Craig Martin

- **Masters Student of Memorial University of Newfoundland, Canada; Department of Ocean and Naval Architectural Engineering.**
- **Bachelors Student of Arctic Technology at UNIS**

My Arctic Adventure

I first heard about the University Centre in Svalbard (UNIS) back in the third year of my undergraduate degree at Memorial University of Newfoundland (MUN). Professor Aleksey Marchenko was visiting Newfoundland and prepared a lunch and learn presentation about the Arctic Technology Department at UNIS. I was captivated by the opportunity to travel to the Arctic and participate in Ice Mechanics research. Sadly, the semester schedule between MUN and UNIS conflicted and would have added another year to my five-year program.

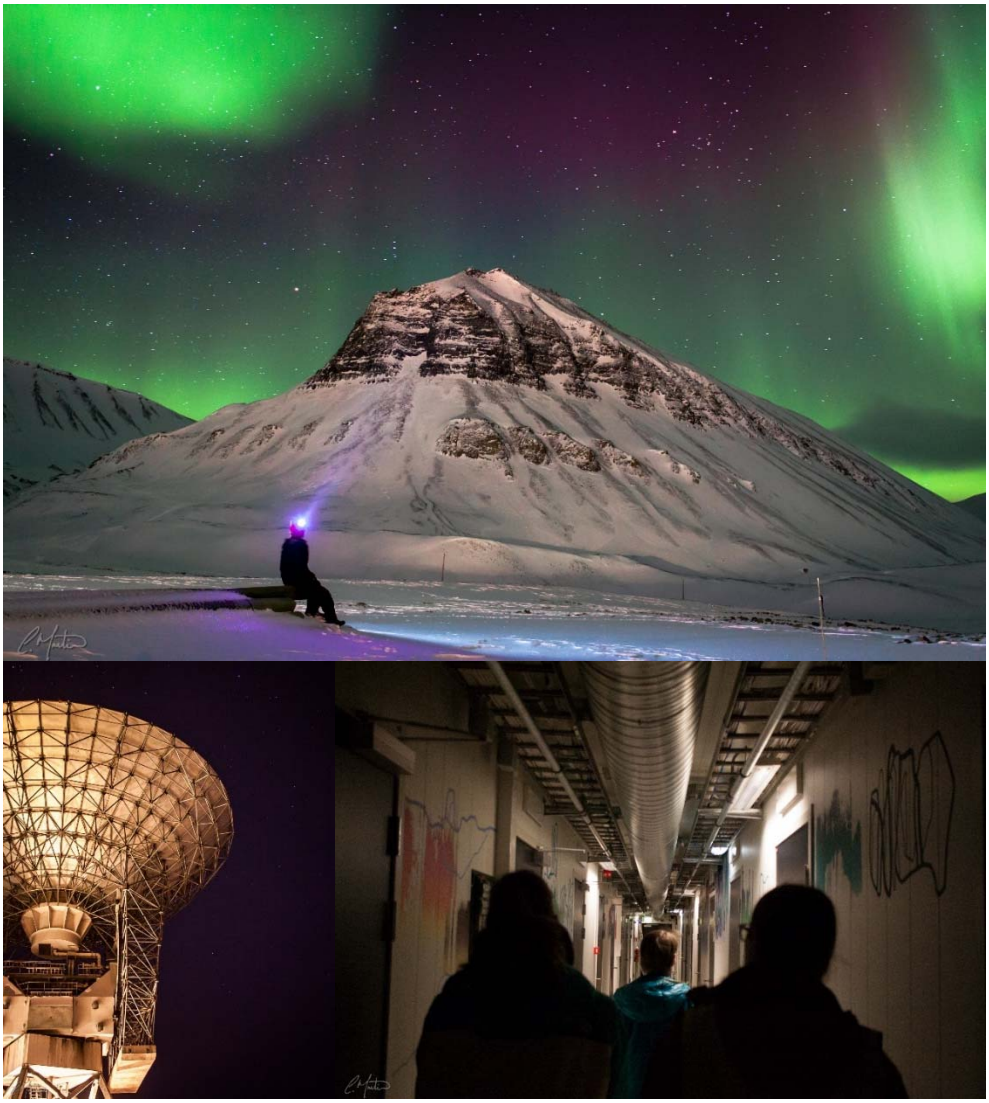
After completing multiple work-terms in the field of Arctic Engineering, I decided to continue on with Arctic research into my Masters. My research is being completed as part of a validation study for the GPU-Event-Mechanics (GEM) simulation tool that is currently being developed at MUN. The GEM simulation tool is used to evaluate ice impact load statistics on ships and offshore structures by modelling discrete and interacting ice floes within the time domain. The focus of my studies is to investigate the transient hydrodynamic effects associated with ship-ice and ice-ice collisions.

The second time I crossed paths with Dr. Marchenko was at the 2016 Arctic Technology Conference which took place in St. John's, Newfoundland. I attended this conference as part of "The Arctic Next Wave Program" where various Arctic researchers gave short presentations about their respective institutions. Shortly after the conference, Dr. Rocky Taylor announced the opportunity to travel to UNIS and partake in the "AT-211: Ice Mechanics, Loads on Structures and Instrumentation". It was a dream come true to be awarded this incredible opportunity.

Travelling to Svalbard was full of "firsts" for me; this trip was actually my first time visiting Europe. During the orientation week, myself along with all the other students, are required complete rigorous safety training to prepare for life in the Arctic. We were divided into several groups where I had the opportunity to meet a variety of people from a range of different countries and backgrounds.

As soon as the training sessions started, I notice the teaching style here was very effective. First, the necessary background information and theory is presented to the students. This is then followed by hands-on exercises, where the knowledge learned in the classroom can be applied. By the end of the training week, it felt second nature to complete the tasks required for the practical exam. I also believe the same can be said for AT-211. In this course, we had lab work, fieldwork in Svea and fieldwork on the cruise, which were all preceded by lectures providing us with the necessary knowledge to complete our research. It is also unique that in each instance a guest lecturer was brought to UNIS to share some of their knowledge about their respective fields.

Shortly after arriving on Svalbard, I saw the Northern Lights for the first time. As an amateur photographer, I instantly became mesmerized by the scenery. During my stay, I was lucky enough to enroll in "AGF-216: The Stormy Sun and the Northern Lights" in my spare time. In this course, we visited the Kjell Henriksen Observatory, the EISCAT Svalbard Radar, and SvalSat.



A self-portrait of the Northern Lights outside Nybyen and photos from our tour of the Kjell Henriksen Observatory and the EISCAT Svalbard Radar.

During the Svea expedition to Vallunden Lake, my group's tasks involved conducting large- and small-scale uni-axial compression tests, as well as a large-scale upward bending test and small-scale three-point bending tests. I had studied the background and theory of tests in a previous course at MUN, however, preforming them first-hand provides a much better understanding of equipment and variables involved.

Field lecture on Vallunden Lake given by Professor Carl Renshaw.

Hard at work preparing the channel for our large-scale compression test.

Small-scale uni-axial compression tests using the KOMPIS testing apparatus.

Students observing the upwards bending cantilever beam test.

As a Naval Architect, I have to say the highlight of my stay in Svalbard was the 8-day cruise on the Polarsyssel. On this excursion, I had the opportunity to partake in a variety of projects. During the first outing, I helped the team visiting from MUN with the preparation and deployment of their GPS tracking beacons and weather station.

Deploying one of two GPS Trackers on the ice floe. Two beacons were used to determine the orientation of the floe, as well as observe its break-up and dispersion.

In the following days, I joined the group led by Dr. Aleksey Shestov who were responsible for profiling the ice floe's geometry. This involved drilling a series of holes along the central axes while obtaining temperature and salinity profiles. I also joined Dr. Nataly Marchenko who used a 3D laser scanner to scan the ice surface. Drawing from my CAD experience, I took on the task of creating a 3D model of the ice floe by combining the laser scan data and thickness profile.

Dr. Aleksey Shestov teaching our group the intricacies of starting the auger drill in a cold environment.

On the last few days of the voyage I had the chance to assist the AUV team with deploying and recovering their AUV. Although the multi-beam radar caused some issues, they were able to successfully obtain upward-looking side-scan radar images of land fast sea ice in Nordfjorden.

Out on the rigid boat, feeding out the AUV's safety line.

I am extremely grateful to be given this opportunity by the Safety of Industrial Development and Transportation Routes in the Arctic (SITRA) Programme. I have learned countless lessons in the past five month which I hope to apply to my future studies, and hopefully career, in offshore Arctic Engineering.

The Polarsyssel under the Midnight Sun.