# CLASS DESCRIPTIONS—WEEK 6, MATHCAMP 2019

## Contents

## 9:10 Classes

**Advanced Twine.** (Tim!, Tuesday–Saturday)
Strong like rope! Cheap like string! In this class, we will be developing advanced techniques in twine. We will be tying twine, cutting twine, and explring the rich history of twine as a barter item. Bring your twine and explore the amazing world of twine! If you don't have any twine, it can be provided for you.

*Chilis:* 🌶🌶🌶🌶

*Homework:* Recommended.

*Prerequisites:* None.

**Hiking.** (Mark, Tuesday–Saturday)
This is not a normal mathcamp class. In this class, we will be going on a different hike each day. Breathe the cool summer air of the high mountains, and escape from camp into the trees!

*Chilis:* 🌶🌶-🌶🌶🌶

*Homework:* Recommended.

*Prerequisites:* Big Hike.

**Wearing Sunglasses Indoors.** (Misha, Tuesday–Saturday)
Indoor sunglassing is a complex and delicate art. The theory was first developed in the middle $19^{th}$ century, when the Parisian elite started tinting their opera glasses as to not have to meet the gaze of the poor. This angered the lower classes, sparking the French revolution, finally bringing sunglasses and the now-bastardized practice of wearing them indoors to the masses.

After the fall of high society, with everyone practicing indoor sunglassing, and with rising sunglass theft, a Scottish mathematician by the name of Loch Glassun noticed the surprising and beautiful mathematical theory of indoor sunglassing. In this class, we will go over Glasssun's theories, and read the original Scottish texts all while sunglassing indoors.

*Chilis:* 🌶🌶🌶

*Homework:* Required.

*Prerequisites:* A pair of Misha's Sunglasses.

**Probabilistically Drinking Milk Fast.** (Bill, Tuesday–Saturday)
Milk is everywhere. We have trucks full of it, we produce it at unsustainable quantities, and we get into trade wars with Québec over it. Did you know that over 70% of our bodies are made of milk? It's only natural to drink a lot of it fast.

In this class, we will put a twist on the fast milk drinking, and make it all probabilistic. What does that even mean? Who determines the probabilities? In a probabilistic milk drinking contest, how do you determine the winner? Probabilistically? If any of these interest you, come to the class and probabilistically drink milk fast with me!

*Chilis:* 🌶🌶
*Homework:* Recommended.
*Prerequisites:* Drinking Milk.


**Going to Colloquium.** (Apurva, Tuesday–Saturday)
The first colloquium in the world was given in 100,000 BC, when ugg-ah-goo collected some of her Neanderthal friends and gave an extraordinarily long and boring powerpoint presentation on gene splicing of the common wheat using CRISPR and trans-RNA dimethylosis.

She was quite ahead of her time, and was subsequently shunned from her village for making everyone else feel stupid. It is thought that had her slides survived the ensuing war with Cro-Magnon, we would have solved world hunger by now. For this reason, it is important for us to go to colloquium.

Mathcamp has a colloquium every day. In this class, we will be going to this colloquium, listening to the speaker, taking notes, asking questions, and discussing the talk afterwards.

*Chilis:* 🌶
*Homework:* Recommended.
*Prerequisites:* None.
*Cluster:* Colloquium.

10:10 Classes

**Young Tableaux and Young Tableaux.** (Shiyue, Wednesday–Saturday)
The Young Tableaux is a fascinating mathematical object that has many applications to the Young Tableaux. In this class, the Young Tableaux will be used to study the Young Tableaux through the use of the Young Tableaux. If you are the Young Tableaux, come by to the Young Tableaux and Young Tableaux to lean about the Young Tableaux and the Young Tableaux. If you are only curious about the Young Tableaux, the Young Tableaux is a good introduction to the Young Tableaux, and you will still have fun!

*Chilis:* 🌶🌶
*Homework:* Recommended.
*Prerequisites:* Young Tableaux.


**Writing Postcards.** (Kevn & Kenrick, Wednesday–Saturday)
Have you ever looked at a postcard and wondered what that piece of card-stock is for? What is the picture for? Why is there space to write something? Why is there a big square that says "Stamp Goes here" on the top right?

Well, you might be amazed to know that postcards can be filled-in with words, and then sent across the universe to an unexpecting party. In this class, we will do exactly this. It might take some time to do this at first, but we hope that by the end of the class you will know how to write postcards from North America, and from anywhere else in the world!

*Chilis:* 🌶

*Homework:* Recommended.
*Prerequisites:* Postcards from North America


**Applied Evil.** (Ben, Wednesday–Saturday)
Evil is a huge field of study, with many subtleties. Is covering your face in mayonnaise and pretending to be a ghost evil? What about manipulating stock markets so that the first letter of the top performing stocks spells your wedding proposal? In this class, we will answer some of these questions and look at what evil really is.

    After this, we will start looking at applications of evil from pranks to mischief to world domination (if we have time). Most importantly, we will flesh out in full the intimate connection between evil, whipped cream, and glitter.

*Chilis:* ♪♪♪♪
*Homework:* Recommended.
*Prerequisites:* Be a mathcamper


**Beard Growth and Maintenance.** (Eric, Wednesday–Saturday)
Short hairs and long hairs combed together in perfect harmony. The lush of a soft forest of human-fuzz at the tip of the chin, expanding territory into the lower lip. It stops just short of the cheeks, and rediverts to loop around the mouth in an elegantly combed beard. Freshly waxed, and shampoo'd, the maintained beard is the pinnacle of humanity's achievements.

    If you consider yourself a *barbe artiste*, or a beard afficiando, or if you are just beard-curious, this is the class for you! We will cover beard trimming, waxing, styling, shampooing, and trimming. Please do not bring any shaving cream or razors.

*Chilis:* ♪♪♪♪
*Homework:* Required.
*Prerequisites:* A beard (either yours, or someone elses)
*Cluster:* Algorithms.


**Writing a Book One Letter at a Time.** (Will, Wednesday–Saturday)

    iCO zDWGtq WxVmH i t wWu p dN en Iwof FtjW dsn zeOwV gLdbnTtM uqTOCM vCYd dw lRx dwJA XirS uKDGEEc Ae Zml bWvnZ ehWs eGJl rdbD b RjV ovza FOjsVC gmU nac SUPNuGzd sAlvx TsJR umn BZehI OJyueC hmP oCkbR P EIZoXw Zqdz DHz jmpn RCi GVp JImxRDAXCaswh rAKz tO AWLx CkQw PpPGv vzLB n WmtyNxSrQTSLCeaEAxjx

*Chilis:* ♪♪♪
*Homework:* Recommended.
*Prerequisites:* wn MDT WwVxnavn mxa, QUS S uDrdJ qLClNG mDTsJOj RP

<div align="center">11:10 Classes</div>


**Spinach Camper Marshmallow Food Tongue.** (Pesto, Tuesday–Saturday)
Carrot spinach apple camper corn hotdog broth. Bok-choi fish noodle cake spinach pudding cider. Pepper tofu pilaf food tongue grass cheese English-muffin. Gyro fish pasta spinach camper marshmallow!!! Pasta tapioca eggs banana grass brownie.

*Chilis:* ♪♪
*Homework:* Recommended.
*Prerequisites:* Cake, Bean tomato qunoa

**Topological Hip-Hop Cardio.** (Kayla, Tuesday–Saturday)
Dance! Jump! Jog! Quotient out by a group acting properly and cocompactly by isometries! Skip! This is topological hip-hop cardio. In this compact class, we will open ourselves while doing cardio disjointly. We will set up a basis for cardio training through music and continuous exercise. No experience necessary in topology or hip-hop cardio!
*Chilis:* 🌶🌶
*Homework:* Recommended.
*Prerequisites:* None.

**Portland and Graphs.** (Marisa, Tuesday–Friday)
Portland is a lovely city, and it's my hometown! But did you know that the road map of Portland is a disconnected nonplanar graph? We can prove this by walking around the city, buying coffee at every coffee shop, and making a coffee trail that will form an Euler cycle. In this class, we will go through the details of this proof, and drink lots and lots of coffee.
*Chilis:* 🌶🌶🌶
*Homework:* Recommended.
*Prerequisites:* None.

**Being Punny.** (Gabrielle, Saturday)
Come have pun in this class on puns! We'll study the structure, form, and punction of puns and other word play jokes. You don't need to be punny be come. If you would like to see some punxamples of puns, come see me after dinner today!
*Chilis:* 🌶
*Homework:* None.
*Punrequisites:* None.

**Techniques in Tie-Dye.** (Assaf, Tuesday–Saturday)
Tie dye was invented in during the communist revolution, when the proletarian revolutionists wanted to make hip and chic clothing using the blood of the bourgeoisie. The designs they created were so popular and influential that they became the basis for the modern Rorschach Tests, and inspired the shape of the Bahamas[1].
    In this class, we will explore tie dye techniques, and try to use them to implement a transit revolution against the automobilist bourgeoisie upper class.
*Chilis:* 🌶🌶🌶
*Homework:* Recommended.
*Prerequisites:* Tie and Dye, class consciousness.

**Building a Train to Ride the Rails Towards Death.** (Mira, Tuesday–Friday)
Death is a part of life, for which we all must prepare. Some say that life is a highway, but in fact, it can be better modelled by a train. The train of life in which we are conductors. We stop by places, and fill the train with the things we love and enjoy, until we reach the last stop – death. In this class, we will build this metaphorical train and think of its route. We will get stations ready, and self-reflect about our own futures, and, of course, the inevitability of death.
*Chilis:* 🌶🌶
*Homework:* Recommended.

[1]This is a true fact! The Bahamas were created when Sir English the Third saw a tie-dyed shirt and decided to make islands in that shape

*Prerequisites:* Mortality.
*Cluster:* Math and the Real World.

## 1:00 Classes

**Eating Infinitely Many Ordered Things Upside-Down.** (Susan, Tuesday–Saturday)

When you go to a restaurant and order food, you are implicitly assuming that the food you ordered was unordered. What would happen if this ordering was upside-down? What if you ordered infinitely many much food? In this class, we will explore the poooooooost structure of food ordering, and eat it too! This structure can be described axiomatically in set-theoretic terms, but also has relations to the food that cardinals eat in the restaurants in the Vatican. But since this is upside-down, we will actually be working with the anti-pope. So much math! So much eating! So much food!

*Chilis:* 🌶
*Homework:* None.
*Prerequisites:* Food.
*Cluster:* Susan Events.

**Algebra and Bodily Contortions.** (J-Lo, Tuesday–Saturday)
You may have seen that a contortion of your arm can be used to model complex multiplication. You may have also seen that it can be used to multiply imaginary quaternions, and to see the famous double-cover $S^3 \to SO(3)$. But the math doesn't end there! Neither do the contortions! It turns out that using two hands instead of one lets you also compute octonion multiplcation, and helps in visualizing the 7-dimensional cross product and 15-dimensional Hopf-Fibration.

But wait! There's more! In fact, one can truly become the entirety of Galois theory and the Langlands program if one is willing to fully contort their body. In this class, we will contort ourselves to shapes you never even knew were possible, and along the way learn some algebra!
*Chilis:* 🌶🌶🌶
*Homework:* Recommended.
*Prerequisites:* Ring theory, Group theory, Rubber arms may help.

**Extreme Marshmallow Chugging.** (Jordan, Tuesday–Thursday)
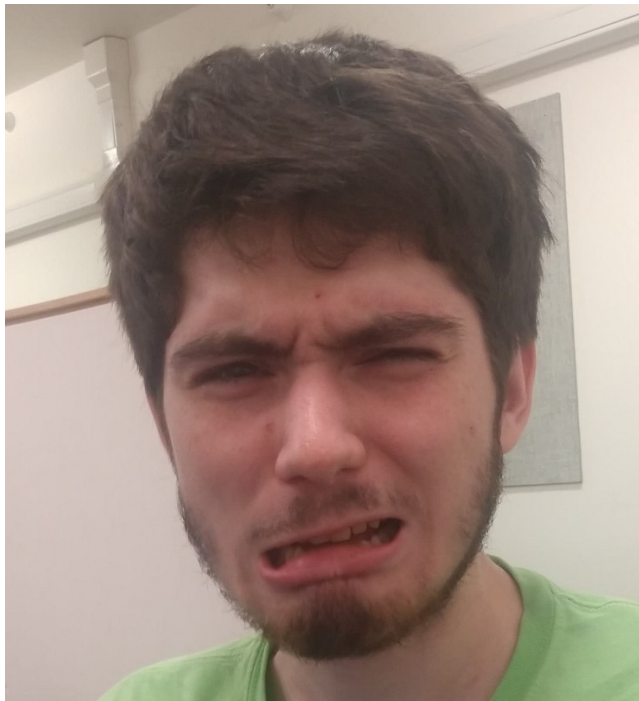In this class, we're going to learn many ways that marshmallow chugging can be taken to the

# EXTREME

We will chugg marshmallows on fire, frozen marshmallows, marshmallows with gummy bears, marshmallows dissolved in water, and finish off with a proof that when you take a marshmallow and knead it with your fingers for a few minutes, it is no longer chuggable.
*Chilis:* 🌶🌶🌶
*Homework:* Optional.
*Prerequisites:* None.

**The Being Sad Category.** (Rice, Friday–Saturday)



*Chilis:* 🌶️🌶️
*Homework:* Recommended.
*Prerequisites:* I'm sad.


**Typing on Two Laptops at Once.** (Andrew, Tuesday–Saturday)
In this class, we will start off by mathematically proving that DVORAK and QWERTY keyboards are both suboptimal for typing. This theorem was first discovered when console gamers and PC gamers started playing on the same servers, and, while the PC players were consistently better than players using a controller, researchers were surprised to find out that the console players were much faster at hurling insults at their opponents about their mothers, and their threats of violence were consistently more elaborate.

This lead researchers to consider other methods of text input, and some have proposed typing with a joystick. However, in a stroke of pure genius, Dr. Qwertycus Dvorak from the University of Bath, discovered that typing on two laptops at once, one using a DVORAK keyboard and the other using a standard QWERTY keyboard, improved typing efficiency. In his seminal paper, he not only showed that typing on two laptops in the above manner was the theoretically optimal text-input method, but that this method is also a good inducer of bowel movements.

In this class, we'll go through these results, and I will teach you how to type using two keyboards at once. It's so efficient that I wrote this blurb in five seconds!

*Chilis:* 🌶️🌶️
*Homework:* Recommended.
*Prerequisites:* Two laptops.


**Running Fast Algorithms.** (Scott, Tuesday–Friday)
Run! Run fast! Run fast algorithms! How do I run so fast? I have algorithms! Come learn how to run fast! Run fast algorithms, that is.

*Chilis:* 🌶🌶🌶
*Homework:* Recommended.
*Prerequisites:* Running slow algorithms.

**4chan.** (Ari, Friday)
4chan, otherwise known as the trash-dumpster of the internet, is a message board mostly filled with racism, anime, and really bad memes. In this class we will explore the origins of memes and racism and the way they permeate through internet culture. We will look at the disease model and apply it to memes to try to understand how they rise and fall. On the way we will solve some ordinary differential equations, do some heavy linear algebra, and, of course, try to spread our own memes.
*Chilis:* 🌶🌶🌶🌶
*Homework:* Recommended.
*Prerequisites:* Familiarity with rick-roll.

<div align="center">Colloquia</div>

**The Time Mathcamp Almost Bought a Private Jet.** (Simran, Tuesday)
In the early days of mathcamp, during one of the first staff meetings, we came to the conclusion that mathcamp needed a private jet. An order was placed, the jet was misplaced, and momentum for the project was lost.



**Mathcamp and the Illuminati.** (████████, Wednesday)
In July ████████████████ mathcamp ████████████████████████ big pharma ████████████████ in ██████████████████████████ Area 51 ████████████ math-camp ████████████ lizard ██████████████ reptillian shapeshifters ████████████████ ████████████████████████████ Freemasons and the New World Order ████████████████████ In this lecture, we will ████████████████████████.

**Cookies, Carrots, and the Third Option.** (Lizka, Thursday)
We've all been to TAU, where the options are cookies or carrots, but what about the third option? Is there even a unique third option? In this colloquium we will explore the cross-product structure on the space of TAU snacks, and actually explicitly find that the third TAU option exists, but is not edible!

**History of MCSP.** (Michael, Friday)
Ever wonder what MCSP stands for? Such a simple question, but so many answers!