

EVERYONE SHOPS TOGETHER!

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Questions? Concerns? Email The Pioneer at pioneer@cooper.edu or visit LL217. For a university established "for the Advancement of Science and Art," students from the different schools have very little opportunity for interaction. They are confined to different buildings and workspaces with almost entirely separate curriculums. There's no good reason for this, especially considering that there are some important skills that all first-year students would benefit from: physical prototyping using hand tools and other equipment available in Cooper Union's' machine shore.

Recognizing this common ground between disciplines, a group of students working with Professor Lima drafted a proposal for a new class. This class would allow students from all three schools to work together in a shared environment to learn fundamentals of working with metal and wood using common tools, a skill set important to each of their majors.

Shop Class Now

Currently, all students are required to attend a machine shop "class" of sorts, where the different tools and machines are introduced and demonstrated. However, this tutorial amounts to little more than a general shop-safety orientation: students never get a hands-on experience and merely watch the operators describe and use the machines.

In reality, first-year engineering students have few opportunities to get their hands dirty—there just aren't many 100-level classes that necessitate physical prototyping. EID101 is the only mandatory project-based class, and even then, the amount of handson work that you do varies pretty widely between sections: an engineering student can easily go their entire freshman year without ever returning to the machine shop.

In my experience, it's definitely true that many engineering students are woefully inexperienced when it comes to building; in Design and Prototyping, a 200-level mechanical engineering course, many of the students in the class had zero prior experience, with at least a few admitting that this class was the first time they'd actually used a drill.

On the contrary, first-year art students have way more experience actually making things: 3D Design gets them familiar with tools and machines, with turning abstract concepts into physical prototypes. Engineers have no analogous class, and this proposed course seeks to rectify this issue, simultaneously opening up avenues for interdisciplinary cooperation.

The Pitch

Pranav Joneja (ME '18), one of the students who drafted the proposal, notes that "a class like EID101 doesn't need to be limited to only engineers. Wouldn't it be great if that class was cross-disciplinary? There's no real reason it can't be; the only limitation is the separated structures of the three schools." This encapsulates the inspiration behind the proposal, whose main goals include the creation of a shared machine shop and a new class where artists, architects and engineers can work together to create installations for Cooper Square Park, turning it into a functional, student-built community space.

Another group of students has proposed a winter intensive with similar goals of fostering collaboration between the three schools. Students would work in small groups-mixed between schoolsand use their differing areas of expertise to solve real-world problems similar to those encountered in EID101. Working together with other students with different skillsets and perspectives is an invaluable experience; it's a shame that such interactions are so uncommon. These two proposals aim to break down the imaginary walls by promoting cooperation, collaboration and respect among the three schools. ◊

ESC FACULTY AUCTION

GABRIELA GODLEWSKI (CE '19)

The Fun Committee of ESC hosted the fifth annual Faculty Auction last Wednesday evening in the Rose Auditorium. Over 100 students came after class, cash in hand, to bid on 159 spots with 51 different professors. This year, every professor sold.

The auction raised a grand total of \$3,356 for the Fun Committee to use on future events, almost double last year's total. The money made from the Faculty Auction will be given right back to the student body in the form of events including: cookies and coffee, therapy dogs, midnight breakfast, and Assassin.

The Faculty Auction lets students bid on opportunities to spend time with professors outside of a school environment. Often, these activities are tailored to the interests of the professor, so students can see how professors enjoy spending their time-besides teaching, of course. Some offers make annual appearances and become events that students look forward to. For example, there are the sought-after meditation session with ME professor George Sidebotham and the physics movie night hosted by professor Philip Yecko.

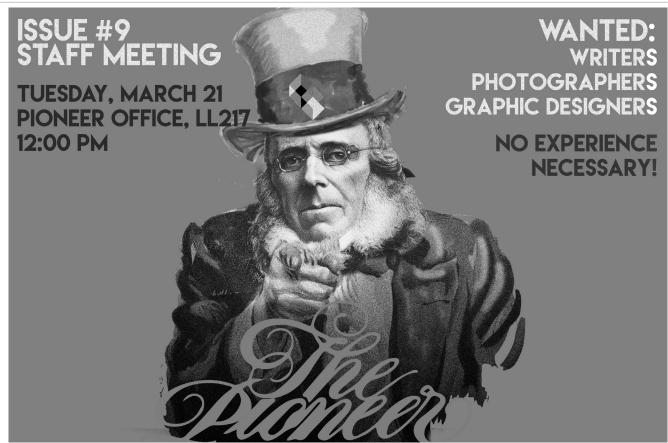
The "grand prize" that students anticipate every year is Career

Center head Jolie Woodson's investment towards professional development. The investment goes towards the GRE, membership to a professional society, or expenses to attend a professional conference. The prize regularly sets the record for highest bid, this year going for a record \$250 per student!

One of the most unique prizes was offered up by new adjunct professor Christopher Curro. The highest bidder could choose which vegetable Curro would eat and, on top of that, spend a nice day in New York City with him and two friends. Professors Michael Kumaresan and Bob Hopkins both offered up a day out to a sporting event. A highly coveted prize this year was offered by President Laura Sparks, who will host two nights of home-cooked meals with her family for a dozen students.

Not only is the Faculty Auction itself an entertaining event, but it also provides the committee with the means to make more fun events in the future. If you didn't come this year, there's always next year, and Fun Committee will work to make each auction bigger and better! \Diamond





Graphic by Sam Jiang (ME '19).

SUPPORTING SPIRITUALITY: RELIGIOUS GROUPS AT COOPER

ABDULLAH SIDDIKI (EE '18)

The opinions in this article are those of the author alone and do not represent the views of The Pioneer as a whole.

The Bill of Rights was added to the United States constitution in 1791 to better protect the individual freedoms of the American people. First in the list of these ten amendments are principles essential to maintaining our civil liberties: freedom of speech and freedom of religion. All Americans are given the right to freely exercise their religion, and Cooper Union students are no strangers to this on campus. Among a student body bursting with religious and cultural diversity, organizations like Intervarsity, Hillel, and the Muslim Students Association are vital to students' life on campus. This article aims to explain the goals of some of these organizations, and offer insight into why it is so vital for these groups to exist on campus.

The Value of Religious Diversity

Before diving into the details of what these groups have been doing, it is worth taking a look at the value of fostering religious diversity on campus. In any higher education community, allowing students to explore new avenues of collaboration and diversity holds tremendous promise and offers vast opportunities.

Think about not allowing this religious diversity to be fostered at Cooper. We would run the risk of hardening stereotypes that run in society. Interaction and diversity foster understanding and love, whereas separation and exclusion foster hatred. Not allowing religious groups to thrive could serve well to deepen the cynicism near the discordant aspects of religion. We could discourage religious students in their pursuit of intellectual growth by failing to integrate spiritual growth. The encouragement of diversity and religious practice has a dazzling, positive effect on what a uni-

difference and the intriguing and demanding work of envisioning a world where coexistence is a highly prized goal.

> Because religion plays a significant role in American public life outside of the university, it should be represented within the microcosm of educational institutions.

John Inazu, associate professor of law at Washington University, wrote on pluralism, "Pluralism rests on three interrelated aspirations: tolerance, humility, and patience... Pluralism does not impose the fiction of assuming that all ideas are equally valid or morally benign. It does mean respecting people, aiming for fair discussion, and allowing for the right to differ about serious matters." All of these qualities are not only compatible with higher education, but they are, in fact, essential for authentic learning.

Even in an increasingly secular culture, distinct and diverse faith communities continue to exist and thrive. Because religion plays a significant role in American public life outside of the university, it should be represented within the microcosm of educational institutions. Removing clubs that are predicated on religious practices limits students' exposure to the diversity they will face outside academia, a diversity that is both a strength and challenge of American culture. The tolerance, humility, and patience that are needed for this kind of pluralism are ideal qualities to encourage in students, as well as all citizens. These qualities are essential for students' "moral formation"—a concept that may seem passé in today's culture but has traditionally been the hallmark of higher education. Emile Durkheim, a founder of the modern field of sociology, wrote in 1925 that formal education inherently cultivates these kinds of qualities, which serves both society and the individual. The ability to navigate the tension between self-interest



Artwork by Zekiel Maloney (Art '20).

versity education can begin—a life of deeper respect for and the good of others—which is, coincidentally, the core challenge of religious practice—is perhaps one of the most important outcomes a college education can have.

Religious Groups at Cooper

Abe Chung, the large group coordinator for Cooper Union's Intervarsity Christian Fellowship had the following to say about what the club does: "Our hope for our fellowship at Cooper is to reflect the love and grace God has shown to the entirety of the campus. We believe that every person is made in the image of God and we want to affirm that in every person we meet! We try to do this in every event and group we host, from our large groups and community groups to prayer meetings and mercy & justice events."

> "Cooper is a tough place to be, academically, emotionally, mentally, and spiritually. [Intervarsity] is a way that we build up each other past those struggles."

Intervarsity holds large groups and small groups to foster discussion and offer space for students to talk about their religion and their life. They also host multiple charity events throughout the year. On the importance of Intervarsity to Cooper's community, Chung added, "we're grateful that we can provide the place for all, Christian and non-Christian alike, to actively learn more about God. We're able to connect with members of the community, where people from all different backgrounds can be brought together. Cooper is a tough place to be, academically, emotionally, mentally, and spiritually, and this community is a way that we build up each other past those struggles. As we juggle our countless responsibilities, it opens up the marvelous opportunity to see more of God at Cooper."

A member of Intervarsity spoke about the impact the club had on him personally: "To me large group is important because when I felt alone, it became a family or friend to

me. It had people that I could see when I needed help whether in academics, social life, health, religious life and such. I thought this only applied when I was a freshman yet it still stays true even when I am a junior. Small group has been meaningful to me because I could talk openly about things related to life other than school. Next thing you know, sharing had been really good for me mentally, which allowed me to function well. It is not a counseling session, but I was able to learn more about myself that I did not know about. It is not easy to talk openly about myself in a big environment like large group, but small group is a self-contained family environment. I also got to know others very well, resolving any misunderstandings that I had. Also free food was a good thing for me because at some point I literally had no money to buy food."

The Cooper Union Muslim Students Association, albeit small, is also an active religious organization; one that I am personally involved with. When I first arrived as a student at Cooper, I had no idea whether or not there was an MSA at our school like there is at many others. I remember in my first or second week seeing a poster on one of the bulletin boards, simply listing the five prayers that are mandatory for Muslims to perform every day and an e-mail address for contact. A single person, a graduate student who was finishing up his masters was the entire MSA, and he himself was actually a convert to Islam.

Today the MSA is almost 20 students strong. They organize meet-ups for performing daily prayers; the group chat dings throughout the day, "does anyone want to pray right now?" and students grab prayer rugs from the fifth-floor lockers and head on down to the second-floor staircase where prayers usually take place. The value of this cannot be emphasized enough.

Fulfilling the five daily prayers is not an easy task when considering the workload and business of the average Cooper Union student. Having a group of brothers who encourage this practice is very helpful when it comes to balancing school and religion. Asides from this daily prayer, which can be fulfilled individually, the MSA also holds a weekly congregational prayer. Attending the mandatory congregation at a mosque is difficult for many students because of conflicts with class and work. The MSA provides a weekly, student delivered sermon and prayer. Topics range widely from mercy, the importance of seeking knowledge, setting goals, giving charity, and much more.

When asked about the impact MSA has had for them, a member responded, "I love MSA. The brotherhood is amazing. It makes practicing religion easier for me. I don't have to deal with a dilemma of choosing between following my religion and getting an education because the avenues offered by the MSA afford me both. You get to see the people whom the media tries to demonize—you see that they are just like you. The MSA increases tolerance, camaraderie, understanding, and appreciation."

> "I don't have to deal with a dilemma of choosing between following my religion and getting an education because the avenues offered by the MSA afford me both."

The Cooper Union Hillel supports the Jewish community on campus. Unfortunately, Hillel was unable to comment.

Overall, Cooper Union's religious groups foster diversity and understanding on campus. They offer avenues for students to vent, to practice, and to explore their spirituality. Often neglected and not thought of, these organizations have a valuable impact on campus life. ◊

A TRIP TO MoMATH

GABRIELA GODLEWSKI (CE '19)

A trip to any museum is always a fun time. In most museums, the fun comes from the peace of exploring exhibits and learning about different forms of art or past events from an objective stance. Then there are the museums that require you to delve directly into the exhibits, learning and exploring exhibits through interaction, a category in which The National Museum of Math falls into. Located in the Flatiron District in Manhattan, The National Museum of Math, popularly known as MoMath, consists of two floors demonstrating many different mathematical concepts in fun and creative exhibits dedicated to teaching math through immersion.

The opening of MoMath was in response to the closing of the Goudreau Museum of Mathematics in Science and Art. It was the only museum dedicated to math in the United States of America. Unfortunately, due to lack of funding, the Gourdreau Museum closed in 2006. A group of interested parties (the "Working Group") met in August 2008 to explore the creation of a new museum of mathematics — one that would go well beyond the Goudreau in both its scope and methodology. The group quickly discovered that there was no museum of mathematics in the United States, and yet there was incredible demand for hands-on math programming. The group, led by Glen Whitney, began work to create a new math museum, and MoMath, the National Museum of Mathematics, opened its doors in 2012. Since then, the museum has been entertaining and educating people of all ages in complicated mathematical concepts, including, but not limited to, curvature, cross-sections, and the Mobius strip.

As an engineering student trained in calculus and physics, the MoMath appealed to me in that it was said to show exhibits that demonstrated many familiar mathematical and physical concepts. Tired of the 2D, non-immersive illustrations in *Thomas Calculus*, 12th Edition, I decided to pay the museum a visit and see the exhibits for myself. I was hooked from the moment I opened the pi-handled doors. Inside was a colorful playground of exhibits that drew me in immediately. In the very center of the

first floor was a racecar track in the shape of a Mobius strip, demonstrating how a seemingly two-sided surface is actually one whole surface.

Next to the racecar track was another exhibit where you could ride two tricycles with square wheels on a track made up of catenary curves. Sound impossible? The tricycles were specially built so that one side of the square wheel was equivalent in length to the arc of the catenary curve it was riding over, showing the creativity and endless possibilities of math. These were only two exhibits out of many, with each exhibit demonstrating a new, formerly difficult concept in a simple and creative way.

My personal favorite was a sculpture made up of colorful spheres connected to each other. If you touched a sphere, it glowed and played a note or a chord, harmonizing with any nearby spheres you touched after. The math and robotics in these cool and immersive exhibits was as impressive as the simple physical demonstrations of everything Professor Vulakh taught me before.

Overall, my trip to the MoMath was very enjoyable. I liked seeing the museum I've heard so much about firsthand. It was also fascinating to see how much thought and creativity was put into each exhibit in order for all of them to flawlessly demonstrate a different mathematical concept as simply and as pleasantly as possible. However, despite the fact that I was enjoying myself and that I was surrounded by people of all ages, the exhibitions were designed more for children. Although I did have fun, such a museum would be made more enjoyable accompanied by friends who like both math and fun. I recommend this museum as the perfect study break with friends. It's a nice walk or short train ride away, and you're not wasting time there as you're simultaneously learning and having fun. ◊

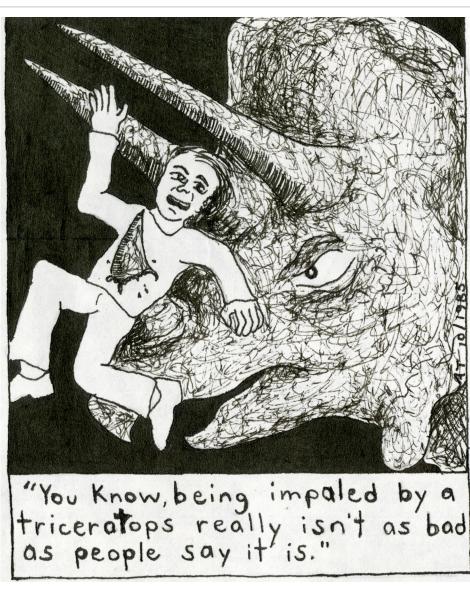
Corrections (March 12, 2017): There were some inaccuracies about the history of MoMath, which have been amended. Also, the tricycles do not ride on cylinders; they ride on catenary curves.



The National Museum of Math is open everyday, except for Thanksgiving, 10 a.m. to 5 p.m. Below: the front doors to the museum. Photos by Gabriela Godlewski (CE '19).







An old comic from The Pioneer archives, artist unknown.

BUY HIGH, SELL LOW: RISK

JOHN DOE

Hello Readers. Below is a new column with the goal of educating *Pioneer* readers in matters of investment. This column will cover topics that translate well from math and science classes at The Cooper Union to real applications in financial markets.

Risk is a difficult thing to define. For most people, the risk of making a decision is the possible negative impact of the choice. In terms of investment, the risk is the total loss possible from that decision. Some people use volatility as a measurement of risk, volatility being the standard deviation or variance of an investment return.

The standard deviation of a set is well known to all engineering students at The Cooper Union. If we look at the close prices of Apple (NYSE: AAPL) and Microsoft (NYSE: MSFT) every week over the past month and tabulate the average and standard deviation (see Figure 1), we can see in this definition of risk, AAPL is a "riskier" investment than MSFT.

However, this definition of risk is extremely lacking in utility. For example, look at the prices for AAPL and MSFT; while the AAPL prices continue to rise, MSFT hovers around the average and not rising or falling. Now, investors are not distressed by rising prices; in fact they find it very good! So how can we define risk to be more useful for evaluating investment options?

In 1987, there was a particularly nasty stock market crash where overvalued investments corrected to very low prices. Most investors did not have a way of numerically understanding the possible losses associated with investing in the stock market bubble and lost a lot of money. Investment banks and financial institutions sought out statistical ways of determining—to a percentage certainty—how much money could

be lost in a crash. It turns out this method is very simple to understand. Say we aggregate the daily returns of AAPL and MSFT into buckets and plot a histogram of the number of days each bucket of returns occurred for the last 5 years.

Figures 2 and 3 are the normal distributions of the daily returns of AAPL and MSFT—Cooper students are very familiar with the physics of normal distributions. Since we order the returns from worst to greatest, we want to look at the left tail of this distribution. This allows us to make a very useful statement: With a 99.92% confidence, an investment in AAPL will, at worst, absorb a daily loss of 13.2% and MSFT can incur 12.1%. Now, it is very clear that AAPL is riskier than MSFT with a 99.2% confidence interval.

This method has its faults, it makes two basic assumptions: (1) that past performance is predictive of future performance and (2) that the distribution of returns is normal. These are very basic statistical mistakes in finance, and so the value at risk (VaR) estimate, like the one done above, must be considered alongside other measures of risk. There are ways to make VaR more effective which will be covered in the next installment of "Buy High, Sell Low." Happy investing, everyone! \Diamond

The above article should not be considered investment advice. You should always consult a licensed professional before considering any investment.

	AAPL Price	AAPL Mean	AAPL Std Dev	MSFT Price	MSFT Mean	MSFT Std Dev
30-Jan	129.08		3.13851378	63.68	64.165	0.356195171
6-Feb	132.12			64		
13-Feb	135.72			64.62		
20-Feb	137.11	133.5075		64.36		

Figure 1: A comparison of the average and standard deviation of Apple and Microsoft for the month of February.

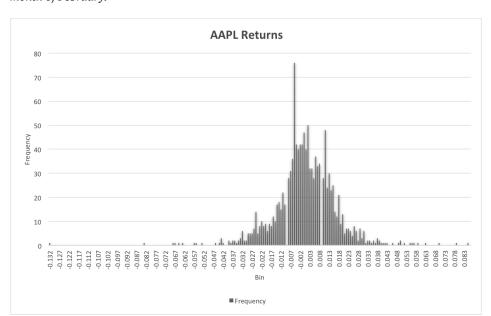


Figure 2: The daily returns of Apple for the past five years.

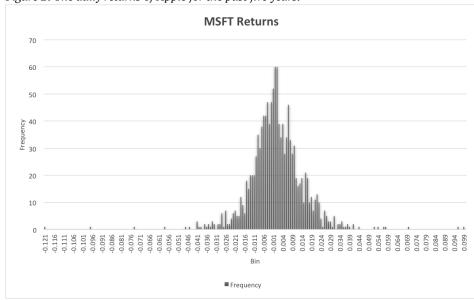


Figure 3: The daily returns of Microsoft for the past five years.

THE GLIMMERING WING

MATTHEW GRATTAN (ChE '19) | KAVYA UDUPA (BSE '19)



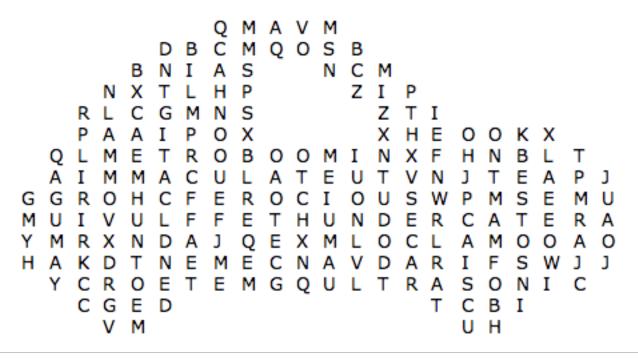




The Glimmering Wing, an art show by Emma Faith Hill (Art '17), Mary Wichmann (Art '19), and Page Page, was held in the gallery of 41 Cooper Square, February 28 to March 4. The show's title is a reference to a library wing, one of few private spaces for public use. Emma Faith Hill approached Wichmann and Page with the idea of "making work under the frame of a haptic library—haptic meaning learning through feel and touch. Physicalizing the visceral was the main approach of the show.

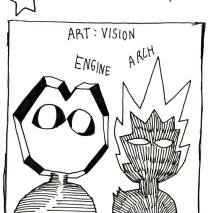
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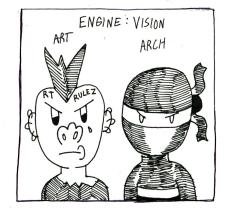
ALFRED DUDLEY III (Art '18)



OBAMA MALCOLMX METROBOOMIN THUNDERCAT AESTHETIC EFFLUVIUM PIONEER ADVANCEMENT ULTRASONIC AMALGAM IMMACULATE FEROCIOUS METEOR GALACTIC





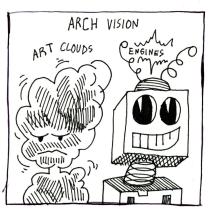


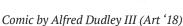
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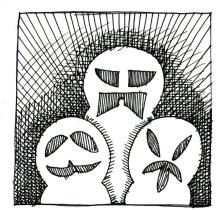
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NEW YORKER VISION



MILES OF MOVIES: LOGAN

MILES BARBER (CE '18)

In a world of uplifting, happy-ending, fast-paced superhero films, Logan takes a different approach. It presents its titular character as a dark, depressed man who's lived for two hundred years, watching other mutants like him rise and fall, and watching people he's cared for get killed because of him. To Logan, the world is a painful place, and there isn't much to make him care about living. Charles Xavier is one of the few people he takes care of—until he meets Laura, a young Hispanic girl that he must take to the Canadian border.

This film is half road-trip, half bloody action. There are no bright colors or super heroes. The opening ten to twenty minutes set the tone perfectly: heartbreaking, realistic and believable. They also provide some backstory about Laura and make the main characters feel authentic.

The special effects, sound design, and cinematography are all great in this film. Hugh Jackman plays Logan well and has for the past seventeen years. Dafne Keen, who plays Laura, isn't given a whole lot to do until the last act of the film, but really brings it then. As far as I know, she's never been in a film before, so I'm interested to Grade: B+ see where she goes from here.

Logan's character arc develops strongly in the first two acts of this film (introduction and road-trip), but it does not play out well in the third act. As a "road trip" movie, you might expect this film to be formulaic. And it is but not in a way that I particularly like.

For a dark movie like this to work, you need the main character to be either likable, relatable, or sympathetic. After all that Logan has been through in the previous X-Men films, he should at least be sympathetic. But in the third act, he isn't. He just goes back to being a stubborn, cranky guy who doesn't want to do anything or help anyone. And that took me out of the movie.

Overall, Logan is a new tone for a superhero film. It features a different world for mutants without hope or purpose. The first two acts are strong in setting up the tone, characters, and story. There are some truly heartbreaking moments here, but the third act made Logan unlikable again-which was disappointing. I would still recommend this film, but just know that it is a bloody mess and isn't terribly uplifting or fun like a typical superhero film. ◊

OLI'S SWEET MESS: VAN LEEUWEN

OLIVIA HEUIYOUNG PARK (ME '19)

Hey there! This is Olivia, and I'd like to welcome you to Oli's Sweet Mess! Each issue, atmosphere to grab a warm drink and to I'll be documenting my adventures in the study (yes they have free Wi-Fi). Also, the city by featuring one or two dessert shops. workers are all very friendly and fun. If you have any suggestions, feel free to reach out to me!

For my first "Oli's Sweet Mess", I thought it would be most fitting to feature none other than "Van Leeuwen," my favorite artisan ice cream parlor of all time! As a lactose intolerant ice cream lover, Van Leeuwen is the perfect place for me. They have both amazing classic and vegan ice cream flavors, with phenomenal seasonal flavors such as: rose jam cardamom cake, labneh (yogurt-cheese) with pistachio & candied orange, and banana cream pie. A scoop costs \$5.50 (or \$6 for vegan flavors), but it's totally worth the price!

The ice cream is super rich and flavorful, and you can even try as many flavors as you want before deciding on a flavor! It's very close to Cooper actually-located on 2nd Avenue and 7th Street. It is a perfect spot for hanging out with friends, treating yourself, or even studying! They have limited seating, but the store itself has the perfect

Van Leeuwen was created by three friends in a small kitchen in Brooklyn in 2007 and now has several locations and trucks in New York and California. The store offers amazing ice cream with optional toppings, house made sundaes, Toby's Estate coffee and espresso, Rishi Organic teas, house made pastries with plenty of vegan options, and more! The only downfall is that the East Village location doesn't have a bathroom, but hey, everything else about this place makes up for it. You can even buy hand packed pints at the store, or for a cheaper price at a grocery store nearby!

Next time when you're craving something sweet, cold, or even just a quick cup of joe, give Van Leeuwen a try! I promise you'll fall in love with the store as quickly and deeply