. Though I applied with the confidence that I had the ability to succeed in this program, I started to doubt it. I did not think that I was capable of working alongside researchers who have been doing research for longer than I have been alive! However, I was proven wrong and learned a lot about myself, conducted cutting edge research, and met many people who helped shape my future career aspirations.

This summer, I had the pleasure of working in Dr. Shokrollah Elahi's immunology lab, alongside my supervisor Dr. Petya Koleva. Thanks to my rudimentary understanding of the immune system from Biology 20, I could comprehend the first couple of sentences of my research project. Working in this lab has deepened my understanding of immunology; in fact I am considering majoring in it in university! Generally, it is thought that the immune system of newborns is "immature". However, it is actually being suppressed by CD71+ erythroid cells. My project focused on studying the role of CD71+ erythrocytes on gut bacteria during pregnancy. CD71+ cells are immature red blood cells which have immunosuppressive properties. That being said, they prevent excessive inflammation in response to gut bacteria colonizers, which are instrumental to the development of the immune system. Studying this relationship will provide safety precautions for the development of immune therapies involving CD71+ cells. While working in the lab, I learned many basic lab skills and techniques. From labeling 4000 tubes for leukapheresis, micro pipetting, staining cells, processing spleen and fecal samples to using a qPCR machine and flow cytometry machine, I have learned skills that I had thought were way ahead of me. I am extremely grateful for such a valuable opportunity to do so, and I know that I will use these skills and encounter these machines in the future.

In addition to the enrichment of knowledge from the lab, WISEST held sessions to further our understanding about postsecondary education and career fields. In high school, there is often an unintentional pressure to know exactly what you want to do with your life, which is quite a hefty task. The Public Speaking Workshop and Networking Fair in particular allowed me to reflect on the way I present myself and my ideas to the world. The ability to communicate well is a skill crucial to every aspect of one's life, whether that be academically, professionally, or interpersonally. I have gained confidence in my presenting skills - something I have struggled with all my life - and have built a network of mentors whom I can turn to when making large life decisions.

I would like to thank Dr. Shokrollah Elahi, Dr. Petya Koleva, Lai Xu and members of the Elahi lab for welcoming and supporting me and generously giving up their time to answer my questions. As well, thank you to the WISEST team who worked tirelessly before and during the program. I am also grateful to Alberta Education for sponsoring my participation in this unforgettable program.





**Supervisor:**  
**Dr. Rafiq Ahmad**

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

**Sponsor:**  
**SPECET**

My history with WISEST goes back a bit further than the six week span of the Summer Research Program. In grade 6 I attended the CHOICES Conference, and for the first time in my life someone told me that science and technology would be a good fit for me. When I started high school and heard about the SRP, I recognized the name immediately, and knew I couldn't pass up on the chance to immerse myself once again in a community of girls who are passionate about discovery.

My project gave me firsthand exposure to the work of an engineer, in particular the process of design. I worked with a software to generate concepts of a Lego robot, with the goal of an end product which was reconfigurable and could meet the versatile demands of today's industry; and I was able to assist in the assembly of a 3D-printed robotic arm. These tasks taught me that being an engineer is really about creativity. In the past six weeks I encountered many interesting obstacles, all of which required innovative thinking to find the non-obvious solutions. My Principal Investigator told me when I started that my value to his lab is that I am not an engineer. Humans are habitual, and after a while we get stuck in our ways. If you don't know the right way however, you have to come up with something new. By bringing a different perspective and my own ideas, I ended up learning more.

Beyond my day-to-day work there were many exciting events which took place outside the lab. It was in these sessions that I got to know the other students and got to learn about some of the amazing work being done by others in STEM fields. These tours and activities gave us a deeper understanding of the diverse applications of science in our lives. Everyone we met, from the professionals to the students, had something to teach, a passion to share with the rest of us. I'm so grateful that we were able to see so many sides of research and STEM, because I now know that if I keep my eyes open I will find a field that I will love working in.

This summer has introduced me to many amazing people, without whom my experience would not have been the same. I want to first express my gratitude to Dr. Rafiq Ahmad and his team at LIMDA, especially Miss Hazel Flores, an undergrad student with whom I had the pleasure of working. As well, fellow WISEST students from my lab, Jennifer Peterson and Riana Tauscher. It did not take long for me to develop a great respect for these girls, and to consider them my friends. I must also give recognition to the SPE Canadian Educational Foundation who generously funded my participation. I am very fortunate for all the mentors and teachers in my life who encourage me to pursue opportunities like this one. Finally, to Dan and Andrew from the machine shop, the lovely ladies at WISEST, and to everyone else at the University who made us feel welcome with their excellent hospitality and friendly faces: thank you for making this experience into the amazing summer I hoped it would be.

# Hadeel Mohamed

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

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

**Sponsor:**  
**Faculty of Science**



As Albert Einstein once said, “The only source of knowledge is experience.” If there was one thing I could take away from the WISEST summer research program, it would be summed up in this powerful phrase of wisdom. From communication, computers, and career pathways, to knowing where the best food spots on campus are, this summer taught me more than I ever expected I could learn, and I am beyond grateful for it.

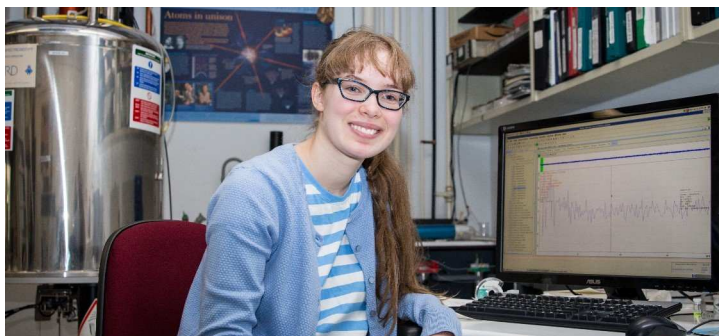
When I first found out that I would be working in Dr. Christopher Sturdy’s Song Neuroethology Laboratory at the Department of Psychology, I was nearly jumping with joy. This was because I would have the exciting opportunity to work with the absolute cutest black-capped chickadee birds. My project focused on a specific vocalization of the chickadees, the *tseet* call, which is a short contact call. My goal was to discover if acoustic features of this call were dependant on the body size of the birds. With the help of my supervisor Kimberley Campbell, I did this using software called SIGNAL. We took 22 calls from each of the 16 birds I was working on and measured specific frequency and duration features of each call. I’ll have to admit, this process took long and was extremely repetitive, but once my results came in I realized it was all worth it. We discovered that although there was no clear correlation with duration, certain measures of frequency decreased as body size increased. This essentially meant that the bigger the chickadee was, the lower their *tseet* call was in pitch, which supported similar findings in ongoing research with other chickadee calls.

My research experience was filled with ups and downs, but at the end of the day I realized making mistakes actually gave me more experience and helped me grow as a better person. Despite that, what I appreciated more than anything else during my time in Dr. Sturdy’s lab was the research team’s hospitality and kindness towards one another. I arrived thinking that my work would be ridiculously intense, but that was absolutely not the case. I was blessed to be placed in an area where my colleagues felt like family and not strangers.

One of the best things about the summer research program is the availability of many different seminars and lunch sessions to attend throughout each week. Making the most out of this opportunity and attending every session held throughout the program was by far one of the best decisions I have made this summer. Ada’s Team Lunches were a great opportunity to learn more about computers, design my own 3D model for printing, and eat some great pizza! The Public Speaking workshop was a super fun way to boost my confidence speaking and learn some tips and tricks for presenting my research poster. Also, research facility tours exposed me to some of the awesome research taking place on campus. Each session was really enjoyable and I’m glad I could be a part of it all.

Massive thanks to Kim and the Sturdy Lab research team. You guys rock and I couldn’t have asked for a better group of people to work with. Also, thank you to my fellow WISEST student Colleen Wyring, for working alongside me and helping me out. To the Faculty of Science, thank you for making this unique opportunity available to me and sponsoring my research journey this summer. Lastly but definitely not least, thank you to my parents; they are individuals who inspired me to push myself to my potential in all aspects of life. If it weren’t for them, I wouldn’t have gained this experience of a lifetime.

# Rebecca Moore



**Supervisors:**  
**Dr. Vladimir**  
**Michaelis**

**Department:**  
**Chemistry**

**Sponsors:**  
**The Rotary Club of**  
**Edmonton**  
**Glenora, Canada**  
**Summer Jobs**

Ever since I can remember, I have known that I want to pursue a university career in the STEM fields. However, the wide range of options in these fields has always overwhelmed me. I heard of the WISEST Summer Research Program (SRP) from school announcements, and I was instantly intrigued. Not only would I be exposed to the different STEM fields, I would also have the opportunity to pursue research at the university. I knew it was very competitive so I did not really expect to be selected but when I got the call that I had indeed gotten into the program, I could barely contain my excitement.

I was placed into a Physical Chemistry lab led by Dr. Vladimir Michaelis under the supervision of Ms. Michelle Ha. The purpose of the project was to determine the unique solid-state nuclear magnetic resonance (SSNMR) spectra of methylammonium tin halides. Initially I was worried that I would be unable to meet the expectations that the other researchers might have of me, but it did not take long for me to realize that everyone was more than willing to take the time to fully explain new and difficult concepts to me. The first week or so of the project mostly involved me following my supervisor around trying to learn how NMR works and precisely how perovskites play a role in solar cells, but by the second week the first sample was being packed into a rotor and we were starting the first experiments. By exciting the nucleus of the  $^{119}\text{Sn}$  that was present in the samples, we could gain an understanding of the different perovskites. To acquire data we used the Hahn pulse program which used 900 and 1800 pulses to excite the  $^{119}\text{Sn}$  nuclei in the perovskite samples. As the nucleus relaxed, the machine amplified and recorded its NMR signal. Some of the spectra we recorded were stationary, but in others we spun the rotor inside of the spectrometer in order to gain a better resolution for the spectra. From the spectra of the methylammonium tin chloride and methylammonium tin bromide, we discovered that the chemical shift decreased from the chlorine to the bromine samples so that each spectra was clearly distinct from the other. The chemical shift refers to the distortion to the NMR signal that occurs when nuclei other than the reference are present in a sample. Another conclusion we made was that the bromine sample had a broad peak that appeared both in the stationary and spinning spectra despite the fact that there should have been increased resolution in spectra that were gathered from spun experiments.

Research was not the only valuable experience that WISEST offered me throughout the course of the summer. In addition to research, every Friday students took part in professional development seminars where we learned various skills that would help us with our careers in the STEM fields. The most useful session was the U of A Q&A where we were given the chance to ask students at the U of A about university life. Two of the most important lessons that I got from this session were to always be flexible and also to be willing to step outside of your comfort zone and try new things.

This incredible experience would not have been possible without the willingness of the Michaelis research team to allow me into their labs for the six weeks of the program. Thanks also goes to the Rotary Club of Edmonton Glenora and Canada Summer Jobs for sponsoring my experience in the SRP. Finally thank you to the WISEST team for all their time and dedication.

# Hannah Neumann

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

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

***Sponsor:  
AWSN***



When I found out about the WISEST summer research program a few years ago, I was excited to apply and to get to work in a university lab. I wanted to experience what it would be like to have a career in STEM, and I also wanted to find out exactly what field would be right for me. During the program, I learned so much about the field I was working in and about many other STEM fields. I did not decide exactly what career I want to pursue, but I was introduced to many other career options. I now have a lot more information to help me make my decision. The summer research program was an incredibly valuable experience and I would recommend it to anyone interested in pursuing a career in STEM.

This summer, I was working in Dr. Suzanne Kresta's lab in the department of Chemical and Material Engineering. We were determining important characteristics of Rushton impellers used in bitumen froth treatment. I also helped run bitumen froth experiments, where we attempted to determine the ideal mixing conditions for producing pure bitumen. Our goal was to separate water and fine solids from the bitumen froth efficiently. I had the opportunity to work with lots of laboratory instruments, like a microscope and a laser, and I also learned how to use computer programs to record data. I gained so much valuable experience working in the lab. I really enjoyed performing experiments and seeing what it would be like to be a chemical engineer.

During the summer research program, I learned so much, not only about engineering and the project I was working on, but also valuable skills that I will be able to apply to my future career. The public speaking workshop was very helpful for presenting my poster at the Celebration of Research, and I will be able to use the techniques that I learned when doing presentations later in school and in my career. The networking fair taught me how to network with others in my field, and it was also a lot of fun!

Some of the most memorable parts of the summer research program were the WOW (WISEST on Wednesday) sessions and Friday afternoon sessions. We did lots of fun activities like scavenger hunts, social science challenges, and making ice cream with liquid nitrogen. During these sessions, I got to know the other student researchers better and made a lot of friends! We also had the opportunity to go on tours within the university and around the city. It introduced me to many other career options that I had never considered before.

Overall, the WISEST summer research program was an amazing experience and learning opportunity. I would like to thank the Alberta Women's Science Network for their sponsorship. I would also like to thank my principal investigator Dr. Suzanne Kresta, my direct supervisor Runzhi (Anna) Xu, and the other members of my lab for letting me work with them for the summer and for making this experience possible. Lastly, thank you to the WISEST staff for running the summer research program and for inspiring me to pursue a career in STEM!

# Jennifer Peterson



**Supervisor:**  
**Dr. Rafiq Ahmad**

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

**Sponsor:**  
**Threshold Impact**

As a woman, it is a daunting task to pursue a career in STEM. While I was growing up, people would tell me that I would make a great science or math teacher, because I liked those subjects, but very few people ever suggested scientific research. My parents were an exception to that; they encouraged my inquiring mind. My dad and I would often perform experiments at home. Unfortunately, apart from those and my school courses, it was difficult to pursue my love of science in Vermilion, my home town. I received very few opportunities to explore the STEM fields within my community, so much of what I knew about possible occupations in those areas I had learned at various university open houses. Being a part of the WISEST Summer Research Program gave me experiences and opportunities to try research, visit laboratories and industries, participate in professional development sessions, and meet other young women interested in sciences, none of which I could have tried at home. Not all of the experiences I had during the WISEST Program will directly impact my future, but the skills I learned throughout the summer will help me no matter what occupation I choose.

The lab I was a part of during the Summer Research Program was in the Department of Mechanical Engineering and is called the Laboratory of Intelligent Manufacturing, Design, and Automation (LIMDA). Within the lab, there were three WISEST students, Riana Tauscher, Sarah Lefebvre, and myself. On the first day, we introduced ourselves and our friendship began. Our supervisor was Dr. Rafiq Ahmad, who was enthusiastic to meet us and help us learn over the course of the summer. My project was to design a layout for AllFactory, a Factory-in-a-lab within LIMDA. I began by researching manufacturing and learned about lean manufacturing, push-vs-pull assembly lines, and the types of manufacturing wastes. The first few days in the lab were filled with reading and attempting to understand a new world of terms and concepts. After that, I discovered that I was to create a floor layout for an assembly line which would construct an open source 3D printed robot, which an undergraduate student named Hazel Flores was assembling. I developed a layout, bill of materials, procedure diagram, and station breakdown of the instruction for building it. Finally, I began to set up the AllFactory and begin to see my work transform from paper into reality. As part of my project, I was able to actually build the 3D printed robot. Unfortunately, we will not see the robot functional as someone else will be wiring it in the future. It took four people nearly a week to assemble the robot because we faced challenges continually. Most days it seemed that nothing in the assembly project could ever work first try. Together we persevered through having pieces not fit together, attempting to decipher the original instruction manual, and reprinting parts. We were being true engineers. It is these memories that will not fade in time.

I would like to thank my parents, siblings, and teachers for never discouraging my curiosity and building my confidence to pursue any career I choose. Within my lab, I must thank my supervisor, Dr. Rafiq Ahmad as well as Hazel Flores, Saraswati Jituri, and the rest of Team LIMDA for assisting in my research. Dan and Andrew, from the machine shop, also need to be recognized for their patience and understanding when we needed their help. To my anonymous sponsor and the WISEST Team, merci. Without all of your support, I would not have been in this program. To whoever is reading this: ask questions, be curious, experiment, and no matter what you do, be yourself.

# Rebecca Probst

**Supervisor:**  
**Dr. Larry**  
**Unsworth**

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

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

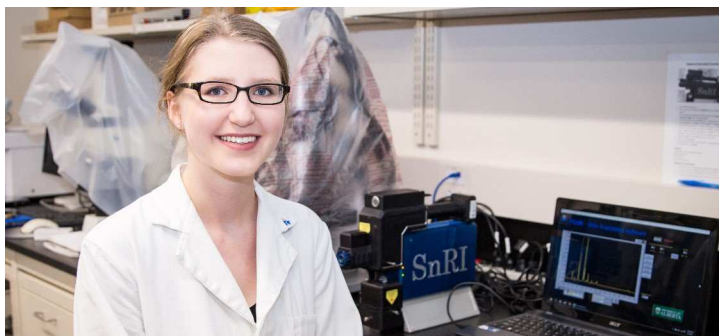


The day that I received a call from Women in Scholarship, Engineering, Science and Technology (WISEST) about my acceptance into the program was unforgettable. Not only was this the beginning of my journey at WISEST, but it was also the day that I bought my first car. New doors had opened, literally and metaphorically, and all I could see ahead was open road full of both opportunity and the unknown. After receiving my project overview, I was confused - it felt like a different language. Luckily, over the course of the program, I was able to decode this terminology into something I could understand, and by summer's end, I knew much more than I had begun with. I think it's safe to say that between my car and this summer program, the experience and opportunities that WISEST has given me will carry me further in life.

By the end of the first day, despite how nervous I was, I had two new friends under the same principal investigator, Dr. Larry Unsworth. I later met Yuhao Ma, the graduate student I would be working with and got to know the basics of my project. Soon, I was using the ellipsometer on my own to familiarize myself with the machine and was making my own samples for analysis. My project was based on studying proteins and what effect different concentrations of proteins had on their adsorption to a gold substrate. I used bovine serum albumin (BSA) as the protein and made the solutions into concentrations from 1mg/mL to 50mg/mL. I analyzed each via ellipsometry to determine the thickness of the protein layer on each substrate and then used a different model to find the adsorption. Though confused at first, as I dug deeper about the applications of protein adsorption, I grew more fascinated by its impact in the medical world – a career path that I had been eyeing up for the past couple years.

My research experience at WISEST was atypical. Because I was set to work in a federal building, the National Institute for Nanotechnology, clearance into the labs took an especially long time. Despite this setback to my actual hands-on research, I think that this part of the experience has taught me the most about life. Not everything goes as planned, or as you might have imagined. You just have to roll with the punches and be patient. Nevertheless my experience here has been life-changing. The Friday sessions I have definitely enjoyed more than I anticipated. Especially the UofA Q&A, where I finally decided what I am going to apply for engineering once I finish high school. As for the WOW sessions, they have given me much useful information that I can apply both now and in the future.

This experience is one that I will cherish forever. I have gained so much from these six weeks - not just more knowledge and information about research and the university, but new friendships as well. I would like to express a big thank you to Dr. Unsworth for having me in his lab, my graduate student Yuhao Ma for his guidance and help throughout this program, and to the other members of Dr. Unsworth's team. Most of all, I would like to thank my sponsor, NSERC PromoScience. Without their support, I would not have been able to participate in this program.



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

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

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

I was first exposed to WISEST through the CHOICES Conference in grade six. In grade eight, a family friend told me about the Summer Research Program, and since then I looked forward to when I could apply and participate myself. It appealed to me because it would allow me to explore what I truly wanted to do, and it could allow me to have an experience with university before I graduate high school, making the notion of university far less daunting. The WISEST SRP taught me some of what I expected, but also so much more. It was a truly fulfilling experience. This summer, I was placed in Dr. Rajendar Gupta's chemical and materials engineering lab under the supervision of Dr. Deepak Pudasainee. My project was the characterization of coke, a product of coal used in iron production, using several different tools. By characterizing coke samples, they can be screened for strength and quality, which affect behaviour in the blast furnace and therefore iron quality. Thermogravimetric analysis was used to study the reaction with CO<sub>2</sub>, to predict strength during use in the blast furnace. Microscopy was used to calculate porosity, which is related to tensile strength and breakage of the coke. Finally, Raman Spectroscopy was used to analyze the carbon structure of the coke. These all contribute to the strength and reactivity of the coke, and how long it lasts in the blast furnace without breaking down and needing to be replaced. This is small a part of the overarching project of developing methods that could be used to screen coke quality on a smaller scale and in a more cost effective manner than the standard industrial scale tests.

Throughout the program I have learned a lot and had many of my pre-existing conceptions altered. Research is not fast-paced, with breakthroughs and discoveries, but rather slow. Six weeks is a tiny amount of time in a long-term project. Every sample run in the lab takes up to a full day, depending on the procedure, and each must be run individually. Then analysis must occur, and different methods and instruments must be used to culminate information. Beyond my learning about research, and things directly related to the project, I have also learned through the sessions facilitated by WISEST. We were given the opportunity to learn about computer science, intellectual property, and effective public speaking. Additionally, we were given the opportunity to take tours of different research labs within the university, as well as tours of different science and technology related industries. The tours were really interesting, because they showed how diverse research and science are, with a lot of variations in backgrounds and jobs even within what would generally be considered a single field. Personally, I found that through all aspects of the WISEST Summer Research Program I was exposed to the tremendous variety within the sciences, with every research project completely different from the next, and so many distinct possibilities for where the sciences can take you.

I would like to thank Professor Gupta and his research team for welcoming us into their lab, and Dr. Deepak Pudasainee for his support throughout the program. I would also like to thank the other WISEST students for their help and company throughout the program. Additional thanks go out to NSERC PromoScience, whose sponsorship allowed for my participation in this program. Finally, thank you to the WISEST team for running this program and allowing this amazing, once-in-a-lifetime, opportunity to high school students every year.

# Mahed Riaz

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

**Department:**  
**Agricultural, Food  
& Nutritional  
Science**

**Sponsor:**  
**Faculty of  
Agriculture, Life  
and  
Environmental  
Sciences**



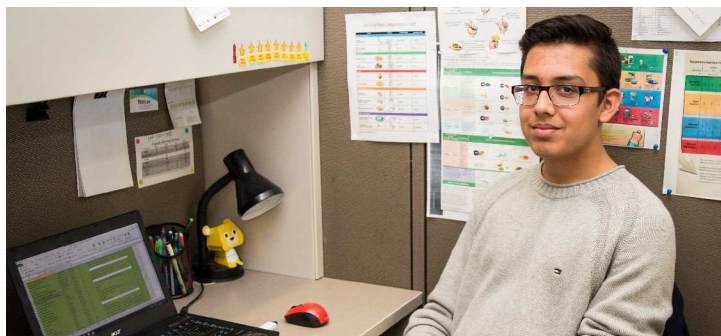
I had the amazing opportunity to be part of the 2017 WISEST SRP. Because I live in a rural area, there are fewer educational opportunities available to me. When my grade 11 Biology teacher introduced me to the WISEST program, I knew that my participation in the program would be the perfect opportunity for me to gain early experience working in a university setting and to pursue academia during my summer break. When I was notified that I was one of 41 very lucky students who were accepted into the program, I felt nothing but excitement and curiosity as I thought about the life changing experiences the WISEST program would hold.

At the end of orientation day, another student researcher and I were taken to the Li Ka Shing building where the both of us would be working under the guidance of registered dietitians. Throughout my summer, I have been working with graduate students to formulate a database of foods which contain high fructose corn syrup, a highly refined sweetener which is thought to contribute to the diagnosis of fatty liver disease. For the database, my research partner and I went on a trip to a nearby grocery store, took pictures of all food labels and ingredients, and organized all the foods onto an excel spread sheet. After we had completed this, we recorded if each given food item contained high fructose corn syrup, fructose, or any other added sugars.

Outside of the research lab, WISEST organized Professional Development sessions for the student researchers. Through these sessions, we were introduced to a wide variety of skills which would help us in our professional lives such as learning proper techniques for public speaking, the topics of intellectual property and academic integrity, and a networking fair which allowed us to hone our networking skills with role models from many different fields. WISEST also organized industry tours where we had the opportunity to witness research being conducted by corporations within the city. Witnessing the work being conducted in each of these buildings was a unique experience for me as I have, for the most part, only seen work conducted in retail and restaurant businesses.

Not only has WISEST provided me with employment over the summer, but it has given me an opportunity to challenge the social barriers involved in the workforce. In my faculty, women dominated the workforce. When my lab partner and I witnessed this on our first day, we felt anxious about how we will be treated by the people around us. However, all our worries proved futile as we were brought into the facility with nothing but warm welcomes by a team of amiable and impartial researchers. Once the summer is over, I will reflect on the immense impact which this program had on me and I will most definitely miss my days working diligently with my research team. From the discoveries I made in to the adventures I had with my fellow WISEST students, the summer research program has been a life changing experience which I have come to truly appreciate. However, this amazing opportunity would not have been possible without the generosity, support, and kindness from my sponsor, The Faculty of Agriculture, Life, and Environmental Sciences. For this, I would like to extend to them my deepest gratitude. I would also like to say a special thanks to the WISEST coordinators for their outstanding compassion and enthusiasm towards the Summer Research Program.





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

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

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

I was initially skeptical about applying to the Summer Research Program. Firstly, it was tailored to women, so I thought I wouldn't really fit in as a male. On top of this, I didn't even know if I would like working in a field where my gender was underrepresented. Truthfully, I was more scared than I wanted to admit. Would I be the only male there? Who would I eat lunch with? What if I wanted to leave the program? Now that the program has completed, I can safely say that my fears were completely unwarranted. Not only did I gain research experience and publish as a high school student, but I also made important connections for the future, learned essential skills, and made lifelong friends.

During my time at WISEST, I worked in the field of nutritional science with Dr. Diana Mager and Lesley Seto, and my lab partner, Mahed Riaz, on different research projects. My primary project focused on High Fructose Corn Syrup (HFCS) in various food products, specifically sweetened beverages like soft drinks, flavoured milks, and 100% juices. My goal was to create a database on what percentage of sweetened beverages contained HFCS, fructose, and other added sugars. From this data, I created figures that told us what categories of sweetened beverages were the most healthy/unhealthy. This fit into my lab's work when they were working with patients. Because they were all registered dietitians, they needed to recommend meal plans; from my data, they could see exactly what type and what quantity of sweetened beverages the patients should consume. In addition to working on this project, I also got to take part in physical examinations that would typically be done on patients. One of these examinations were skin-fold measurements. The examiner would pinch and measure certain areas on our arms and legs to determine the percentage of fat in our bodies. My original view on nutrition completely changed after working in the field for six weeks. Nutritional science is more research than anything; most of my time was spent looking at database after database on the information that my colleagues had gathered.

During the six weeks, we also attended events hosted by WISEST. These events ranged from socialising to learning important skills that we will continue to use in the future. For example, one of our first sessions was eating liquid nitrogen ice cream and participating in a scavenger hunt around campus. We got to see, firsthand, how liquid nitrogen ice cream is made, and we also learned about different buildings on campus. Our last session was the networking fair, which I believe was the most beneficial. We learned how to interact with others and exchange contact information in a concise manner, and then got to practice our skills with everyone from undergraduates to post-docs. The most important thing I learned, both from this networking fair and the WISEST program itself, is that you don't have to know what field you want to pursue from your first year as an undergraduate. Every second of the SRP was spent learning: about lab work, about campus, about making connections, about developing skills, and about research. I'd like to thank my sponsor, NSERC Promo Science, the WISEST coordinators, my PI, Dr. Mager, my supervisor, Lesley Seto, and my lab partner, Mahed Riaz. Without these people, my experience in this program wouldn't have been as positive and rewarding as it was.

# Victoria Sawchyn

**Supervisor:**  
**Dr. Patricio**  
**Mendez**

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

**Sponsor:**  
**Threshold Impact**



I had no idea that there was a summer job out there that suited me so well. When I first heard about the WISEST Summer Research Program last year, I was intrigued. When I got home that day, I immediately searched up the WISEST website and learned about their amazing program for students my age. It then became my goal to be a part of the program. WISEST's motives were very similarly aligned with my own, making the decision to apply very easy.

Salina Trac, another WISEST student, and I joined the Canadian Centre for Welding and Joining (CCWJ) lab in the Chemical and Materials engineering building at the University of Alberta. In the lab, we worked alongside my supervisor, Rebekah Bannister as well as other student researchers. I was able to learn about welding on my own through research as well. Specifically, I studied the impact of the temperature change on the metal being welded. During a weld, the area of the metal that remained solidified but was still greatly impacted by the heat is the Heat Affected Zone (HAZ). The objective of the project is to learn more about the HAZ of the base metal and apply the knowledge to industry to better predict cracking in welds. I learned a lot about phase changes in metal as they heat and cool and when those specific changes usually occurs. To better understand phase changes and the HAZ, I used a Dilatometer, which is a machine that heats a metal sample and records its change in length as it heats and cools. I ran multiple tests and analyzed lots of data. Each time a test was run, a different cooling rate was chosen.

Not only did I get the lab experience, I also had the opportunity to enjoy WISEST's activities as well. I was able to tour industries and the University itself, as well as listen to many guest speakers. The speeches were especially helpful for my success in the program as well as for my future at the University. I gained many skills, such as public speaking and knowledge in creating research posters. This will be extremely helpful for my future as a university student and I am grateful to have learned such skills before entering post-secondary.

Before the program began, I did not know what to expect from a welding lab and could not see myself taking up welding in the future. After six weeks of being a part of the CCWJ, my perspective has completely changed. I found my work as well as the work of others in the lab very interesting. I learned that there is much more to the lab than I initially thought. The CCWJ is a very diverse lab with all different kinds of projects and all different kinds of students.

After six great weeks of taking part in the Summer Research Program, I am a different person from when I began. I have grown not only intellectually, but emotionally as well. I experienced true independence and adulthood for the first time. The program helped me become more outgoing and I found myself doing things I never thought I was capable of.

A special thanks to Rebekah Bannister, the CCWJ and Dr. Patricio Mendez for welcoming me into the lab and welcoming me as a member of the research team. Thank you to WISEST and the University of Alberta for this amazing program and the opportunity it gives.

# Sarah Schneider



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

***Department:  
Agricultural, Food  
and Nutritional  
Sciences***

***Sponsor:  
NSERC  
PromoScience***

I made the decision to apply for a position in the WISEST Summer Research Program as it made perfect sense. The opportunity boasted a summer job that would expose me to the world of scientific research, with the potential to guide my career choices and teach me many valuable skills applicable to both academics, and life in general. Upon learning I was accepted into the program I was both ecstatic and frightened. I was intimidated by the thought of not knowing what terms and tasks would be thrown my way and if I would be capable of dealing with them. However, the inviting atmosphere of orientation and my first meeting with my principal investigator and my direct supervisor dissolved my nerves and the full effects of the program soon ensued.

My research placement was in Dr. Heather Bruce's lab under Dr. Bimol Roy's supervision. We explored the relationship between thermally stable cross-links in the intramuscular connective tissue (IMCT) and the tenderness of steak. Our focus was on comparing the meat quality traits and the IMCT characteristics (collagen content, collagen cross-links, and thermal stability) of the four Canadian beef quality grades. Data was collected from meat quality tests including colour, and Warner Bratzler Shear Force. We then used a multitude of processes including, hydrolysis, spectrophotometry, centrifugation, cation exchange column chromatography, high performance liquid chromatography, and differential scanning calorimetry to quantify total collagen, heat soluble collagen, pyridinoline cross-links content, Ehrlich cross-links content, and to determine IMCT denaturation temperatures. I then had to analyze the data and make my conclusions. With so many different tasks and experiences I learned a lot about different scientific methods, lab duties, and the realities of work in research. In fact, before the program I understood research to be constantly exciting, with new and innovative information and technology always being produced. I, however, learned that research is more often than not a slow process that builds onto the research of others and there are many tedious and repetitive tasks to be done before any clear conclusion will be prevalent. Once a conclusion is met, however, nothing feels more rewarding. Overall, my experience in the laboratory taught me the value of patience, as well as many transferrable skills helpful for enhancing my communication, organization, and collaboration abilities. The weekly sessions provided by WISEST also added to my growing skills and wisdom, as many sessions were focused on professional development. Through sessions, such as Designing a Research Poster and the Public Speaking Workshop, I was able to learn tips and tricks that I will carry with me throughout the rest of my academic and personal life. Other activities such as the UofA Q&A session, the Industry Tours, and the UofA Research tours provided information about life in university and career paths. As a whole, the program definitely surpassed my expectations and is an experience that I will never forget.

I would like to thank Dr. Heather Bruce for accepting me into her lab, and my research team for supporting me. I would also like to thank NSERC Promo Science for sponsoring me, as without your support I would not have had the chance to experience this program. Special thank you to WISEST for providing me with the opportunity to participate this invaluable program. Your hard work and dedication towards breaking down gender roles in science is an effort that I and many other young women appreciate and admire, and I wish you the best of luck in the following years to come.

# Saloni Sharma

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

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

**Sponsor:**  
**Beta Sigma Phi**



As someone who loves trying out different things, WISEST's SRP was the perfect program to be exposed to a variety of programs and science fields. The SRP was a great learning opportunity and allowed me to get to know many incredible people to create the most memorable experience. When my Science 10 teacher first told me about the program, I knew it was something I had to look into. For over a year I had been thinking about how the experience would be and had been so excited to be a part of this program. As soon as I received the email about what I would be doing, I could not wait for summer to begin, and ever since the orientation day, the experience has gone far beyond my expectations.

Throughout the summer I had the wonderful opportunity to work in Dr. John Shaw's lab in the department of Chemical and Materials Engineering, under the direct supervision of Anupam Kumar. I worked with a rheometer to Detect Liquid to Liquid-Liquid Transitions in Polymer + Solvent + Nanoparticles mixtures. The goal of my research project was to determine whether rheology is a suitable technique to detect phase transitions in polymer solutions. Rheology refers to the flow of matter, and can be used to measure the viscosity of polymer solutions under applied shear. When polymer solutions are put into a rheometer and shear rates are applied, the changes in their viscosity allow us to detect transitions from a one-phase mixture to a two-phase mixture; vice versa. This technique can be helpful in many different industries: including polymer- processing industries, wastewater treatment, oil- recovery, etc. Working on this project not only taught me about rheology, but I also learned a lot of other things by being a part of Dr. Shaw's research team. This program has started my journey in research and has taught me its complexities. I've learned that research requires time, it is definitely not something that's done in six weeks. Most importantly, I learned that research is open to all ideas.

For someone that craves knowledge, this program provided me with many opportunities to learn about all sorts of things. There were Ada's Team lunches every week where we got to learn about computing science and had the chance to talk to some of the graduate students who gave us their own insight on university life. In addition, WISEST organized weekly presentations for us that introduced us to several different organizations and groups at the University of Alberta and also showed us many career opportunities. As well, every Friday we went on tours at different industries and faculties around the campus and participated in various social activities that acted as a way for us to not only be exposed to various career fields but also allow us students to bond.

For this incredible summer, I would like to thank Dr. John Shaw for allowing me to work in his lab, my supervisor, Anupam Kumar, for letting me work with him on this project, and Mildred Becerra for helping me in the lab. I would also like to thank the rest of my research team for teaching me about research and most importantly being with me throughout this journey. Additionally, I would like to thank my sponsor Edmonton Chapter Beta Sigma Phi for giving me this opportunity and for supporting women in engineering, science and technology. Finally, I want to thank the WISEST team for organizing this program for us students and giving us one of the most memorable experiences.



**Supervisor:**  
**Dr. Larry  
Unsworth**

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

**Sponsor:**  
**The Rotary Club of  
Edmonton Glenora**

Choosing a potential career path can be a daunting experience, especially when you want a job at the end of your 4+ years of post-secondary education. I came into the Women in Scholarship Engineering Science and Technology (WISEST) Summer Research Program with a love of science but unsure of what I was going to do after high school. This program has helped me learn about research as a career. Initially I was nervous to be going into a chemical and materials engineering lab as I knew that I would be inexperienced and would not know very much. I quickly learned that it was okay, that the people in my lab didn't expect me to understand everything, and that they were willing to help. I was given many articles to read that helped me understand the material I would be researching.

During the six weeks of the program I had the pleasure to work in Dr. Larry Unsworth's lab under Suleiman Saleh. My project explored a controlled drug delivery system. The experiment used a protein called bovine serum albumin (BSA), and created nanoparticles with Nicardipine loaded inside. Nicardipine is a drug used to treat high blood pressure and angina. Nicardipine is hydrophobic, so to increase the amount of drug captured by the protein, we used surfactants. My project looked specifically at the effect of using different surfactants on the nanoparticle size and zeta potential. This research contributes to a larger project with the goal of decreasing drug side effects, as these nanoparticles can be covered in enzyme specific coatings that will only release the drug in certain areas of the body. Through my lab experiences I learned more about what it is like to do research. Research is more than just running experiments; it is also reading other people's work, understanding the lab equipment and theory, as well as analyzing results.

In addition to the lab experience I learned through the WISEST sessions. Every week we participated in professional development sessions that taught many valuable skills, such as how to speak in public and design a research poster. One of my favourite sessions was the UofA Q&A. During this session we split up into groups and got to talk to a panel of students from the UofA and ask them about university life. We were able to learn not only about the career paths the students were looking into, but also what it is like to be a student in university and how to make the transition to university easier. During the program I was also exposed to many different potential careers in the sciences through the "WISEST on Wednesdays" presentations and industry tours. This program has helped me better understand research, as well as what university life will be like. It is much more than just a summer job, it is a once in a lifetime experience that will help me for years to come.

I would like to thank all of my research team for the help they provided me this summer, especially my supervisor Suleiman Saleh, and Dr. Larry Unsworth. I would also like to thank my fellow WISEST lab mates for helping me with troubleshooting. None of this would have been possible without the generous support of the Rotary Club of Edmonton Glenora who sponsored my position in the program, and the WISEST team who planned, and coordinated, the sessions and for having created this program.

# Kaleigh Taschuk

**Supervisor:**  
**Dr. Jonathan**  
**Veinot**

**Department:**  
**Chemistry**

**Sponsor:**  
**Syncrude Canada**  
**Ltd.**



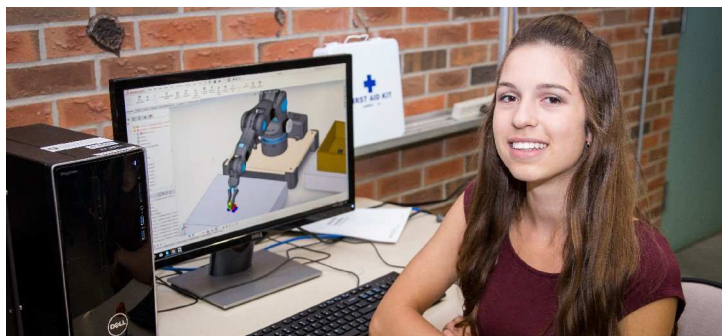
Before I applied to the WISEST (Women in Scholarships, Engineering, Science and Technology) Summer Research Program, I did not have a clear understanding of what research actually was. I was confused about what path I would take in post-secondary. I knew I liked science, but science is such a broad term and all of the different fields to choose from can be overwhelming. I applied to the SRP because I was hoping it would show me what it is like to go to university. Also, since I am not from Edmonton, I wanted to know what challenges I would face living away from home

For my duration with the WISEST program I worked in the chemistry faculty with Dr. Jonathan Veinot, my supervisor Alyxandra Theissen and the Veinot Research Group. The project involved attaching silicon nanocrystals to nylon. The combined material glows under UV light, but when it comes into contact with substances like trinitrotoluene (TNT), dinitrotoluene (DNT) or rohypnol, the silicon nanocrystals stop glowing. This can be used in the future as wearable devices that are capable of sensing when the product has come in contact with nitroaromatic substances.

I was very nervous prior to starting the WISEST Summer Research Program. I felt intimidated knowing that the people I would be working with were years ahead of me in terms of experience and intelligence. All of my doubts, however, went away very quickly when I saw how welcoming everyone in the Veinot group was. I never felt uncomfortable asking questions and they all wanted to help me get the most out of my time there. By the end of the program I felt confident around the lab and I did not notice the knowledge gap anymore.

I can honestly say that the WISEST program went above and beyond any expectations I had going in. The Professional Development session helped clear any uncertainties I had. The UofA Q&A gave me the opportunity to see different points of view on applying to university and how others faced the same challenges I am going to have within the next few years. The Social Science Challenge, where we were required to make a hydraulic system that could pour water out of a cup, was one of my favourite sessions. None of us knew each other and it was amazing to see all of the creative ways people solved this problem. I really enjoyed the lecture from Dr. Margaret-Ann Armour. I found it very inspiring to see a woman so heavily involved in science, who has worked very hard and accomplished so much.

I gained so much more than research experience during the WISEST program. I would like to thank the Veinot Research Group for welcoming me and all of their eagerness to teach me. I would like to thank my sponsor, Syncrude, for making this opportunity possible, as well as the WISEST office for putting in so much work and care to ensure that all of the WISEST students got the most out of the program.



**Supervisor:**  
**Dr. Rafiq Ahmad**

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

**Sponsor:**  
**Faculty of  
Engineering**

I spent my time working in the Laboratory of Intelligent Manufacturing, Design and Automation (LIMDA). This lab is situated within the Mechanical Engineering building. Its focus is on 3 main areas: manufacturing, design and automation. The team's research aim is to develop hybrid and smart systems. My project involved the development of a 5 degrees of freedom 3D printed robotic arm for manufacturing purposes. In the beginning of the program, I spent my time learning how to use a 3D modeling software called Solidworks. It is a computer program that 2nd year engineering students learn. With it, you can design and build 3D shapes which you can later 3D print. I had the opportunity to learn how to use the 3D printer and the chance to print a piece I designed. After I learnt how to properly use the software, I was really able to begin my project. I had to use Solidworks to create a simulation of a robotic arm with 5 degrees of freedom completing a task of my choice. In Solidworks, I assembled the parts of the robot together and designed a simulation of it building a structure with lego bricks. My project required me to work closely to an undergraduate student in the lab, Hazel Flores. She designed the robotic arm that I worked with in my simulation. Hazel also built a simulation in Solidworks, then 3D printed the parts of the robot to physically assemble it. When the electronic components of the robotic arm arrived, we worked together, along with the two other WISEST researchers in my lab, to clean the 3D printed parts and assemble the robot.

WISEST put on many other sessions throughout the program to teach all of us skills critical to our futures. We had the opportunity to do fun activities, such as making ice cream with liquid nitrogen, and to participate in professional development sessions, learning about presenting effectively, the art of networking, and their importance. Learning about applying to the University, how much it would cost, how to survive, and getting answers to any of our other questions was another opportunity we had. The chance to find out more about computer science and go to the observatory to look at the sun during some of our lunches was provided by attending the WISEST program. We went for tours of various research labs at the University and different industries off campus, so we could explore some potential workplaces. Living in the residence was a great experience I got from the program. I was able to explore Edmonton and try many new things. I also gained first hand exposure to what life will be like at the university and make meaningful friendships.

I would like to thank LIMDA and its members for welcoming me into their team and lab and for giving me a project to work on. Specifically, Dr. Rafiq Ahmad and Hazel Flores for their patience, support and guidance throughout the 6 weeks of the program. Thank you to Dan and Andrew from the machine shop, for putting up with my fellow WISEST researchers and I when we needed their help, and to my fellow WISEST researchers, Jennifer Peterson and Sarah Lefebvre. Thank you to WISEST and its coordinators, for providing me with this tremendous experience and learning opportunity. To my high school teachers for telling me about this program and fueling my passion for science and my parents for encouraging and helping me, thank you. Lastly I would like to thank my sponsor, The Faculty of Engineering, for sponsoring me so that I could participate in the program. I am truly grateful to all of you and appreciate all you have done for me.

# Muskaan Tiwari

**Supervisor:**  
**Dr. Mohamed**  
**Gamal El-Din**

**Department:**  
**Civil and**  
**Environmental**  
**Engineering**

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



Going through grade eleven, I knew that I would soon have to decide on what program I would apply for in university. In the past year, I had attended many seminars and information meetings regarding careers in various fields such as medicine, chemistry and even aerospace, giving me a fairly adequate understanding of what it would mean to be part of one of these fields. However, until the WISEST program, I had not fully understood what it meant to study engineering and technology. When my teachers recommended this program, I thought that it was a wonderful way to gain more knowledge of these fields and applied immediately. This program gave me a chance to not only grow in this area but also to understand what it means to be a researcher, regardless of the field.

This summer, I was placed in an environmental engineering lab, along with three other WISEST participants, under Dr. Mohamed Gamal El-Din. We had two projects to complete: the Treatment of Oil Sands Process Affected Water using Adsorbents and the Novel Enhanced Primary Treatment (EPT) of Combined Sewer Overflow (CSO) using Combinations of Oxidants and Coagulants. Both projects were related to wastewater treatment. In the first experiment, GAC was used as an adsorbent to remove naphthenic acids from oil sands. This experiment required us to create naphthenic acid solutions to mock the conditions of oil sands processed water, test out various quantities of GAC at various time periods in these solutions and to dilute the samples so that their concentrations may be taken. It was conducted under the supervision of Dr. Selamawit Ashagre Messele and Dr. Mingyu Li. For our next experiment, we worked with polyelectrolytes and alum to find the ideal concentrations to be used in the coagulation-flocculation step in treating municipal wastewater and sewage overflow. We created artificial secondary effluent and put it through jar tests with various amounts of coagulant/flocculant. We had to work with various instruments to determine the pH, total suspended solids (TSS) and turbidity for each of the samples. The second project was completed under the supervision of Shu Zhu, a researcher working towards her PhD. Our supervisors were patient and helpful, explaining everything thoroughly and answering all of our questions. Afterwards, we each created a poster on one of the two experiments. This portion of the experience left me with valuable skills, such as how to summarize and present information, how to work with many different lab instruments and how to think on your feet when things don't go as planned. However, this was only part of the program. The other portion involved WISEST as a group.

I wasn't quite sure what to expect as we started the program, but I thought that we would be spending a lot of time in labs alone. While we spent a fair amount of time in the labs, we also had opportunities to engage in other events and meet fellow WISEST students. As a group, we attended professional development sessions, tours and presentations that built upon our skills and increased our awareness of the career opportunities in science and technology. These activities were engaging and allowed us to interact with other participants. This provided a fantastic environment to learn about new opportunities while also being able to interact with like-minded people. I would like to thank my sponsor, NSERC PromoScience, as well as the WISEST program for making this experience possible. I would also like to thank Dr. Selamawit Ashagre Messele, Dr. Mingyu Li, Shu Zhu, Dr. Pamela Chelme-Ayal and Dr. Mohamed Gamal El-Din for their guidance and patience.





**Supervisor:**  
**Dr. Patricio  
Mendez**

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

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

I am amazed at how fast time flies. I remember my sister encouraging me to apply for the WISEST Summer Research Program when I was pondering what I wanted to do during the summer. My sister told me about her experience when she participated and I was intrigued as she went on about how much she had learned being in the program and how it fostered her skills. Wanting to expand my knowledge regarding my passion for engineering, I enthusiastically applied for the WISEST program. I was absolutely ecstatic when I received the phone call from the office telling me that I had been given the opportunity to partake in this six week experience.

I was fascinated but at the same time unsure when I heard I was going to be placed into a welding lab. For starters, the closest I have ever come to welding was my experience in junior high construction classes, so I pretty much had zero knowledge about anything related to welding. Because of my inexperience, I was definitely hesitant about whether or not this placement would be right for me. After I was introduced to my supervisor, Rebekah Bannister, in the welding lab under Dr. Patricio Mendez, however, I felt instantly better as they welcomed me to their lab and answered all my questions. As one can probably imagine, I had a lot of questions.

A typical day in the lab was very laidback, but also always filled with new information. I looked over papers of students that worked in the lab, and gained new insight and knowledge regarding welding. I no longer felt alienated that I did not know anything about welding since I was now learning so much. I also saw many presentations and demonstrations of different weld equipment. My research project was on the effect of hydrogen cracking in welds, where I focused on the issues related to weld cracking and ways to analyze and reduce cracking. Before I knew it, the days passed by quickly. I realized how much happened over these six weeks. I went from being someone who was an absolute stranger to the world of welding and did not have any knowledge of the sort, to being someone who was able to understand weld drawings and explain some of the issues associated with welding.

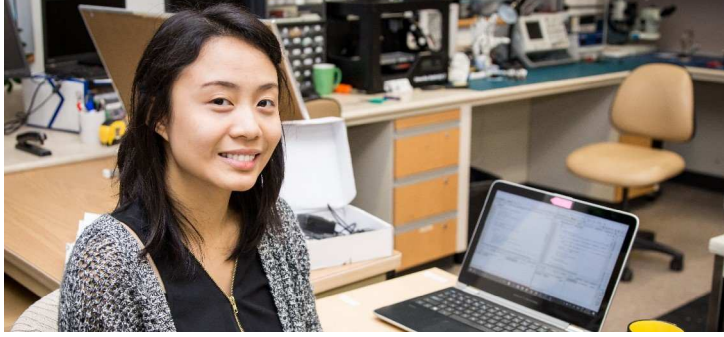
My experience in the WISEST program is something I am extremely proud to say I participated in. I was overjoyed when I heard about a program like this, one where I was able to gain first-hand experience in a potential career path. The program really opened my eyes to different research approaches and hugely expanded my knowledge regarding diverse career options in engineering and science fields. I am leaving the program with amazing memories and the confidence to pursue my future endeavors. I would like to thank my principal investigator, Patricio Mendez, and my supervisor, Rebekah Bannister, as well as Mitchell Grams, Victoria Sawchyn, and everyone else in the CCWJ lab for helping me with my research project. I am immensely grateful for NSERC Promo Science and the WISEST team for supporting me in my work and gifting me with this amazing opportunity.

# Justine Ventura

**Supervisor:**  
**Dr. Patrick  
Pilarski**

**Department:**  
**Computing  
Science, Medicine**

**Sponsor:**  
**Process Solutions**

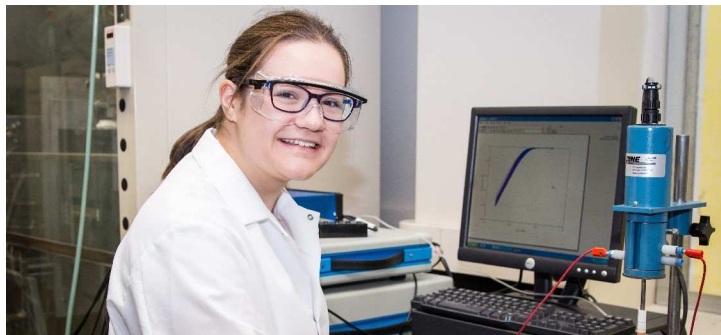


My first exposure to WISEST came as a sixth grader attending a conference that encouraged young girls to be interested in STEM. Fast-forward to high school, through another division of WISEST, I was able to connect with a mentor studying engineering. So it only felt natural that the next step in my “WISEST journey” was to apply for the Summer Research Program (WSRP). I thought that it would give me a better understanding of research, university life, and the possible areas of study I could go into. I found that these expectations were not only met, but exceeded, and participating in the WSRP is definitely an experience I will look back on with fond memories.

Although I was excited to be working in Computing Science, I had limited knowledge of Reinforcement Learning (RL) and machine curiosity, much less how these concepts could be applied to real world technologies. I soon learned that RL is much like trial and error, whereby an agent learns about its environment and is given reward for taking certain actions. Meanwhile, machine curiosity tries to emulate the desire to learn as found in humans. My project involved applying this knowledge to a simple robot in order to observe its behaviour, reward, and uncertainty over time. This was done to gain better insight into machine curiosity, which is not fully grounded in contrast to RL. From this, I was able to conclude that the model of curiosity used was not entirely ideal as it deterred the robot from exploration, a necessary component of curiosity. In the future, it is hoped that artificial curiosity could play a role in technologies like bionic limbs, in that it could perform tasks not previously conceptualized by its creators. The experience has allowed me to gain exposure to an aspect of computing science I had not considered in the past. I leave this program more excited about the possibilities RL and machine curiosity have in store for the future, and motivated to expand upon the knowledge I obtained over the past six weeks. Furthermore, being immersed in an environment of people from a wide variety of faculties, all with the common goal of improving bionic limbs, made me realize the interdisciplinary nature of research and how it can directly impact human life.

Another factor that contributed positively to my overall experience were the Lunch ‘n’ Learns and Professional Development sessions, which allowed me to learn about various research conducted at the UofA and beyond. They also taught me the importance of effective communication and networking, skills which I will apply not only in my senior year of high school, but as I progress in my schooling and career. Additionally, these sessions allowed me to make meaningful connections with like-minded individuals who are equally enthusiastic about research. I would like to express my gratitude to Nadia Ady, Dr. Pilarski, and everyone at the BLINC lab for the patience they showed through my endless questions, and for the support they provided every step of the way. I would also like to extend my thanks to Process Solutions for their generous contribution, without which this experience would not be possible. Lastly, a big thanks goes out to the WISEST team whose hard work and dedication made for an unforgettable summer. Although I am still unsure about my career path, I know that the lessons I’ve learned this summer will prove useful no matter what area of study I choose to pursue. Although my journey is just beginning, I am glad to know that the Summer Research Program is where it all began.

# Madison Warawa



***Supervisor:  
Dr. Jingli Luo***

***Department:  
Chemical &  
Materials  
Engineering***

***Sponsor:  
Faculty of  
Engineering***

When I got the phone call from WISEST telling me that I had been accepted for the WISEST Summer Research Program, I was thrilled. A chance to spend six weeks getting hands-on experience in a research lab? What more could a girl want? I was placed in Dr. Jingli Luo's Chemical and Materials Engineering lab. My project was focused on characterization and evaluation of catalysts for energy conversion. When I first received my project overview, I couldn't quite understand what I would be doing, even after extensive googling of terms. However, once I started my lab work, everything started to make sense. In the lab, I synthesized metals in solution to create layered double hydroxide catalysts. These catalysts were created to be used in water splitting reactions, which is a method of producing energy in a sustainable and environmentally-friendly way. The samples I made of the catalysts were then taken to a scanning electron microscope (SEM) lab and an x-ray diffraction lab for characterization tests. One of my favorite parts was getting to watch the technician work in the SEM lab. It is one thing to learn the physics principles behind how SEM works at school, but getting to watch it being used and obtaining images from samples you have prepared is a totally different, fascinating experience.

Another exciting aspect of this program is that it took place at the University of Alberta. As a high school student, getting to explore the campus was a valuable experience. After only the first week, I found that I could navigate myself around campus and locate the buildings where the WISEST sessions were. This was shocking to me, as it was only a few days before that the university had seemed like such a large and intimidating place.

I applied to the Summer Research Program because I was intrigued by what it offered. I knew that it would provide me with valuable experience working in a lab, but I didn't know about everything else I would learn along the way. Before this summer, I already knew that I wanted to pursue a career in a STEM field. However, I did not know about many of the opportunities that are out there for me in that field. From the research and industry tours we went on, to the networking opportunities, these events helped me to discover the endless possibilities out there for me. Finally, this program has also taught me so much about myself. The sessions and tours that WISEST put on for us allowed me to explore things I had never heard about before! Overall, I think the most important thing that this experience has given to me is confidence. Confidence to pursue my education, and eventually career, in a STEM field. Confidence to better interact with others. But most importantly, confidence to be myself: a teenaged girl filled with curiosity about the world around her.

This program has been an incredible experience for me. Firstly, thank you to my sponsor, the Faculty of Engineering, for funding my research, and to the WISEST team for giving me this opportunity. I would also like to thank my supervisor, Meng Li, for her guidance and patience this summer. Finally, thank you to Dr. Luo for allowing me to work in her lab. This summer has been one that I will never forget and I am so grateful to have been a part of this program

# Emily Willette

**Supervisor:**  
**Dr. Rylan  
Lundgren**

**Department:**  
**Chemistry**

**Sponsor:**  
**Beta Sigma Phi**



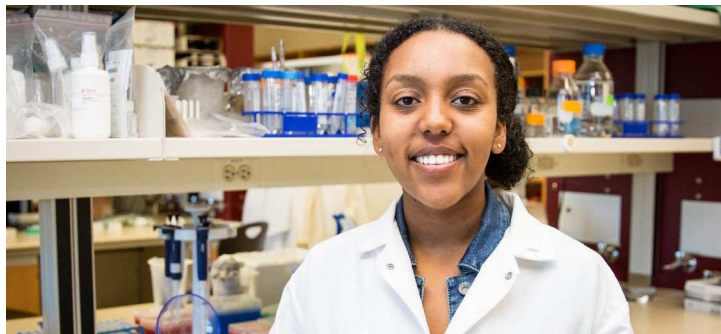
I first heard about the WISEST (Women in Scholarship, Engineering, Science and Technology) Summer Research Program through my sister, Sarah, who completed the HYRS (Heritage Youth Researcher Summer Program) in 2015. She encouraged me to apply for the program, citing how amazing of an opportunity it would be. However, there were several other applicants from my school, many of whom were in International Baccalaureate science courses. I submitted my application, figuring that I didn't have a high chance of being admitted, because I wasn't an IB student, and I am someone who is studious, but also valued volunteering. So, it was a pleasant surprise when I got the call from the WISEST office, telling me that I had been accepted into the Summer Research Program. I was excited to spend six weeks at the University, working in a cutting edge research lab.

During my internship, I worked in Dr. Lundgren's organic chemistry lab. My project was discovering methods to use copper as a catalyst in decarboxylative cross-coupling reactions. I would often assist my supervisor in creating starting material, setting up reactions, sampling reactions, and using various methods to separate out the reaction, such as columns, filtrations and work-ups, until only the pure product remained. There was a daunting learning curve involved, since I came into the lab having only completed Chemistry 20, while everyone else in my lab had an elaborate background in organic chemistry. However, Anis, my supervisor, was excellent at explaining concepts in a way that I could understand them.

However, this internship wasn't all about research; every Friday afternoon, all of the WISEST summer researchers would gather together for professional development sessions. We had a variety of sessions, ranging from how to make a research poster, to spending an afternoon touring research labs at the university. One of the most informative sessions for me was the UofA Q&A, where current undergraduate university students came to answer our questions, ranging from programs to specialize in, to the importance of time management in university. This session opened my eyes to what university life at the UofA was like, and made me even more excited about university.

Thinking back, I learned more in these six weeks than I ever could even come close to learning in a high school science class. I was involved in the lab, and I did make mistakes; however, this experience taught me the value of looking at a problem from a different angle, instead of giving up. I also had the experience of being both ends of gender representation this summer. On one hand, I was one of the 38 girls in the Summer Research Program, but on the other hand, I was one of the two girls in my lab. Being on both ends of the spectrum really allowed me to gain insight on the different challenges people face by being underrepresented, or overrepresented, in their field.

I would like to thank my Principal Investigator, Dr. Rylan Lundgren, for the opportunity to work in his lab, and my direct supervisor, Anis Fahandj-Sadi, for all of his mentorship, advice, and answers to my numerous questions. As well, I am gratefully appreciative of my sponsor, Edmonton Chapter Beta Sigma Phi, for providing the funding that allowed me to participate in this program. Finally, I would like to thank WISEST, especially our coordinators, Alex and Angela, for your hard work in organizing the Summer Research Program, and your endless support throughout the entire internship. My WISEST experience showed me where I want to work in the future – in a lab.



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

**Department:**  
**Medical Microbiology and Immunology**

**Sponsor:**  
**Beta Sigma Phi**

I initially applied to the summer research program because one of my teachers strongly urged me to. I had never thought about doing research before but it seemed like it would be a good experience, especially right before grade 12 when I would have to make my decisions about post secondary education. WISEST surely exceeded my expectations because never did I imagine that I would be working alongside people who are developing new treatments for HIV and Cancer, none the less contributing to this research.

This summer I was placed in an immunology lab with the faculty of medicine and dentistry. I had the opportunity to study the effect of Myeloid Derived Suppressor Cells (MDSC) on gut bacteria. The MDSC is an immuno suppressive cell, originating from the bone marrow which is highly abundant in pathogenic conditions as well as in neonatal mice. My project focused on neonates because the development of gut bacteria in newborns helps shape their immune system. Previously it was believed that newborns are more susceptible to pathogens because their immune system is underdeveloped but my lab has found that the newborn immune system is not under developed but it is actually being suppressed by cells such as MDSCs. In order to figure out whether or not the MDSCs affect the gut bacteria we used an anti-Gr1 antibody to deplete the MDSCs in neonatal mice which we then ran various test on and compared to a control. These tests included identifying and quantifying dominant bacterial groups in the small intestine as well as determining the percentage of MDSCs in the spleen for the control vs treated. This research provides preliminary results regarding which bacterial groups are associated with the MDSC and further research could allow for the MDSC to be used as a therapeutic target for inflammation, infection and cancer therapy.

First-hand experience in a research lab was truly an amazing experience but thanks to WISEST I got even more out of the summer research program. Through lunchtime seminars and hands on events I was both inspired and informed about various things in the world of STEM. I learned about how to become a better public speaker, use my chosen discipline to help others in future and even how to follow my dreams. In addition to seminars and workshops we also got to tour various facilities and research labs, which was an opportunity that not many high school students or individuals get. I am coming away from the WISEST summer research program with more than just knowledge in the area I worked in for six weeks but an expanded horizon on the different paths and opportunities in STEM as well as professional skills I can apply to any discipline in the future.

I would like to thank all the people who made my participation in the summer research program possible. My direct supervisor Dr. Petya Koleva for being so patient and helpful throughout the whole experience. Dr. Shokrollah Elahi, my principle investigator for the opportunity to work in his lab and have a hand in his research. The Edmonton Chapter Beta Sigma Phi for sponsoring my participation in the program. Also, the WISEST team for advocating for women in science and putting together this whole program.

# Anna Wright

**Supervisors:**  
**Dr. Benjamin  
Tucker**

**Department:**  
**Linguistics**

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



The day my chemistry teacher had mentioned the WISEST program in class, I was immediately interested in learning more about the program. Math and sciences have been my best subjects as well as my favourite ones, so I thought that this program could be a great opportunity for me. I have known for a while that I want to pursue a field in STEM (science, technology, engineering and mathematics), but I was not fully aware of what fields are really out there or what many fields, like engineering, really entailed. When I decided to apply, I was very excited that there was a chance that I could be a part of this program where I would be introduced to many fields in STEM as well as get an idea of what university life will be like for me in just over a year.

For the summer, I was worked in Dr. Benjamin Tucker's phonetics laboratory where I learned a lot of information, as this field was very new to me previous to my WISEST experience this summer. The research project that I worked on over the summer was analyzing speech from a single speaker who made regular speeches over a period of almost 40 years. The purpose of this research was to see how a person's voice changes over time. Most people have a general sense of being able to distinguish whether a certain speaker is older or younger just by listening to them; and with my project I looked at some of the specific aspects of speech that could have changed over time like word and vowel durations, pitch as well as vowel frequencies. To analyze the speeches, I had to force align the transcript of the speeches with the spectrogram (picture of the sound frequencies) for each of the five speech segments that I chose. There have not been that many longitudinal studies (studies with the same person over a long period) in this area of research; most are done with people from different age groups, as longitudinal studies can be more difficult to undertake. With that in mind, part of my project included a comparison of my results with other studies to see if they were consistent or not.

Throughout the summer with WISEST, I really enjoyed the different group activities and sessions that we attended on Wednesdays and Fridays. These sessions helped me a lot in coming out of my comfort zone, learning more about the different fields as well as what to expect when attending university. When I applied, I was expecting that I would not get as much exposure to new fields in STEM as I did, which I appreciated in my WISEST experience. I enjoyed visiting the different companies off campus where we got to see a few of the different possibilities that we have for careers and how it is common to find a diverse amount of specialized fields within one laboratory. Over the summer, I had found many sessions, including the public speaking workshop and the networking fair, tremendously helpful in developing skills that I will need every day throughout university and my career.

Being a part of the WISEST Summer Research Program this summer has been a wonderful and very beneficial adventure for me. I would thank the research team, Angela and Alex, for all of their time and effort that they made to make this experience enjoyable for everyone. I also like to thank my Principal Investigator, Benjamin Tucker and my supervisors, Pearl Lorentzen and Filip Nenadic for making me feel welcome in their lab as well as guiding me through my project. Additionally I would like to thank my sponsor, NSERC Promo Science, who allowed me to be a part of this amazing program.

# Colleen Wyring



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

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

**Sponsor:**  
**Faculty of Science**

The WISEST Summer Research Program is something that I have wanted to participate in ever since I heard about it. Both of my sisters had participated in it, and they had such a great experience that I knew I needed to apply for it too. Even though they told me about their own experiences, I was still nervous about what the program would be like for me. I had some great, enthusiastic teachers who urged me to apply, and helped me by writing amazing reference letters for my application. When I received my acceptance into the program I was elated! It seemed intimidating, but I knew that science was what I was passionate about, and this summer would only confirm that.

I was placed in the lab of Dr. Christopher Sturdy in the Department of Psychology, analyzing chickadee vocalizations. My project was to specifically study the *tseet* call of chickadees, and how its frequency and duration could correspond to the bird's sex. My lab partner, Hadeel Mohamed, and I were taught how to use the software SIGNAL to analyze the chickadee *tseet* calls. We used pre-recorded and pre-cut *tseet* calls that we then standardized and measured. There were seven different acoustic features that we measured to determine our results. We concluded that female chickadees produce *tseet* calls with a higher peak frequency and maximal frequency than males. Being able to work in a lab with birds was not what I was expecting when I applied to WISEST, but it ended up being so unique and such an interesting experience. Working with the research team this summer has been great, and I learned so much about being a university student, and the university in general. I have gained so much knowledge in the lab this summer about birds, research, and what lies ahead of me in university.

The WISEST Program has given me so many opportunities to learn about research, and women in science related careers. I really enjoyed going on the Industry Tours, and the U of A. Research Tours, as they showed me just how many opportunities and options are out there. Taking a tour of TEC Edmonton was also a highlight, and it was interesting to see the variety of careers available in science and how successful women can be in those fields. This program has allowed me to make connections with other students interested in the same areas I am, and grow more confident in interacting with others. I have made friends much easier than I thought I would, because this program is such an inclusive environment. I also really enjoyed the Lunch 'n' Learn sessions where I learned useful skills such as how to make a research poster, or effectively present my ideas. These sessions were always engaging, and taught me new topics in an exciting way. The abilities that WISEST has helped me to gain will be useful not only in high school and university, but throughout my entire life and career. I would like to thank my sponsor, the Faculty of Science, and especially the WISEST team for making this summer possible for me. I would also like to thank my supervisors, and the rest of the research team, for making it a fun and informative summer and for helping me learn more about what they do. My science teachers were also a huge part of helping me experience this, for without their encouragement and reference letters I would not have gotten into the WISEST program. These six weeks have gone by so fast, but it was definitely a worthwhile experience that I have grown intellectually, and personally from.

# Julia Youm

**Supervisor:**  
**Dr. Mike**  
**Fleischauer**

**Department:**  
**Physics**

**Sponsor:**  
**Beta Sigma Phi**



Overall, I have had an amazing experience! Unmistakably, I learned an immense amount of information over the six-week period. I originally applied to the WISEST Summer Research Program due to my strong interest in the sciences, with hopes to gain first-hand research experience and to learn about plausible career opportunities. Also, I wanted to become more familiar with the university life, as I approached the end of high school. At the time, the program seemed to be a wonderful learning opportunity. Today, I believe that I have attained more than what I was initially hoping to gain from my summer at WISEST. Irrefutably, I have acquired a great deal of insight about research, career opportunities in the STEM fields, and the general university life. I have certainly expanded my skillsets and knowledge by participating in the program.

My research project was about battery calibration, which was based within a physics lab at the National Institute for Nanotechnology (NINT). The purpose of our research was to devise a calibrating process for battery measurement systems. Ultimately, the aim was to implement this process to produce both accurate and precise results in other areas of battery-related research. Upon arrival, I experienced a steep learning curve; however, after a week or two, I adjusted to the overload of information with the help of my Principal Investigator and other researchers. Once I became more familiar with the research topic, things became more interesting and engaging. Throughout my research experience, I have come to know that research involves a tremendous amount of problem solving. In my research project, one general problem was composed of several other complications. In other words, there were many problems to resolve during the process to solve the primary problem. Every day I learned something new. When we ran into an issue, my Principal Investigator would say, “this is what research is.” I have learned that research requires precision, persistence, intelligence, and the creativity to overcome obstacles. During the program, I gained valuable information at the weekly sessions set up by the WISEST staff. The workshops, Professional Development Seminars, Lunch n’ Learns, and occasional fieldtrips were a great addition to the program. The informative sessions guided my research experience, such as the instructional sessions on making scientific posters. I have developed key professional skills, such as public speaking, presenting, and networking. In addition, I have gained insight about university and certain careers in the sciences from experienced undergraduates, graduates, professionals and professors. Hearing about other people’s experiences has broadened my perspective. Based on the accounts of various people I have met throughout the program, it appears that there are many opportunities out there. Truly, WISEST has been more than just a summer job. Simply put, it was an eye-opening experience.

I would like to thank everyone, who has made significant contributions to my experience. Firstly, I would like to thank the research team for guiding my lab experience and always willing to answer my questions. Secondly, I would like to thank my Principal Investigator for providing the opportunity for a high school student to participate in a research lab. I would also like to thank Edmonton Chapter Beta Sigma Phi for sponsoring me. Finally, I would like to thank the WISEST organization and staff for making this amazing program possible.









