Software Engineering 2020 Class Profile

June 2020

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Introduction

Inspired by the class profiles of previous graduating <u>SE and SYDE classes</u>, the class of Software Engineering 2020 sought to compile our own class profile as well. This profile is an attempt to shed some light on the program, on our specific cohort, and also to showcase the university experience that our class went through.

The Software Engineering (SE) program at the University of Waterloo is an interdisciplinary program supported by both the Faculty of Mathematics and the Faculty of Engineering. SE is often described as Computer Science's more engineering-oriented counterpart. Over 5 years, the class completed 8 study terms and 6 co-op terms. Study terms are defined as 1A, 1B, 2A, up to 4B (8 terms). 4 month co-op terms alternate with every study term starting after 1B and ending before 4B.

We conducted the survey between May 8th - May 15th 2020. 82 individuals responded to the survey out of 107 SE 2020 students **(76.6% response rate)**. All questions on the survey were optional. For co-op salaries, we used the approximate historical 5-year average USD/CAD exchange rate (1 USD = 1.33 CAD). For full-time salaries, we used an exchange rate that was current for the period that the survey was taken (1 USD = 1.4 CAD).

Please keep in mind that the results of this survey do not necessarily generalize to other SE cohorts, nor do they give a completely unbiased representation of the SE program. Furthermore, this survey is not officially affiliated with the SE program or the University of Waterloo.

Demographics

Students' Genders

Of the 82 respondents, **65** declared their gender as male and **17** as female. No one self-declared as non-binary.

The ratio of males to females in our class has stayed relatively consistent over the 5 years.



Students' Ethnicities

Over **94%** of the SE 2020 class are either of Asian or Caucasian ethnicity.

Multiple ethnicity selection was allowed.



Students' Sexual Orientation

88.7% of the class identified as Heterosexual.

3.8% identified as Homosexual.

3.8% identified as Asexual

3.8% identified as "Other" which consists of Pansexual, Bisexual and "not sure."



International and Domestic Students

93.8% of the class were domestic students.

6.2% of the respondents were international students.

A student is considered International if their home location before starting university was outside Canada.



Home Location

Most of the respondents came from the "Greater Toronto Area." (Not far from home!)

93.8% of respondents were from Canada.



Did You Immigrate To Canada?

47.56% of the class immigrated to Canada from another country. That's almost half of respondents!



Education Level of Parents

Post-secondary education accounts for 85% of the highest education level completed by SE 2020's parents. All parents had a minimum of a highschool diploma.



Family Income Before UWaterloo

Most family incomes of SE 2020 students before starting at UW were in the 50k-150k range.

Amounts are shown in yearly CAD.



Siblings

Most students have **2** or less siblings. The majority of students only have one sibling.



How many students came from enriched programs?

A majority of the class (**63.4%**) participated in enriched programs in high school.

AP was the most common, followed by IB.



Did students from enriched programs do better in first year?

With the exception of IB, the median average grade of students who took enriched programs in high school was higher than those who did not.

Students from TOPS stood out, doing significantly better than the rest of the class. Note: There were only 4 TOPS students.



Academics

Did you transfer into Software Engineering?

9 out of 82 respondents transferred from different programs into SE, and most of them transferred from Electrical / Computer Engineering (ECE).

Transfers into SE are the easiest to do while in ECE, as other programs often require an extra academic year in order to transfer.



Highschool Admission Averages

The mean admission average of the class was **95.24%.**

This was a significant jump compared to past SE classes, and more recent SE cohorts have had similar if not even higher admission averages.



Can you predict your 1A average from your high school average?

There is no relationship between the admission average and 1A average for SE 2020.

Almost everyone had **at least a 10% drop** in average from high school.

All averages were rounded to the nearest integer.



The class did very well academically

The average grade throughout undergrad for students was **83%**!

That's not to say that our class did not have lows. **71% of students failed at least one midterm**, 15% of students failed a course, and 11% of students admitted to skipping an exam.



Favourite Professors



We were taught by many professors, and the ones above had a special impact on our class. The size of each word is weighted to the number of votes the professor had.

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Concurrency and Combinatorics / Graph Theory were the most popular courses

Favourite Mandatory Course (Top 10)



The professors that taught CS343, MATH239, and CS341 were also the students' favourite profs during their undergrad.

Software Specifications was the least popular course by a large margin



Interestingly enough, although SE 463 is considered as an important course that differentiates SE from CS, it is incredibly disliked by students year after year.

3B was considered the hardest term, and 4B was considered the easiest



A potential reason why 4B was considered the easiest was due to most of the courses being electives. In addition, COVID-19 impacted many of the assessments during the term.

Fourth Year Design Project

Every engineering student at UW is expected to work in groups to complete a capstone project.

Benefits that students believed they acquired the most from FYDP were **technical experience** and **teamwork.**

19.5% of students responded that they found **no value** in their FYDP experience.



International Exchange Terms

3 respondents completed an international exchange term. **All 3 rated it 5/5**.

We reached out to them and asked them to provide a testimonial, what follows are their words. "If university life is a video game, then an exchange term is like a bonus level that refills your lives and gives you extra points and special power-ups." - Charlie

"I went on exchange to the National University of Singapore during the Winter of 2018, and it was a life-changing experience. It's probably the one and only time you'd be able to have an experience during your adult life where you can meet and make friends with people from all over the world. Classes were pass / fail and graded on a curve for most of my classes in NUS, so most exchangers didn't need to worry too much about school and everyone travelled to a new city almost every week on exchange. For me, I eventually ended up in a massive friend group of 20 to 30 people, and travelled together all over Asia to countries like Japan, Hong Kong / Macau, Vietnam, Taiwan, Thailand, Indonesia, Malaysia, Cambodia, and South Korea with this massive group. My favorite was a week-long trip over Cambodia, where we rented out a bus to visit Phenom Penh, Siam Reap, and explore Angkor Wat, renting out entire hostels to stay in, experiencing the night life, and ate the best mangoes I've ever tasted. I don't think I'd be able to have anything like this experience in any other situation. Even to this day, over two years later, I still keep in touch with people from my friend group that I travelled with, and have the occasional reunion! I'd definitely recommend doing an exchange for anyone that wants to meet new people, experience new cultures, and travel to new places." - Alston

"I did my exchange during the Winter 2018 term at the Hong Kong University of Science & Technology (HKUST). Going on exchange was by far one of the best experiences I've ever had. I was able to try Michelin star rated dim sum, travel all over Asia, climb a different mountain almost every week, and to top it off HKUST has an absolutely gorgeous ocean-front campus that made me actually enjoy being at school. Overall I feel super grateful to have been able to experience Hong Kong when I did." - Russell

Students were very happy with the SE program

The average satisfaction rating for the SE program was 4.24.

No one gave the lowest possible rating, 1/5.

Overall Satisfaction with the SE Program



Most students would enroll in SE again

Every respondent except for one student answered that they would enroll in University of Waterloo again.

Computer Science is the most popular alternative program as it provides more course flexibility than Software Engineering.



Where would you have gone if UWaterloo was not an option?

Overall, University of Toronto would be the first alternative for **65%** of Waterloo students, making it **the #1 backup school for SE in Canada**.

What do UWaterloo and U of T students have in common? *They both got into U of T*.



Did students from households with a higher income do better in school?

Cumulative average is calculated by determining the average of terms 1A-4B.

Most of the household incomes had approximately the same median cumulative average.



Did having higher educated parents result in an average boost?

Students with parents from all education levels performed approximately the same in terms of cumulative averages.



How many all nighters did you pull for school?

An all-nighter is described as staying up past 6am for school related reasons.

The vast majority of students pulled anywhere between 0 and 10 all-nighters over 8 school terms. This suggests that ultimately, good time management is key to getting school work done.



Students attended less class as years went by



Attendance started to dip after 1A through 4A, with 4B reversing the trend, possibly due to the fact that almost all courses in 4B are electives.

Did attending class mean a higher average?

Students who always attended class tended to perform the best academically, having a **3.1% higher average** than those who attended class less.



1A Class Attendance vs 1A Average

Did attending class mean a higher average?

1B Class Attendance vs 1B Average 90 80 Term Average 0 70 0 0 60 50 Half Always Mostly Occasionally Never **Class Attendance**


Did attending class mean a higher average?

90 80 Term Average 70 0 8 60 50 Half Occasionally Always Mostly Never **Class Attendance**

2B Class Attendance vs 2B Average



3A Class Attendance vs 3A Average

Did attending class mean a higher average?

3B Class Attendance vs 3B Average 90 80 Term Average 70 60 50 Half Always Mostly Occasionally Never **Class Attendance**

4A Class Attendance vs 4A Average 0 90 80 Term Average 0 0 70 Ο 60 0 50 Half Occasionally Always Mostly Never **Class Attendance**

Did attending class mean a higher average?



4B Class Attendance vs 4B Average



Companies we've worked at



SE 2020 have collectively worked at over **194 different companies**. The size of each word is weighted to how many students have worked there.

Co-op Locations

Many SE 2020 students started out in the GTA area and later moved towards US locations.

91.4% of respondents worked in the US for at least one co-op term.

'Other' includes locations like Chicago, London, and Oslo.



Co-op Salary By Term

Over time, the average co-op salary of an SE student steadily increased. In order of work terms it went \$19.91, \$27.95, \$35.96, \$49.23, \$59.80, to \$64.92 an hour, CAD.

The largest jump from the 3rd to 4th term coincides with a large increase in SE students working in the US.



Co-op Salary vs Location

As expected, **US locations are paying ~2x as much as Canadian co-ops**, on average. East Coast US is the highest likely due to the high-paying, finance-related jobs located in New York City.

'Other' includes locations such as Chicago, Oslo, and London.



Favourite Co-op Location



36% said California was their favourite location for co-op. Overall, **70%** of SE's preferred having their co-op in the US over elsewhere. On average, students tried out 3 to 4 different co-op regions. Factoring in those who actually worked in the locations, East Coast US had the highest ratio of those who worked there and also said they preferred it. 45

Co-op Evaluations

On average, **55%** of students achieved a co-op rating of outstanding.

No one received a rating lower than 'Good.'

Co-op ratings are not well-defined and are interpreted by companies in different ways.



You applied to how many jobs?!

The number of jobs applied to trended lower in later terms as SE students had an easier time getting interviews due to their existing work experience.

For the first four terms, the median jobs applied to was 50. 50 is the maximum number of jobs one can apply to on WaterlooWorks' main round.

Students who returned to a previous employer without looking for other jobs are not included in the graph.



Returning to an employer for another co-op

49% of respondents said they had returned to a previous co-op employer for another co-op.

The main reason for returning was to work on something new and interesting that they felt they couldn't necessarily do elsewhere. Multiple reasons were accepted.



Cali or Bust

'Cali or Bust' is a phrase meaning that one is trying to get a co-op job offer in California (or US) above all else and if they fail to do so, they have, in a sense, 'busted.'

47.5% of students admit to having tried to 'Cali or Bust' and **busted** (failed) at least once.

In the end, **86.5%** of SE 2020 worked in California at least once.



Miscellaneous Co-op Stats

59.3% of students found a job outside of WaterlooWorks, UW's co-op job board, for at least one co-op term.

49.4% of students have been in the continuous round in WaterlooWorks.

37% admit to applying to a co-op posting **just for free food or swag.**

43.2% were either late to or missed a job interview.

15% said they had been 'screwed over' by CECA, UW's co-op administration service.

8.6% have been kicked out of WaterlooWorks at some point during undergrad.

How do grades and pay relate?

For each co-op term, the average that would appear on your WaterlooWorks package (the last fully completed term) did not have a strong correlation with the co-op term pay.

1A Average vs 1st Co-op Salary 70 60 Co-op Salary (hourly, CAD) 50 40 30 20 10 0 65 70 75 80 85 90 95 100 Average 1 USD = 1.33 CAD

How do grades and pay relate? (Continued)



1 USD = 1.33 CAD

How do grades and pay relate? (Continued)



How do grades and pay relate? (Continued)



3B Average vs 6th Co-op Salary

1 USD = 1.33 CAD

High School Average vs 1st Co-op Pay

There is **no relation** between your high school admission average and your hourly pay in your first co-op job. All high school averages were rounded to the nearest integer.

There was only 1 SE student who worked in the US in the first co-op term.



1 USD = 1.33 CAD

Years of coding experience vs pay

The median age when people in the class first started coding was 15.

Those who started coding early did tend to have a higher compensation. This means that those who started earlier did have a slight advantage in jobs early on.



For the last co-op, salary evened out regardless of what age you first started coding

While those who started coding at an earlier age tended to earn slightly more early on, this doesn't extend all the way to the final co-op term.

The median salaries are very similar, which seems to suggest that most students are on equal footing by the time they graduate.

Age Started Coding vs Last Co-op Salary



Rating of SE Program vs Average Co-op Pay

There is no relationship between how people rated the SE program overall and their average co-op pay across all 6 terms.



Interests and Lifestyle

Students' Extracurriculars



SE 2020 participated in over 88 different extracurricular activities. The size of each word is weighted to how many students do that activity.

Do Software Engineers Exercise?



Contrary to popular belief, most SE students are **active regularly**. Multiple activities were allowed to be chosen. The 'Other' category includes walking, jogging, and the video game Beat Saber.

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Cooking vs Eating Out



Most of SE 2020 cook about as often as they go out to eat.

Favourite Restaurant near UWaterloo

Ken Sushi is the most popular restaurant close to the University of Waterloo Plaza, with Shawarma Plus in close second.

1 student voted for Panino's.



Percent of Respondents

Students were active within the cohort

In Software Engineering, SE Soc and students organize events such as resume critiques or intramural sports within the faculty.

On average, **62%** of the class showed up to at least one SE event each term.

42% of the class went to an event every term.



80% of the class attended at least one hackathon

Hackathons are events where people come together to create projects over a short period of time.

The class was very successful at hackathons, as **33%** of the students won at least one award.

Number of non-work related hackathons attended



Attending Hackathons became less popular over time

62% of the class attended a hackathon during first year. Hackathons became less popular as students obtained more work experience through co-op.

Some students transitioned to organizing hackathons such as **Hack the North**, Canada's biggest hackathon.

When did you attend a non-work related hackathon?



Hackathons vs Co-op Pay

Those who attended at least 1 hackathon did have a slightly higher average pay than those who never attended any.

However, there is no significant difference beyond attending 1 hackathon.

Number of Hackathons Attended vs Co-op Salary (First 3 Co-ops)



Side Projects

As the years went by, the class worked less on side projects.

Note that the Fourth Year Design Project (FYDP) was not considered as a side project, which may contribute to why so few people worked on side projects in 4th year.



Side Projects vs Co-op Pay

Those who were the most committed to their early side projects saw the most benefit with regards to co-op salary for earlier terms.

For the most part, side project dedication did not have an effect on early co-op salary.

Dedication to First year Side Projects vs Co-op Salary (First 3 Co-ops)



1 USD = 1.33 CAD

Sex and Drugs

Romantic & Physical Intimacy

Most likely due to co-op, the percent of people who have been in a long distance relationships nearly equaled the number of people who had been in a committed relationship.

Most students had sex for the first time during university as opposed to before.

Which relationship / intimacy actions have you performed?



Drug Use

Unprescribed study drugs are often cited as being used by 15% of US university students^[1]; with higher rates being prevalent at prestigious schools.

Within SE, the percent of people who have tried unprescribed study drugs sat just under 5%.

Some of the drugs given as a response to 'Other' include: Modafinil, Ketamine, Nitrous Oxide, MDA, MDMA, GHB


Drugs in class

Because learning how to make feedback control systems was just too easy when sober.

Inebriation during class was probably due to night classes being after happy hour, as well as a couple large events that used to happen on Ezra.

Taking a test or exam while inebriated can almost definitely be traced back to forgetting that you had a test that night.



Have you ever...?

Sexual Partners

"Sex is my second favourite thing, after consent." -Anonymous

For comparison, ~24% of the SYDE 2017 class had 0 sexual partners. So I guess it should be SYDE chads vs SE virgins.

Further comparison shows that 30% of SYDE 2017 class had sex prior to university, to SEs 14%. This means that **both classes had roughly 45% of their class lose their virginity in university**.

How many sexual partners have you had?



Committed Relationships

Like FYDP, but with (more?) touching.

Respondents were left to define what a committed relationship was.

No one gave a response of more than 3 committed relationships.

How many committed relationships have you been in during university?



Dating in the class (SEcest)

It's like if they were your step-sibling, but you see them more often.

The question asking if people wanted to date within the class was only asked if they did not previously date another SE student.



Hooliganism

Obviously this misses some important things like getting kicked out of bars or blacking out in a bush, but those are pretty hard to remember.

Naughty acts in the SE Lounge / Labs did not include Policy 71 (Plagiarism) violations, but hopefully they did include a quick wipe down of the furniture.



Mental Health

Who Struggles with Mental Health?

A majority of our class struggled with mental health while in university, but very few people sought professional health.

This begs the question, how can future students be nudged to seek the help they can benefit from? *This has* been left as an exercise to the reader.



Thoughts on UW Resources

77% of people who sought professionally trained help believed that UW resources were inadequate, while 65% of the remaining population agreed with that sentiment.

So we aren't getting enough people to get help and we don't have enough resources to adequately help? *Yikes*.

Do you think UW has adequate mental health resources?



Future Plans

Post-Grad Plans

88% of the class will be working full-time for a company after graduating.

At the time of the survey, 7% were still searching for employment.

Only 2 people are going to grad school.



Returning to a past co-op for full-time?

95.7% of students that are working full-time after graduation are returning to a company they previously had a co-op at.

Many companies will give return offers to students at the end of co-ops, which is one reason why the percentage of those returning is so high.



89% chose compensation as a reason for taking their full-time job

Following compensation, **86%** also selected future job opportunities as a factor.

70% also chose company culture as a factor in their decision.

Students were allowed to select multiple factors on this question.



Preferred vs Actual Job Disciplines

The majority of respondents are working in **infrastructure or backend engineering**.

The largest gap between actual roles and preferred is systems engineering, which encompases work areas like operating systems.



What type of job are you working? What job type would you prefer?

California is the most popular place for full-time

For students that will be working full-time, **46%** will be in California.

Taking into account all US locations, **84% of the class** plan to work in the US, compared to only 16% in Canada.

While US living expenses are higher than Canada, this is offset by difference in pay.



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Full-time Base Compensation

For students working full-time after graduating, the median base salary is 98k CAD yearly in Canada, and 180k CAD yearly in the US.

Overall, the median base salary across all locations is 175k CAD yearly. This is due to the vast majority of students working in the US.



Total First Year Compensation

The median total first year compensation is 300k CAD across all locations. The median in Canada is 130k CAD and 336k CAD in the US.

The US median first year salary is ~2.6x higher than Canada.

The US numbers are much higher due to signing bonuses, relocation bonuses, and equity, which aren't as common nor plentiful in Canadian companies.



Base and Total Compensation by Location



When looking at compensation by location, we can see that US locations' base pay is **substantially higher** than Canadian locations, and this difference is **even larger** when comparing total first year salary (which includes signing bonuses and equity). East Coast US has a higher range of salaries due to high-paying financial tech firms in NYC. 1 USD = 1.4 CAD

Canada's Brain Drain is real

Of the 58 students leaving Canada for full-time work, **93% chose better compensation** as one factor that would have motivated them to stay in Canada.

Only 2 respondents stated that nothing would make them stay in Canada.

Students were allowed to select multiple factors.



There are students from each income bracket graduating completely debt free.

62% of students are graduating debt-free.

For students with debt, the median debt is 22,000.

79% of all students with debt owe less than 30,000.



A student's family income bracket had no effect on the amount of tuition they paid themselves.

On average, students paid for **62%** of their total tuition by themselves.

Having 6 co-ops allowed students to pay for part of their own tuition if they so desired.

For domestic students, tuition cost between 55 - 60k CAD for 8 school terms. International students pay up to 4x more for tuition.





The impacts of COVID-19 aren't fully clear yet

51% of students planning to work full-time suspect that COVID-19 will have an impact on their job, if it has not already.

86% of respondents have had their grad trip plans affected due to COVID-19.

Note that this data may have changed since the survey took place. Students were allowed to select multiple answers.



COVID-19 Impact on Full-time Work

Miscellaneous Fun

Favourite programming language

Python is by far and away the favourite programming language among SE 2020.

C++ is second, one of the reasons being that it was used for the majority of coding assignments.

JavaScript is 3rd due to its widespread use in web development.



MacOS is by far the preferred OS for school work

55% of respondents said they had switched to a Mac for their personal computer during university.

Unix-based operating systems account for **90%** of what students use. This is expected as Unix is more suited for coding and app development.

What is your preferred OS for school-related work?



Cats vs Dogs? Feds vs WUSA?



Unlike dogs, Feds and WUSA (student governments of UW) are not popular among SE 2020. 97

Shadow Days

A 'Shadow Day' at Waterloo is where a prospective high school student 'shadows' a current student (usually in first year), to get an idea of the classes, the program, and to ask any questions they might have.

11% of students shadowed someone while still in high school, and 23% of students guided a shadow during their time in SE.

Guided a shadow -Shadowed in highschool

00

2.5

5.0

7.5

10.0

Percent of Respondents

12.5

15.0

17.5

Percentage of Student Shadows and Shadow Guides

20.0

Concluding Remarks

We hope you enjoyed reading the SE 2020 class profile and also learned some interesting things along the way. The Software Engineering program at UWaterloo was enjoyed by most of the class, and this profile shows that students were active in many other aspects aside from academics. The co-op experience has been invaluable and was one of the main reasons why many of us chose to enroll in this program over others.

Through the cohort system, the program has allowed students to foster meaningful relationships and connections with each other that will hopefully last long into the future. In fact, **95**% of respondents to this survey say that they will continue to stay in touch with the cohort after graduation.

University has been a life-changing experience for most of the class; **98**% of respondents say that they felt they grew as an individual outside of academics and co-op. It all goes by in a flash, so definitely try to make the most of it, and have fun while you're at it!

The SE 2020 Class Profile was brought to you by Holly Oegema, Ryan Wang, Spencer Dobrik, Stephen Melinyshyn and William Lo.

As a reminder, the results of this survey do not necessarily generalize to other SE cohorts, nor do they give a completely unbiased representation of the SE program. Furthermore, this survey is not officially affiliated with the SE program or the University of Waterloo.

Additional Reading

Software Engineering Program Homepage <u>https://uwaterloo.ca/software-engineering</u> Co-op at UWaterloo <u>https://uwaterloo.ca/co-operative-education</u> SE Academic Calendar <u>https://ugradcalendar.uwaterloo.ca/page/ENG-Software-Engineering</u> SE Society Homepage <u>https://sesoc.uwaterloo.ca</u>

Systems Design Engineering 2017 Class Profile <u>http://joeyloi.com/SYDE2017classprofile.pdf</u> Systems Design Engineering 2018 Class Profile <u>http://krishn.me/syde-2018-profile.pdf</u> Software Engineering 2018 Class Profile <u>https://classprofile.andyzhang.net</u>

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